15 PROSPECT STREET

15 Prospect Street, 326 Front Street

320-322 Front Street and Vacant Lot on Sands Street

STATEN ISLAND, NEW YORK

Remedial Action Work Plan

NYC VCP Project Number: 16CVCP071R
OER Project Number: 16EH-N081R

Prepared For:
Blue Star Front Street, LLC
1357 Hugenot
Avenue, Staten Island, NY 10312 (718) 689-9998
bluestarsi@aol.com

Prepared By:
Airtek Environmental Corp.
39-37 29th Street
Long Island City, New York 11101
(718) 937-3720
cchen@airtekenv.com

June 2016

REMEDIAL ACTION WORK PLAN
TABLE OF CONTENTS

FIGURES

APPENDICES

LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AS/SVE	Air Sparging/Soil Vapor Extraction
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
C&D	Construction and Demolition
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CHASP	Construction Health and Safety Plan
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering Controls and Institutional Controls
ELAP	Environmental Laboratory Accreditation Program
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations Emergency Response
IRM	Interim Remedial Measure
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYS DEC	New York State Department of Environmental Conservation
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYC OER	New York City Office of Environmental Remediation
NYC VCP	New York City Voluntary Cleanup Program
NYCRR	New York Codes Rules and Regulations
NYS DEC	New York State Department of Environmental Conservation

NYS DEC DER	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
ORC	Oxygen-Release Compound
OSHA	United States Occupational Health and Safety Administration
PCBs	Polychlorinated Biphenyls
PE	Professional Engineer
PID	Photo Ionization Detector
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan or Plan
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI	Remedial Investigation
RMZ	Residual Management Zone
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SSDS	Sub-Slab Depressurization System
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
USGS	United States Geological Survey
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VOC	Volatile Organic Compound

CERTIFICATION

I, Ravi Korlipara, am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for designing the remedial program for the 15 Prospect Street at 15 Prospect Street, 326 Front Street, 320-322 Front Street and Vacant Lot on Sands Street site in the Stapleton Waterfront section of Staten Island, New York (NYC OER Project Number: 16EH-N081R, VCP site number: 16CVCP071R). I certify to the following:

- I have reviewed this document and the Stipulation List, to which my signature and seal are affixed.
- Engineering Controls developed for this remedial action were designed by me or a person under my direct supervision and designed to achieve the goals established in this Remedial Action Work Plan for this site.
- The Engineering Controls to be constructed during this remedial action are accurately reflected in the text and drawings of the Remedial Action Work Plan and are of sufficient detail to enable proper construction.
- This Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-Site will be in accordance with all applicable City, State and Federal laws and requirements. This RAWP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

Ravi Korlipara
Name

070038
PE License Number


Signature

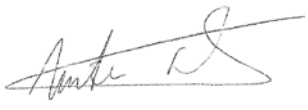
PE Stamp

6/27/16
Date

I, Mike Zouak, am a qualified Environmental Professional. I will have primary direct responsibility for implementation of the remedial program for the 15 Prospect Street at 15 Prospect Street, 326 Front Street, 320-322 Front Street and Vacant Lot on Sands Street site in the Stapleton Waterfront section of Staten Island, New York (NYC OER Project Number: 16EH-N081R, VCP site number: 16CVCP071R). I certify to the following:

- This Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-Site will be in accordance with all applicable City, State and Federal laws and requirements. This RAWP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

Mike Zouak
QEP Name


QEP Signature

4/20/16
Date

EXECUTIVE SUMMARY

Blue Star Front Street, LLC is working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program to investigate and remediate a 23,292-square foot site located at 15 Prospect Street, 326 Front Street, 320-322 Front Street, and Vacant Lot on Sands Street in the Stapleton Waterfront section of Staten Island, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

Site Location and Background

The Site is located at 15 Prospect Street, 326 Front Street, 320-322 Front Street, and a vacant lot on Sands Street in the Stapleton Waterfront section in Staten Island, New York and is identified as Block 490 and Lots 24, 26, 37 and 45 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 23,292-square feet and is bounded by Sands Street (not an open street), a one-story car wash shop and a fenced yard to the north, Prospect Street, a one-story warehouse for tiles and a storage yard to the south, Front Street and a residential building under construction to the east, and an elevated MTA Staten Island Railway Line to the west. A map of the Site boundary is shown in Figure 2. Currently, the Site is used for an industrial repair and machine shop and has been occupied by ACME Industrial Inc. for about 35 years. The Site is improved with two (2) one-story commercial buildings at 15 Prospect Street (Lot 45) and 326 Front Street (Lot 37), a storage shed on the south portion of Lot 24, a trailer office along the east boundary of Lot 26, a two-story storage trailer along the north boundary of Lot 26, and another one-story storage trailer on the northwest corner of Lot 37. The rest of the property is used as a storage yard/parking lot.

Summary of Redevelopment Plan

The proposed future use of the Site will consist of a new five-story mixed-use building. The building has no basement or cellar level. The ground floor will contain some commercial/office

spaces and open ground floor with partially covered parking, with additional open surface parking. Total parking capacity will be 46 cars with some (12) contemplated on lifts. The upper four floors will be used for residential use and consist of approximately 68 units. There will be little islands (9' and 6'-11" wide) on each side of the rows of parking (as shown on the site plan) that will be newly planted trees and ground cover. It is expected that the new building's structure will be supported on pilings, which will be driven to a depth, where the bearing capacity/friction is sufficient to support the same. There will be poured reinforced concrete pile caps at a depth of minimum four (4) feet with concrete walls/piers brought from the top of the pile caps to the surface. The limited excavation will be backfilled and a reinforced slab on grade poured under the entire first floor building footprint. The balance of the Site will be paved. There might be tree wells, as required by the zoning. There will be no open/grassed areas on the site that will be used for anything other than new parking areas. Layout of the proposed site development is presented in Figure 3 and Appendix 1. The current zoning designation is C4-2A, Commercial District. The proposed use is consistent with existing zoning for the property.

Summary of Surrounding Property

The area surrounding the Site consists of mixed commercial, industrial and residential properties, each zoned primarily for commercial use as C4-2 or C4-2A. The uses and features of adjacent properties are described below.

North:	Sands Street, a one-story car wash shop and a fenced yard.
East:	Front Street and a residential building under construction.
South:	Prospect Street, a one-story warehouse for tiles and a storage yard.
West:	Elevated MTA Staten Island Railway Line.

There are no sensitive receptors, such as schools, hospitals, and day care facilities, located within a 250 to 500-foot radius. Figure 2 shows the surrounding land usage.

Summary of Past Site Uses and Areas of Concern

A Phase I ESA report for the Site was prepared by Airtek Environmental Corp. (Airtek) on August 25, 2015. The Phase I ESA identified the following on-site and primary off-site recognized environmental conditions (RECs):

- All four lots at the Site are E-Designation sites, designated as E-168 (Effective Date: 10/25/2006), which are subject to Underground Gasoline Storage Tanks Testing Protocol and Window Wall Attenuation & Alternate Ventilation.
- The Site is listed as an inactive NY SWF/LF (State Solid Waste Facilities/Landfill Sites) site, and as NY RGA LF (Recovered Government Archive Solid Waste Facilities List) site between 2004 and 2012. In addition, ACME Repair, Inc. at 328 Front Street at the Site is listed in the RCRA NonGen /NLR and FINDS (Resource Conservation and Recovery Act Non-Generators/No Longer Regulated and Facility Index System/Facility Registry System) databases. One of the four records received by EPA and dated April 25, 1995 listed the facility as a large quantity generator for generating ignitable waste.
- Review of the fire insurance map dated 1937 depicted a garage facility at 8 and 10 Prospect Street, the south adjacent properties. Fire insurance maps dated 1937, 1950 and 1962 depicted a gasoline tank labeled as *G.T.* along the north boundary of these properties on Prospect Street. Fire insurance map dated 1962 depicted a machine shop at 308 Front Street, the north adjacent property. Fire insurance map dated 1977 depicted the north adjacent property as an auto repair shop. In addition, fire insurance maps dating from 1981 through 2007 depicted an auto repair shop at 14 Prospect Street, a south adjacent property.
- Review of the city directories revealed a motive parts facility, a maintenance/repair shop, Bay St. Collision Works, and AAA Auto Diesel Repair at 308 Front Street, the north adjacent property, between 1960 and 2013.
- (14) E-Designation sites are located within one-eighth of a mile of the Site. Three of these E-Designation sites are located on the adjacent properties, including 308 Front Street (Block 489, Lot 25), north adjacent property; 12 and 14 Prospect Street (Block 491, Lots 32 and 29), south adjacent properties. These three lots are all designated as E-168, which are also subject to Hazardous Underground Gasoline Storage Tanks Testing Protocol and Window Wall Attenuation & Alternate Ventilation.
- The north adjacent property at 308 Front Street is listed as a US Historical Auto Stations site.

Summary of Work Performed under the Remedial Investigation

1. Installed nine (9) soil borings, SB-1through SB-9, at the Site. Collected (19) soil samples, S-1s, S-1d through S-9s, S-9d, from the nine soil borings and a duplicate sample, S-10, from soil boring SB-9.
2. Installed five (5) temporary groundwater monitoring wells, MW-1 through MW-5, which were converted from five (5) of the nine (9) soil borings. Collected six (6) groundwater samples, W-1 through W-5, from the five groundwater monitoring wells, and a duplicate sample, W-6, from monitoring well MW-4.
3. Installed seven (7) soil gas monitoring implants, SG-1 through SG-7, at the Site. Collected four (4) soil vapor samples, SV-1 through SV-4, from SG-1 through SG-4, and three (3) sub-slab soil vapor samples, SV-5 through SV-7, from SG-5 through SG-7. Sampled concurrently with the three (3) sub-slab soil vapor samples, two (2) indoor air samples, V-1 and V-2, from the two onsite buildings, and one (1) ambient air sample, V-3, in front of the building at 326 Front Street on Lot 37, were also collected at the Site.

Summary of Findings of Remedial Investigation

1. Elevation of the property ranges from 14 to 16 feet.
2. Depth to groundwater ranges from 5.87 to 6.92 feet at the Site.
3. Groundwater flow is generally from west to east beneath the Site.
4. Depth to bedrock is approximately over 12 feet at the Site.
5. The stratigraphy of the site, from the surface down, consists of historic fill from zero to 1.5 feet (concrete fragments and urban fill material). The fill layer is underlain by natural soil to variable depths ranging from 1.5 to 12 feet (i.e. coarse to fine dark grey or brown sand, sandy clay or silty clay).
6. Soil/fill sample results were compared to New York State Department of Environmental Conservation (NYSDEC) Unrestricted Use Soil Cleanup Objectives and Restricted Residential Use Soil Cleanup Objectives (SCOs) as presented in 6NYCRR Part 375-6.8. Soil/fill samples showed no PCBs at detectable concentrations. One VOC (Acetone) ranging from 0.079 mg/kg to 0.12 mg/kg was detected in four deep samples at concentrations above their Track 1 Unrestricted Use SCOs. Seven (7) SVOCs, all PAH compounds, were detected in five shallow samples and two deep samples at concentrations above their Track 1 Unrestricted Use SCOs and Track 2 Restricted

Residential SCOs. They include: benzo(a)anthracene (max of 6.4 mg/kg), benzo(a)pyrene (max of 6.3 mg/kg), benzo(b)fluoranthene (max of 4.8 mg/kg), benzo(k)fluoranthene (4.4 mg/kg), chrysene (max of 7.8 mg/kg), dibenz(a,h)anthracene (max of 0.99 mg/kg), and Indeno(1,2,3-cd)pyrene (max of 4.1 mg/kg). However, detection limits for some of the SVOCs were greater than NYSDEC SCOs in one sample (S-6d) due to the limitations of the instruments used by the lab. Nine metals were detected above their respective Track 1 Unrestricted Use SCOs. They include: arsenic (max of 28.1 mg/kg) in five shallow and three deep samples, barium (max of 547 mg/kg) in three shallow and one deep samples, cadmium (max of 3.46 mg/kg) in one shallow and two deep samples, chromium (max of 76.7 mg/kg) in three shallow and three deep samples, copper (max of 1,070 mg/kg) in all samples except for one deep sample, lead in all samples except for one deep sample (max of 2,450 mg/kg), mercury (max of 11.2 mg/kg) in all samples except for one deep sample, nickel (max of 366 mg/kg) all samples except for one shallow sample, and zinc (max of 1,290 mg/kg) in all samples except for two deep samples. These metals, except cadmium, chromium and zinc, were also above Track 2 Restricted Residential SCOs. However, detection limit for mercury was greater than NYSDEC SCOs in one sample (S-5d) due to the limitations of the instruments used by the lab. Three pesticides including: 4,4'-DDE (0.050 mg/kg), 4,4'-DDT (0.14 mg/kg), and Dieldrin (0.02 mg/kg), were detected in one shallow sample at concentrations above their Track 1 Unrestricted Use SCOs. However, detection limits for some of pesticides were greater than NYSDEC Track 1 Unrestricted Use SCOs, because some of the pesticides required dilution due to a large amount of petroleum material present in the samples. Three hotspot areas at locations 1D, 5D and 8D are identified for elevated lead and mercury. Overall, the findings were consistent with observations for other historic fill sites in NYC and during the RI.

7. Groundwater sample results were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater samples showed no VOCs, PCBs or Pesticides at detectable concentrations. However, detection limits for some of the VOCs and one pesticide were greater than their GQSs due to the limitations of the instruments used by the lab. Six (6) SVOCs, all PAH compounds, were detected in four samples above their NYSDEC GQS. They include: benzo(a)anthracene (max of 0.38

µg/L), benzo(a)pyrene (max of 0.43 µg/L, benzo(b)fluoranthene (max of 0.38 µg/L), benzo(k)fluoranthene (0.33 µg/L), chrysene (max of 0.39 µg/L), and Indeno(1,2,3-cd)pyrene (max of 0.3 µg/L). Several metals were identified, but only iron, manganese and sodium exceeded their GQSs in dissolved groundwater samples.

8. Soil vapor samples collected during the RI were compared to the compounds listed by the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006. Soil vapor samples showed a variety of low concentrations of petroleum related hydrocarbons including BTEX and associated compounds. Total BTEX were detected at a maximum concentration of 34.33 $\mu g/m^3$. Highest concentrations were detected for hexane (max. of 12,000 $\mu g/m^3$). Chlorinated VOCs including 1,1,1-Trichloroethane (TCA) in four samples at concentrations ranging from 1.98 $\mu g/m^3$ to 66.5 $\mu g/m^3$; Tetrachloroethene (PCE) in all seven samples at concentrations ranging from 1.1 $\mu g/m^3$ to 1,670 $\mu g/m^3$; Trichloroethene (TCE) in three samples ranging from 0.62 $\mu g/m^3$ to 2.08 $\mu g/m^3$; and Carbon Tetrachloride in one sample at a concentration of 326 $\mu g/m^3$. Concentrations of PCE and carbon tetrachloride are above the monitoring level ranges established within the NYSDOH soil vapor guidance matrix and require mitigation.
9. Indoor air and ambient air sample results indicated low concentrations of VOCs. Most compounds were detected at less than 25 $\mu g/m^3$. Five (5) VOCs were detected in the indoor air samples above the monitoring level range established within the NYS DOH soil vapor guidance matrix. They include: Acetone (93.5 $\mu g/m^3$ in V-1 and 247 $\mu g/m^3$ in V-2), Ethanol (333 $\mu g/m^3$ in V-1 and 1,580 $\mu g/m^3$ in V-2), total Xylenes (5.86 $\mu g/m^3$ in V-1 and 111.9 $\mu g/m^3$ in V-2), Toluene (77.6 $\mu g/m^3$ in V-2), and Trichloroethene (TCE) (1.66 $\mu g/m^3$ in V-1 and 0.84 $\mu g/m^3$ in V-2).

Summary of the Remedial Action

The preferred remedy for the site is Alternative 2, a Track 4 site specific cleanup remedy. The Alternative 2 remedy will remove all soil/fill exceeding Track 4 Site Specific Use SCOs throughout the Site, which will be confirmed with post-excavation sampling. Engineering Controls are required for a Track 4 Site Specific cleanup. A concrete slab and waterproofing/vapor barrier membrane covering the entire first floor building footprint would be installed, and the rest of site will be paved. Additional soil vapor management would include an

active SSDS to address soil vapor contamination. Use restrictions will be imposed on the site and the Site would continue to be encumbered with an E-designation for hazardous material. The proposed remedial action achieves protection of public health and the environment for the intended use of the property. The proposed remedial action achieves all of the remedial action objectives established for the project and addresses applicable standards, criterion, and guidance; is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants; is cost effective and implementable; and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establishment of Track 4 Site-specific Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Completion of a Waste Characterization Study prior to or during excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).
6. Excavation and removal of soil/fill exceeding Track 4 Site Specific SCOs.
   The entire footprint of the Site will be excavated to a depth of approximately 2 feet below grade for development purposes. A small portion of property will be excavated to the depths of 8 feet below grade for hotspot areas into the groundwater table and 4 feet below grade for piling pits. Three additional hotspot areas identified (1D, 5D and 8D) will be excavated to meet SCOs. Approximately 2,658+ tons of soil/fill will be removed from the Site and properly disposed at an appropriately licensed or permitted facility.
7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.

8. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
9. Removal of all UST's that are encountered during soil/fill removal actions. Registration of tanks and reporting of any petroleum spills associated with UST's and appropriate closure of these petroleum spills in compliance with applicable local, State and Federal laws and regulations.
10. Transportation and off-Site disposal of all soil/fill material at licensed or permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
11. Collection and analysis of 9 post-excavation end-point samples and hotspot end-point samples to determine the performance of the remedy with respect to attainment of SCOs. All samples will be analyzed for SVOCs and Metals only.
12. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
13. Construction of an engineered composite cover consisting of a reinforced, poured slab on grade. The foundation pilings terminate at top in poured reinforced concrete pile caps at a depth of four (4) feet with concrete walls/piers brought from the top of the pile caps to the surface. The limited excavation will be backfilled and a reinforced slab on grade poured. The balance of the Site will be paved. There might be tree wells, as required by the zoning. There will be no open/grassed areas on the site that will be used for anything other than new parking areas.
14. Installation of a vapor barrier system consisting of vapor barrier beneath the building slab and outside of sub-grade foundation sidewalls to mitigate soil vapor migration into the building. Because of a closely spaced pilings/pile caps foundation system (please see Foundation Plan), which would require numerous penetrations to a liner resulting in a need to effectively seal the numerous openings, in our experience, a polyethylene type barrier would be less optimum from a constructability and sealing perspective. Therefore, products that can integrally bond to poured concrete, and can be installed with greater efficiency and ease, will be chosen for this project.

Specifically, the vapor barrier system will consist of W.R. Grace & Company's PREPRUFE 300R membrane for horizontal applications (46 mil thickness) below the slab throughout the full building first floor footprint area, and PREPRUFE 160R membrane for vertical applications (32 mil thickness) outside all sub-grade foundation sidewalls, and associated ancillaries (tapes, sealants, etc.) which are part of their barrier system, required for proper installation and sealing. All welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration. The selected PREPRUFE products 300R and 160R both have permeance to water vapor transmission of 0.01 perms; due to this low permeance, these waterproofing membrane products also function as vapor barriers. The vapor barrier and waterproofing system is an Engineering Control for the remedial action. The remedial engineer will certify in the RAR that the vapor barrier system was designed and properly installed to mitigate soil vapor migration into the building. Approved equals may be used for the waterproofing and vapor barrier membranes.

15. Installation of an active sub-slab depressurization system (SSDS) consisting of a network of horizontal piping underneath the slab of the building set within an engineered gas permeable layer immediately beneath the building slab and vapor barrier system. The horizontal subsurface piping will consist of 4-inch, Schedule 40 PVC pipe, with approximately 28 sq. in. (approximately 18.6%) slotted opening area (or equivalent perforated open area), wrapped in a 6-oz/SY geotextile intended to prevent migration of fines into the piping, as well as to provide it with physical protection. The manifolded subsurface piping will be connected to a 4-inch steel riser pipe that penetrates the slab and travels through or on the side of the building (depending on building plans) to the roof, where it will terminate a minimum 3-feet above the highest point, or at a height that would be based on building air flow considerations (e.g., minimizing cavity effects, distance to intake locations, etc.), whichever is more restrictive. The gas permeable layer will consistent of a minimum 6-inch thick layer of minimum 1/2-inch Blue stone on all sides of piping. Please note that the engineering specifications mentioned above are preliminary and will be finalized during the detailed design phase after final building plans are available. The active SSDS is an Engineering Control for the remedial action. A 122 cfm centrifugal

duct fan (Fantech Model FR100, supplied by Grainger) is proposed for installation. This is equivalent to approximately five to six air changes per hour (5-6 ACH) of subsurface vapors from the 6" bedding zone from under the entire footprint of the building on the first floor. The remedial engineer will certify in the RAR that the active SSDS was designed and properly installed to establish a vacuum in the gas permeable layer and a negative (decreasing outward) pressure gradient across the building slab to prevent vapor migration into the building.

16. Construction and operation of a grade-level parking garage with high volume air exchange in conformance with NYC Building Code to be done as part of building construction plans. Part of the ground floor of the building will contain a parking garage and will mediate any potential accumulation of soil vapors inside the building.
17. Performance of all activities required for the remedial action, including acquisition of required permits and attainment of pretreatment requirements, in compliance with applicable laws and regulations.
18. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
19. Submission of a RAR that describes the remedial activities certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site.
20. Submission of an approved Site Management Plan (SMP) in the Remedial Action Plan (RAR) for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
21. The property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual

contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

COMMUNITY PROTECTION STATEMENT

The NYC Office of Environmental Remediation (OER) provides governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan ("cleanup plan") describes the findings of prior environmental studies, shows the location of identified contamination at the site, and describes the plans to clean up the site to protect public health and the environment.

This cleanup plan provides a very high level of protection for neighboring communities and also includes many other elements that address common community concerns, such as community air monitoring, odor, dust and noise controls, hours of operation, good housekeeping and cleanliness, truck management and routing, and opportunities for community participation. The purpose of this Community Protection Statement is to explain these community protection measures in non-technical language to simplify community review.

Project Information:

- Site Name: 15 Prospect Street
- Site Address: 15 Prospect Street, 326 Front Street, 320-322 Front Street, and Vacant Lot on Sands Street in the Stapleton Waterfront section of Staten Island, New York
- NYC Voluntary Cleanup Program Project Number: 16CVCP071R

Project Contacts:

- OER Project Manager: William Wong, 212-788-8841/212-341-0659
- Site Project Manager: Mike Zouak/Christine Chen, 718-937-3720
- Site Safety Officer: Christine Chen, 718-937-3720
- Online Document Repository: http://www.nyc.gov/html/oer/html/document-repository/document-repository.shtml

Remedial Investigation and Cleanup Plan: Under the oversight of the NYC OER, a thorough study of this property (called a remedial investigation) has been performed to identify

past property usage, to sample and test soils, groundwater and soil vapor, and to identify contaminant sources present on the property. The cleanup plan has been designed to address all contaminant sources that have been identified during the study of this property.

Identification of Sensitive Land Uses: Prior to selecting a cleanup, the neighborhood was evaluated to identify sensitive land uses nearby, such as schools, day care facilities, hospitals and residential areas. The cleanup program was then tailored to address the special conditions of this community.

Qualitative Human Health Exposure Assessment: An important part of the cleanup planning for the Site is a study to find all of the ways that people might come in contact with contaminants at the Site now or in the future. This study is called a Qualitative Human Health Exposure Assessment (QHHEA). A QHHEA was performed for this project. This assessment has considered all known contamination at the Site and evaluated the potential for people to come in contact with this contamination. All identified public exposures will be addressed under this cleanup plan.

Health and Safety Plan: This cleanup plan includes a Construction Health and Safety Plan (CHASP) that is designed to protect community residents and on-Site workers. The elements of this RAWP are in compliance with applicable safety requirements of the United States Occupational Safety and Health Administration (OSHA). This RAWP includes many protective elements including those discussed below.

Site Safety Coordinator: This project has a designated Site safety coordinator to implement the CHASP. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is identified at the beginning of this Community Protection Statement.

Worker Training: Workers participating in cleanup of contaminated material on this project are required to be trained in a 40-hour hazardous waste operators training course and to take

annual refresher training. This pertains to workers performing specific tasks including removing contaminated material and installing cleanup systems in contaminated areas.

Community Air Monitoring Plan: Community air monitoring will be performed during this cleanup project to ensure that the community is properly protected from contaminants, dust and odors. Air samples will be tested in accordance with a detailed plan called the Community Air Monitoring Plan or CAMP. Results will be regularly reported to the NYC Office of Environmental Remediation. This cleanup plan also has a plan to address any unforeseen problems that might occur during the cleanup (called a 'Contingency Plan').

Odor, Dust and Noise Control: This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and include steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with applicable NYC noise control standards. If you observe problems in these areas, please contact the onsite Project Manager or NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document.

Quality Assurance: This cleanup plan requires that evidence be provided to illustrate that all cleanup work required under the plan has been completed properly. This evidence will be summarized in the final report, called the Remedial Action Report. This report will be submitted to the NYC Office of Environmental Remediation and will be thoroughly reviewed.

Stormwater Management: To limit the potential for soil erosion and discharge, this cleanup plan has provisions for stormwater management. The main elements of the stormwater management include physical barriers such as tarp covers and erosion fencing, and a program for frequent inspection.

Hours of Operation: The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. For this cleanup project, the hours of operation will conform to requirements of the NYC Department of Buildings.

Signage: While the cleanup is in progress, a placard will be prominently posted at the main entrance of the property with a laminated project Fact Sheet that states that the project is in the NYC Voluntary Cleanup Program and provides project contact names and numbers, and a link to the document repository where project documents can be viewed.

Complaint Management: The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager or the NYC Office of Environmental Remediation Project Manager listed on the first page of this Community Protection Statement document, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

Utility Mark-outs: To promote safety during excavation in this cleanup, the contractor is required to first identify all utilities and must perform all excavation and construction work in compliance with NYC Department of Buildings regulations.

Soil and Liquid Disposal: All soil and liquid material removed from the Site as part of the cleanup will be transported and disposed of in accordance with all applicable City, State and Federal regulations, and required permits will be obtained.

Soil Chemical Testing and Screening: All excavations will be supervised by a trained and properly qualified environmental professional. In addition to extensive sampling and chemical testing of soils on the Site, excavated soil will be screened continuously using hand-held instruments, by sight, and by smell to ensure proper material handling and management, and community protection.

Stockpile Management: Soil stockpiles will be kept covered with tarps to prevent dust, odor and erosion. Stockpiles will be frequently inspected. Damaged tarp covers will be promptly replaced. Stockpiles will be protected with silt fences. Hay bales will be used, as needed, to protect storm water catch basins and other discharge points.

Trucks and Covers: Loaded trucks leaving the Site will be covered in compliance with applicable laws and regulations to prevent dust and odor. Trucks will be properly recorded in logs and records and placarded in compliance with applicable City, State and Federal laws, including those of the New York State Department of Transportation. If loads contain wet material that can leak, truck liners will be used. All transport of materials will be performed by licensed truckers and in compliance with applicable laws and regulations.

Imported Material: All fill materials proposed to be brought onto the Site will comply with rules outlined in this cleanup plan and will be inspected and approved by a qualified worker located on the Site. Waste materials will not be brought onto the Site. Trucks entering the Site with imported clean materials will be covered in compliance with applicable laws and regulations.

Equipment Decontamination: All equipment used for cleanup work will be inspected and washed, if needed, before it leaves the Site. Trucks will be cleaned at a truck inspection station on the property before leaving the Site.

Housekeeping: Locations where trucks enter or leave the Site will be inspected every day and cleaned regularly to ensure that they are free of dirt and other materials from the Site.

Truck Routing: Truck routes have been selected to: (a) limit transport through residential areas and past sensitive nearby properties; (b) maximize use of city-mapped truck routes; (c) limit total distance to major highways; (d) promote safety in entry to highways; (e) promote overall safety in trucking; and (f) minimize off-Site line-ups (queuing) of trucks entering the

property. Operators of loaded trucks leaving the Site will be instructed not to stop or idle in the local neighborhood.

Final Report: The results of all cleanup work will be fully documented in a final report (called the Remedial Action Report) that will be available for public review online. A link to the online document repository and the public library with Internet access nearest the Site are listed on the first page of this Community Protection Statement document

Long-Term Site Management: If long-term protection is needed after the cleanup is complete, the property owner will be required to comply with an ongoing Site Management Plan that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are defined either in the property's deed or established through a city environmental designation registered with the Department of Buildings. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

REMEDIAL ACTION WORK PLAN

1.0 Project Background

Blue Star Front Street, LLC is working with the NYC Office of Environmental Remediation (OER) in the New York City Voluntary Cleanup Program and/or in the "E" Designation Program to investigate and remediate a property located at 15 Prospect Street, 326 Front Street, 320-322 Front Street, and Vacant Lot on Sands Street in the Stapleton Waterfront section of Staten Island, New York (the "Site"). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, and complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 Site Location and Background

The Site is located at 15 Prospect Street, 326 Front Street, 320-322 Front Street, and a vacant lot on Sands Street in the Stapleton Waterfront section in Staten Island, New York and is identified as Block 490 and Lots 24, 26, 37 and 45 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 23,292-square feet and is bounded by Sands Street (not an open street), a one-story car wash shop and a fenced yard to the north, Prospect Street, a one-story warehouse for tiles and a storage yard to the south, Front Street and a residential building under construction to the east, and an elevated MTA Staten Island Railway Line to the west. A map of the Site boundary is shown in Figure 2. Currently, the Site is used for an industrial repair and machine shop and has been occupied by ACME Industrial Inc. for about 35 years. The Site is improved with two (2) one-story commercial buildings at 15 Prospect Street (Lot 45) and 326 Front Street (Lot 37), a storage shed on the south portion of Lot 24, a trailer office along the east boundary of Lot 26, a two-story storage trailer along the north boundary of Lot 26, and another one-story storage trailer on the northwest corner of Lot 37. The rest of the property is used as a storage yard/parking lot.

1.2 Redevelopment Plan

The proposed future use of the Site will consist of a new five-story mixed-use building. The building has no basement or cellar level. The ground floor will contain some commercial/office spaces and open ground floor with partially covered parking, with additional open surface parking. Total parking capacity will be 43 cars with some contemplated on lifts. The upper four floors will be used for residential use and consist of approximately 60 units. There will be little islands (9' and 6'-11" wide) on each side of the rows of parking (as shown on the site plan) that will be newly planted trees and ground cover. It is expected that the new building's structure will be supported on pilings, which will be driven to a depth, where the bearing capacity/friction is sufficient to support the same. There will be poured reinforced concrete pile caps at a depth of four (4) feet with concrete walls/piers brought from the top of the pile caps to the surface. The limited excavation will be backfilled and a reinforced slab on grade poured. The balance of the Site will be paved. There might be tree wells, as required by the zoning. There will be no open/grassed areas on the site that will be used for anything other than new parking areas. Layout of the proposed site development is presented in Figure 3. The current zoning designation is C4-2A, Commercial District. The proposed use is consistent with existing zoning for the property.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan.

1.3 Description of Surrounding Property

The area surrounding the Site consists of mixed commercial, industrial and residential properties, each zoned primarily for commercial use as C4-2 or C4-2A. The uses and features of adjacent properties are described below.

North:	Sands Street, a one-story car wash shop and a fenced yard.
East:	Front Street and a residential building under construction.
South:	Prospect Street, a one-story warehouse for tiles and a storage yard.
West:	Elevated MTA Staten Island Railway Line.

There are no sensitive receptors, such as schools, hospitals, and day care facilities, located within a 250 to 500-foot radius.

Figure 2 shows the surrounding land usage.

1.4 Summary of Past Site Uses and Areas of Concern

A Phase I ESA report for the Site was prepared by Airtek Environmental Corp. (Airtek) on August 25, 2015. The Phase I ESA identified the following on-site and primary off-site recognized environmental conditions (RECs):

- All four lots at the Site are E-Designation sites, designated as E-168 (Effective Date: 10/25/2006), which are subject to Underground Gasoline Storage Tanks Testing Protocol and Window Wall Attenuation & Alternate Ventilation.
- The Site is listed as an inactive NY SWF/LF (State Solid Waste Facilities/Landfill Sites) site, and as NY RGA LF (Recovered Government Archive Solid Waste Facilities List) site between 2004 and 2012. In addition, ACME Repair, Inc. at 328 Front Street at the Site is listed in the RCRA NonGen /NLR and FINDS (Resource Conservation and Recovery Act Non-Generators/No Longer Regulated and Facility Index System/Facility Registry System) databases. One of the four records received by EPA and dated April 25, 1995 listed the facility as a large quantity generator for generating ignitable waste.
- Review of the fire insurance map dated 1937 depicted a garage facility at 8 and 10 Prospect Street, the south adjacent properties. Fire insurance maps dated 1937, 1950 and 1962 depicted a gasoline tank labeled as *G.T.* along the north boundary of these properties on Prospect Street. Fire insurance map dated 1962 depicted a machine shop at 308 Front Street, the north adjacent property. Fire insurance map dated 1977 depicted the north adjacent property as an auto repair shop. In addition, fire insurance maps dating from 1981 through 2007 depicted an auto repair shop at 14 Prospect Street, a south adjacent property.
- Review of the city directories revealed a motive parts facility, a maintenance/repair shop, Bay St. Collision Works, and AAA Auto Diesel Repair at 308 Front Street, the north adjacent property, between 1960 and 2013.

- (14) E-Designation sites are located within one-eighth of a mile of the Site. Three of these E-Designation sites are located on the adjacent properties, including 308 Front Street (Block 489, Lot 25), north adjacent property; 12 and 14 Prospect Street (Block 491, Lots 32 and 29), south adjacent properties. These three lots are all designated as E-168, which are also subject to Hazardous Underground Gasoline Storage Tanks Testing Protocol and Window Wall Attenuation & Alternate Ventilation.
- The north adjacent property at 308 Front Street is listed as a US Historical Auto Stations site.

1.5 Summary of Work Performed under the Remedial Investigation

1. Installed nine (9) soil borings, SB-1through SB-9, at the Site. Collected (19) soil samples, S-1s, S-1d through S-9s, S-9d, from the nine soil borings and a duplicate sample, S-10, from soil boring SB-9.
2. Installed five (5) temporary groundwater monitoring wells, MW-1 through MW-5, which were converted from five (5) of the nine (9) soil borings. Collected six (6) groundwater samples, W-1 through W-5, from the five groundwater monitoring wells, and a duplicate sample, W-6, from monitoring well MW-4.
3. Installed seven (7) soil gas monitoring implants, SG-1 through SG-7, at the Site. Collected four (4) soil vapor samples, SV-1 through SV-4, from SG-1 through SG-4, and three (3) sub-slab soil vapor samples, SV-5 through SV-7, from SG-5 through SG-7. Sampled concurrently with the three (3) sub-slab soil vapor samples, two (2) indoor air samples, V-1 and V-2, from the two onsite buildings, and one (1) ambient air sample, V-3, in front of the building at 326 Front Street on Lot 37, were also collected at the Site.

1.6 Summary of Findings of Remedial Investigation

A remedial investigation was performed and the results are documented in a companion document called “Remedial Investigation Report, 15 Prospect Street, Staten Island, New York”, dated January 2016 (RIR).

1. Elevation of the property ranges from 14 to 16 feet.

2. Depth to groundwater ranges from 5.87 to 6.92 feet at the Site.
3. Groundwater flow is generally from west to east beneath the Site.
4. Depth to bedrock is approximately over 12 feet at the Site.
5. The stratigraphy of the site, from the surface down, consists of historic fill from zero to 1.5 feet (concrete fragments and urban fill material). The fill layer is underlain by natural soil to variable depths ranging from 1.5 to 12 feet (i.e. coarse to fine dark grey or brown sand, sandy clay or silty clay).
6. Soil/fill sample results were compared to New York State Department of Environmental Conservation (NYSDEC) Unrestricted Use Soil Cleanup Objectives and Restricted Residential Use Soil Cleanup Objectives (SCOs) as presented in 6NYCRR Part 375-6.8. Soil/fill samples showed no PCBs at detectable concentrations. One VOC (Acetone) ranging from 0.079 mg/kg to 0.12 mg/kg was detected in four deep samples at concentrations above their Track 1 Unrestricted Use SCOs. Seven (7) SVOCs, all PAH compounds, were detected in five shallow samples and two deep samples at concentrations above their Track 1 Unrestricted Use SCOs and Track 2 Restricted Residential SCOs. They include: benzo(a)anthracene (max of 6.4 mg/kg), benzo(a)pyrene (max of 6.3 mg/kg), benzo(b)fluoranthene (max of 4.8 mg/kg), benzo(k)fluoranthene (4.4 mg/kg), chrysene (max of 7.8 mg/kg), dibenz(a,h)anthracene (max of 0.99 mg/kg), and Indeno(1,2,3-cd)pyrene (max of 4.1 mg/kg). However, detection limits for some of the SVOCs were greater than NYSDEC SCOs in one sample (S-6d) due to the limitations of the instruments used by the lab. Nine metals were detected above their respective Track 1 Unrestricted Use SCOs. They include: arsenic (max of 28.1 mg/kg) in five shallow and three deep samples, barium (max of 547 mg/kg) in three shallow and one deep samples, cadmium (max of 3.46 mg/kg) in one shallow and two deep samples, chromium (max of 76.7 mg/kg) in three shallow and three deep samples, copper (max of 1,070 mg/kg) in all samples except for one deep sample, lead in all samples except for one deep sample (max of 2,450 mg/kg), mercury (max of 11.2 mg/kg) in all samples except for one deep sample, nickel (max of 366 mg/kg) all samples except for one shallow sample, and zinc (max of 1,290 mg/kg) in all samples except for two deep samples. These metals, except cadmium, chromium and zinc, were also above Track 2 Restricted Residential SCOs. However, detection limit for mercury was greater

than NYSDEC SCOs in one sample (S-5d) due to the limitations of the instruments used by the lab. Three pesticides including: 4,4'-DDE (0.050 mg/kg), 4,4'-DDT (0.14 mg/kg), and Dieldrin (0.02 mg/kg), were detected in one shallow sample at concentrations above their Track 1 Unrestricted Use SCOs. However, detection limits for some of pesticides were greater than NYSDEC Track 1 Unrestricted Use SCOs, because some of the pesticides required dilution due to a large amount of petroleum material present in the samples. According to the statement made by Phoenix Environmental Laboratories, Inc., the reason why large amount of petroleum material is present but not shown in the VOC results, except for Acetone, is because "the TPH (total petroleum hydrocarbons) has two patterns, one that is similar to a weathered diesel/fuel #2 and one that is "heavier" in the motor oil range. The VOA chromatogram show very little TPH because the sample does not have any TPH in the gasoline range – this also explains why the volatile analysis is mainly ND (not detected). Because the pesticide analysis is a subset of the semi-volatile range of organics, the TPH that affected the SVOAs also affects the Pesticide analysis (even after a florisil cleanup)". Overall, the findings were consistent with observations for other historic fill sites in NYC and during the RI.

7. Groundwater sample results were compared to New York State 6NYCRR Part 703.5 Class GA groundwater quality standards (GQS). Groundwater samples showed no VOCs, PCBs or Pesticides at detectable concentrations. However, detection limits for some of the VOCs and one pesticide were greater than their GQSs due to the limitations of the instruments used by the lab. Six (6) SVOCs, all PAH compounds, were detected in four samples above their NYSDEC GQS. They include: benzo(a)anthracene (max of 0.38 µg/L), benzo(a)pyrene (max of 0.43 µg/L, benzo(b)fluoranthene (max of 0.38 µg/L), benzo(k)fluoranthene (0.33 µg/L), chrysene (max of 0.39 µg/L), and Indeno(1,2,3-cd)pyrene (max of 0.3 µg/L). Several metals were identified, but only iron, manganese and sodium exceeded their GQSs in dissolved groundwater samples.
8. Soil vapor samples collected during the RI were compared to the compounds listed by the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion dated October 2006. Soil vapor samples showed a variety of low concentrations of petroleum related hydrocarbons including BTEX and associated compounds. Total BTEX were detected at a maximum concentration of 34.33 $\mu g/m^3$.

Highest concentrations were detected for hexane (max. of 12,000 µg/m^3). Chlorinated VOCs including 1,1,1-Trichloroethane (TCA) in four samples at concentrations ranging from 1.98 µg/m^3 to 66.5 µg/m^3; Tetrachloroethene (PCE) in all seven samples at concentrations ranging from 1.1 µg/m^3 to 1,670 µg/m^3; Trichloroethene (TCE) in three samples ranging from 0.62 µg/m^3 to 2.08 µg/m^3; and Carbon Tetrachloride in one sample at a concentration of 326 µg/m^3. Concentrations of PCE and carbon tetrachloride are above the monitoring level ranges established within the NYSDOH soil vapor guidance matrix and require mitigation.

9. Indoor air and ambient air sample results indicated low concentrations of VOCs. Most compounds were detected at less than 25 µg/m^3. Five (5) VOCs were detected in the indoor air samples above the monitoring level range established within the NYS DOH soil vapor guidance matrix. They include: Acetone (93.5 µg/m^3 in V-1 and 247 µg/m^3 in V-2), Ethanol (333 µg/m^3 in V-1 and 1,580 µg/m^3 in V-2), total Xylenes (5.86 µg/m^3 in V-1 and 111.9 µg/m^3 in V-2), Toluene (77.6 µg/m^3 in V-2), and Trichloroethene (TCE) (1.66 µg/m^3 in V-1 and 0.84 µg/m^3 in V-2).

For more detailed results, consult the RIR. Based on an evaluation of the data and information from the RIR and this RAWP, disposal of significant amounts of hazardous waste is not suspected at this site.

2.0 Remedial Action Objectives

Based on the results of the RI, the following Remedial Action Objectives (RAOs) have been identified for this Site:

Soil

- Prevent direct contact with contaminated soil.
- Prevent exposure to contaminants volatilizing from contaminated soil.

Groundwater

- Prevent direct exposure to contaminated groundwater.
- Prevent exposure to contaminants volatilizing from contaminated groundwater.

Soil Vapor

- Prevent exposure to contaminants in soil vapor.
- Prevent migration of soil vapor into dwelling and other occupied structures.

3.0 Remedial Alternatives Analysis

The goal of the remedy selection process is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedance of applicable standards, criteria and guidance values (SCGs). Remedial alternatives are then developed and evaluated based on the following ten criteria:

- Protection of human health and the environment;
- Compliance with SCGs;
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community acceptance;
- Land use; and
- Sustainability.

As required, a Track 1 Unrestricted Use scenario is evaluated for the remedial action. The following is a detailed description of the alternatives analyzed to address impacted media at the Site:

Alternative 1:

- Selection of NYSDEC 6NYCRR Part 375 Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
- Removal of all soil/fill exceeding Track 1 Unrestricted Use SCOs throughout the Site and confirmation that Track 1 Unrestricted Use SCOs have been achieved with post-excavation endpoint sampling. However if soil/fill containing analytes at concentrations above Track 1 SCOs is still present at the base of the excavation after removal of all soil required for construction of the cellars and rear yard are complete, additional excavation will be performed to ensure complete removal of soil that does not meet Track 1 SCOs.

Based on the results of the Remedial Investigation, it is expected that additional excavation than that is proposed for the construction of the new building will be required to achieve Track 1 Unrestricted Use.

- No Engineering or Institutional Controls are required for a Track 1 cleanup. A concrete slab covering the entire site and water proofing membrane would be installed as part of standard building development and are not considered components of the remedy. Additional soil vapor management is required and an active SSDS would be installed (such a system cannot operate for more than five years under the Track 1 remedy).

Alternative 2:

- Establishment of Site Specific (Track 4) Soil Cleanup Objectives (SCOs).
- Removal of all soil/fill exceeding Track 4 Site-specific SCOs and confirmation that Track 4 Site-specific SCOs have been achieved with post-excavation end point sampling. Based on the results of the Remedial Investigation, it is expected that this alternative would be achieved by excavating three hot spots, each to a depth of approximately 8 feet over an area of approximately 10 feet x 10 feet, where high levels of SVOCs and metals were detected. As part of development, soil beneath most of the site will be removed to a depth of 2 feet. If soil/fill containing analytes at concentrations above Track 4 Site-specific SCOs is still present at the base of the excavation, additional excavation would be performed to meet Track 4 Site-Specific SCOs.
- Placement of a composite cover system over the entire Site to prevent exposure to remaining soil/fill;
- Installation of a vapor barrier system beneath the building slab and along foundation side walls to prevent potential exposures from soil vapor;
- Installation of an Active Sub Slab Depressurization System (SSDS);
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of restricted Site uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval;
- Establishment of an approved Site Management Plan (SMP) to ensure long-term management of these Engineering and Institutional Controls including the performance of periodic inspections and certification that the controls are performing as they were

intended. The SMP will note that the property owner and property owner's successors and assigns must comply with the approved SMP; and

- The property will continue to be registered with an E-Designation at the NYC Buildings Department.

3.1 Threshold Criteria

Protection of Public Health and the Environment

This criterion is an evaluation of the remedy's ability to protect public health and the environment, and an assessment of how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, and implementation of Engineering Controls or Institutional Controls. Protection of public health and the environment must be achieved for all approved remedial actions.

Alternative 1 would be protective of human health and the environment by removing all soil/fill exceeding Track 1 Unrestricted Use SCO's and groundwater protection standards, thus eliminating potential for direct contact with contaminated soil/fill once construction is complete and eliminating the risk of contaminants leaching into groundwater.

Alternative 2 would achieve comparable protections of human health and the environment by excavation and removal of most of the historic fill at the Site and by ensuring that remaining soil/fill on-Site meets Track 4 Site-Specific SCO's, as well as by placement of Institutional and Engineering Controls, including a composite cover system. The composite cover system would prevent direct contact with any remaining on-Site soil/fill. Implementing Institutional Controls including a Site Management Plan and continuing the E-designation instituting a deed notice on the property would ensure that the composite cover system remains intact and protective of public health. Establishment of Track 4 Site-Specific SCO's would minimize the risk of contamination leaching into groundwater.

For both Alternatives, potential exposure to contaminated soils or groundwater during construction would be minimized by implementing a Construction Health and Safety Plan, an

approved Soil/Materials Management Plan, and Community Air Monitoring Plan (CAMP). Potential contact with contaminated groundwater would be prevented as its use is prohibited by city laws and regulations. Potential future migration of off-Site soil vapors into the new building would be prevented by installing a vapor barrier below the building slab and outside foundations walls below grade.

3.2 Balancing Criteria

Compliance with Standards, Criteria and Guidance (SCGs)

This evaluation criterion assesses the ability of the alternative to achieve applicable standards, criteria and guidance.

Alternative 1 would achieve compliance with the remedial goals, chemical-specific SCGs and RAOs for soil through removal of soil to achieve Track 1 Unrestricted Use SCO's and Protection of Groundwater SCO's. Compliance with SCGs for soil vapor would also be achieved by installing a waterproofing/vapor barrier system below the new building's basement slab and continuing the vapor barrier outside of subgrade foundation walls, as part of development. In addition, part of the ground floor of the building will contain a parking garage with high volume air exchange that conforms to the NYC Building Code.

Alternative 2 would achieve compliance with the remedial goals, chemical-specific SCG's and RAOs for soil through removal of soil to meet Track 4 Site-Specific SCO's. Compliance with SCG's for soil vapor would also be achieved by installing a waterproofing/vapor barrier system below the new building's basement slab and continuing the vapor barrier outside of subgrade foundation walls. Additional soil vapor management would include an active SSDS. A Site Management Plan would ensure that these controls remained protective for the long term. In addition, part of the ground floor of the building will contain a parking garage with high volume air exchange that conforms to the NYC Building Code and will mediate any potential accumulation of soil vapors inside the building.

Health and safety measures contained in the CHASP and Community Air Monitoring Plan (CAMP) will be implemented during Site redevelopment under this RAWP. For both Alternatives, focused attention on means and methods employed during the remedial action would ensure that handling and management of contaminated material would be in compliance with applicable SCGs. These measures will protect on-site workers and the surrounding community from exposure to Site-related contaminants.

Short-Term Effectiveness and Impacts

This evaluation criterion assesses the effects of the alternative during the construction and implementation phase until remedial action objectives are met. Under this criterion, alternatives are evaluated with respect to their short term effects during the remedial action on public health and the environment during implementation of the remedial action, including protection of the community, protection of onsite workers and environmental impacts.

Both Alternative 1 and 2 have similar short-term effectiveness during their implementation, as each requires excavation of historic fill material. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Short-term impacts could potentially be higher for Alternative 1 since excavation of greater amounts of historical fill material would take place. However, focused attention to means and methods during a Track 1 removal action, including community air monitoring and appropriate truck routing, would minimize the overall impact of these activities.

An additional short-term adverse impact and risks to the community associated with both remedial alternatives is increased truck traffic. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flag persons will be used to protect pedestrians at Site entrances and exits.

The potential adverse impact to the community, workers and the environment for both alternatives would be minimized through implementation of control plans including a Construction Health and Safety Plan, a Community Air Monitoring Plan (CAMP) and a Soil/Materials Management Plan (SMMP), during all on-Site soil disturbance activities and

would minimize the release of contaminants into the environment. Both alternatives provide short-term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-Site contaminants. Construction workers operating under appropriate management procedures and a Construction Health and Safety Plan (CHASP) would provide protection from on-Site contaminants by using personal protective equipment would be worn consistent with the documented risks within the respective work zones.

Long-term effectiveness and permanence

This evaluation criterion addresses the results of a remedial action in terms of its permanence and quantity/nature of waste or residual contamination remaining at the Site after response objectives have been met, such as permanence of the remedial alternative, magnitude of remaining contamination, adequacy of controls including the adequacy and suitability of Engineering Controls/Institutional Controls (ECs/ICs) that may be used to manage contaminant residuals that remain at the Site and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of ECs.

Alternative 1 would achieve long-term effectiveness and permanence related to on-Site contamination by permanently removing all impacted soil/fill above Track 1 Unrestricted Use SCO's. Removal of on-Site contaminant sources will also prevent future groundwater contamination.

Alternative 2 would provide long-term effectiveness by removing most on-Site contamination and attaining Track 4 Site-Specific SCOs; installing a composite cover system across the Site; installing an active SSDS; maintaining use restrictions; establishing an SMP to ensure long-term management of ICs and ECs; and maintaining registration as an E-designated property to memorialize these controls for the long term. The SMP would ensure long-term effectiveness of all ECs and ICs by requiring periodic inspection and certification that these controls and restrictions continue to be in place and are functioning as they were intended, assuring that protections designed into the remedy continue to provide the required level of protection.

Reduction of toxicity, mobility, or volume of contaminated material

This evaluation criterion assesses the remedial alternative's use of remedial technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants as their principal element. The following is the hierarchy of source removal and control measures that are to be used to remediate a Site, ranked from most preferable to least preferable: removal and/or treatment, containment, elimination of exposure and treatment of source at the point of exposure. It is preferred to use treatment or removal to eliminate contaminants at a Site, reduce the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

Alternative 1 will permanently eliminate the toxicity, mobility, and volume of contaminants from on-Site soil by removing all soil in excess of Track 1 Unrestricted Use SCO's.
Alternative 2 would remove most of the historic fill at the Site, and all remaining on-Site soil/fill beneath the new building will meet Track 4 Site-Specific SCO's.

Alternative 1 would remove a greater total mass of contaminants from the Site. The removal of soil to 2 feet for the new development in both scenarios would lessen the difference in contaminant mass removal between these two alternatives.

Implementability

This evaluation criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation, including technical feasibility of construction and operation, reliability of the selected technology, ease of undertaking remedial action, monitoring considerations, administrative feasibility (e.g. obtaining permits for remedial activities), and availability of services and materials.

The techniques, materials and equipment to implement both Alternatives 1 and 2 are readily available and have been proven to be effective in remediating the contaminants present on the Site. They use standard equipment and technologies that are well established in the industry. The

reliability of each remedy is also high. There are no special difficulties associated with any of the activities proposed.

Cost effectiveness

This evaluation criterion addresses the cost of alternatives, including capital costs (such as construction costs, equipment costs, and disposal costs, engineering expenses) and site management costs (costs incurred after remedial construction is complete) necessary to ensure the continued effectiveness of a remedial action.

Since historic fill at the Site was found to extend to a depth of up to 8 feet below grade during the RI, the costs associated with Alternative 1 would potentially be significantly higher than Alternative 2. Additional costs would include installation of additional shoring/underpinning, disposal of additional soil, and import of clean soil for backfill. However, long-term costs for Alternative 2 are likely higher than Alternative 1 based on implementation of a Site Management Plan as part of Alternative 2.

The remedial plan would couple the remedial action with the redevelopment of the Site, lowering total costs. The remedial plan will also consider the selection of the most appropriate disposal facilities to reduce transportation and disposal costs during cleanup and redevelopment of the Site.

Community Acceptance

This evaluation criterion addresses community opinion and support for the remedial action.

Observations here will be supplemented by public comment received on the RAWP.
This RAWP will be subject to a public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedy. This public comment will be considered by OER prior to approval of this plan. The Citizen Participation Plan for the project is provided in Appendix 2. Observations here will be supplemented by public comment received on the RAWP. Under both alternatives, the overall

goals of the remedial program, to protect public health and the environment and eliminate potential contaminant exposures, have been broadly supported by citizens in NYC communities.

Land use

This evaluation criterion addresses the proposed use of the property. This evaluation has considered reasonably anticipated future uses of the Site and takes into account: current use and historical and/or recent development patterns; applicable zoning laws and maps; NYS Department of State's Brownfield Opportunity Areas (BOA) pursuant to section 970-r of the general municipal law; applicable land use plans; proximity to real property currently used for residential use, and to commercial, industrial, agricultural, and/or recreational areas; environmental justice impacts, Federal or State land use designations; population growth patterns and projections; accessibility to existing infrastructure; proximity of the site to important cultural resources and natural resources, potential vulnerability of groundwater to contamination that might emanate from the site, proximity to flood plains, geography and geology; and current Institutional Controls applicable to the site.

The current, intended, and reasonably anticipated future land use of the Site and its surroundings are compatible with the selected remedy of soil remediation. The proposed future use of the Site includes a new five-story mixed-use building. The building has no basement or cellar level. The ground floor will contain some commercial/office spaces and open ground floor with partially covered parking, with additional open surface parking. Total parking capacity will be 43 cars with some contemplated on lifts. The upper four floors will be used for residential use and consist of approximately 60 units. There will be little islands (9' and 6'-11" wide) on each side of the rows of parking (as shown on the site plan) that will be newly planted trees and ground cover. It is expected that the new building's structure will be supported on pilings, which will be driven to a depth, where the bearing capacity/friction is sufficient to support the same. There will be poured reinforced concrete pile caps at a depth of four (4) feet with concrete walls/piers brought from the top of the pile caps to the surface. The limited excavation will be backfilled and a reinforced slab on grade poured. The balance of the Site will be paved. There might be tree wells, as required by the zoning. There will be no open/grassed areas on the site that will be used for anything other than new parking areas. Following remediation, the Site will meet either

Track 1 Unrestricted Use or Track 4 Site-Specific SCOs, both of which are protective of public health and the environment for its planned residential use. The proposed use is compliant with the property's zoning and is consistent with recent development patterns. The areas surrounding the site is urban and consist of predominantly mixed residential and commercial buildings in zoning districts designated for commercial and residential uses and provide a modern mixed commercial/residential building. The development would remediate a commercial property of four lots used as an industrial repair and machine shop. The proposed development would clean up the property and make it safer, create new employment opportunities, living space for affordable and supportive housing and associated societal benefits to the community, and other economic benefits from land revitalization.

Temporary short-term project impacts are being mitigated through site management controls and truck traffic controls during remediation activities. Following remediation, the Site will meet either Track 1 Unrestricted Use SCOs or Track 4 Site-Specific SCOs, both of which are protective of public health and the environmental for its planned use.

The Site is not in close proximity to important cultural resources, including federal or state historic or heritage sites or Native American religious sites, natural resources, waterways, wildlife refuges, wetlands, or critical habitats of endangered or threatened species. The Site is located in an urban area and not in proximity to fish or wildlife and neither alternative would result in any potential exposure pathways of contaminant migration affecting fish or wildlife. The remedial action is also protective of groundwater natural resources. Both alternatives are equally protective of natural resources and cultural resources. Improvements in the current environmental condition of the property achieved by both alternatives considered in this plan are consistent with the City's goals for cleanup of contaminated land.

Sustainability of the Remedial Action

This criterion evaluates the overall sustainability of the remedial action alternatives and the degree to which sustainable means are employed to implement the remedial action including those that take into consideration NYC's sustainability goals defined in PlaNYC: A Greener,

Greater New York. Sustainability goals may include: maximizing the recycling and reuse of non-virgin materials; reducing the consumption of virgin and non-renewable resources; minimizing energy consumption and greenhouse gas emissions; improving energy efficiency; and promotion of the use of native vegetation and enhancing biodiversity during landscaping associated with Site development.

While Alternative 2 would potentially result in lower energy usage based on reducing the volume of material transported off-Site, both remedial alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. The remedial plan for either alternative would take into consideration the shortest trucking routes during off-Site disposal of historic fill and other soils, which would reduce greenhouse gas emissions and conserve energy used to fuel trucks. The New York City Clean Soil Bank program is available for reuse of any clean native soils under either alternative. A complete list of green remedial activities considered as part of the NYC VCP is included in a Sustainability Statement.

SELECTION OF THE PREFERRED REMEDY

The preferred remedy for the site is Alternative 2, a Track 4 site specific cleanup remedy. The Alternative 2 remedy will remove all soil/fill exceeding Track 4 Site Specific Use SCOs throughout the Site, which will be confirmed with post-excavation sampling. If soil/fill containing analytes at concentrations above Track 4 Site Specific Use SCOs is still present at the base or walls of the excavation after removal of all soil required for construction of the new building's cellar level and slab are complete, additional excavation would be performed to ensure complete removal of soil/ fill that does not meet Track 4 Site Specific Use SCOs.

Engineering Controls are required for a Track 4 Site Specific cleanup. A concrete slab and waterproofing/vapor barrier membrane covering the entire first floor building footprint would be installed, and the rest of the site will be paved. Additional soil vapor management would include an active SSDS to address soil vapor contamination.

Use restrictions will be imposed on the site (including prohibitions on any use higher than Restricted Residential, e.g. the use of groundwater from the Site; prohibitions of restricted Site

uses, such as farming or vegetable gardening, to prevent future exposure pathways; and prohibition of a higher level of land use without OER approval). The Site would continue to be encumbered with an E-designation for hazardous material.

4.0 Remedial Action

4.1 Summary of Preferred Remedial Action

The preferred remedial action alternative is Alternative 2, the Track 4 remedial action. The preferred remedial action achieves protection of public health and the environment for the intended use of the property. The preferred remedial action will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establishment of Track 4 Site-specific Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Completion of a Waste Characterization Study prior to or during excavation activities. Waste characterization soil samples will be collected at a frequency dictated by disposal facility(s).
6. Excavation and removal of soil/fill exceeding Track 4 Site Specific SCOs.
   The entire footprint of the Site will be excavated to a depth of approximately 2 feet below grade for development purposes. A small portion of property will be excavated to the depths of 8 feet below grade for hotspot areas and 4 feet below grade for piling pits. Three additional hotspot areas identified (1D, 5D and 8D) will be excavated to meet SCOs. Approximately 2,658+ tons of soil/fill will be removed from the Site and properly disposed at an appropriately licensed or permitted facility.

7. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
8. Management of excavated materials including temporarily stockpiling and segregating in accordance with defined material types and to prevent co-mingling of contaminated material and non-contaminated materials.
9. Removal of all UST's that are encountered during soil/fill removal actions. Registration of tanks and reporting of any petroleum spills associated with UST's and appropriate closure of these petroleum spills in compliance with applicable local, State and Federal laws and regulations.
10. Transportation and off-Site disposal of all soil/fill material at licensed or permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
11. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
12. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
13. Construction of an engineered composite cover consisting of a reinforced, poured slab on grade. The foundation pilings terminate at top in poured reinforced concrete pile caps at a depth of four (4) feet with concrete walls/piers brought from the top of the pile caps to the surface. The limited excavation will be backfilled and a reinforced slab on grade poured. The balance of the Site will be paved. There might be tree wells, as required by the zoning. There will be no open/grassed areas on the site that will be used for anything other than new parking areas.
14. Installation of a vapor barrier system consisting of vapor barrier beneath the building slab and outside of sub-grade foundation sidewalls to mitigate soil vapor migration into the building. Because of a closely spaced pilings/pile caps foundation system (please see Foundation Plan), which would require numerous penetrations to a liner resulting in a need to effectively seal the numerous openings, in our experience, a polyethylene type barrier would be less optimum from a constructability and sealing

perspective. Therefore, products that can integrally bond to poured concrete, and can be installed with greater efficiency and ease, will be chosen for this project. Specifically, the vapor barrier system will consist of W.R. Grace & Company's PREPRUFE 300R membrane for horizontal applications (46 mil thickness) below the slab throughout the full building first floor footprint area, PREPRUFE 160R membrane for vertical applications (32 mil thickness) outside all sub-grade foundation sidewalls, and associated ancillaries (tapes, sealants, etc.) which are part of their barrier system, required for proper installation and sealing. All welds, seams and penetrations will be properly sealed to prevent preferential pathways for vapor migration. The selected PREPRUFE products 300R and 160R both have permeance to water vapor transmission of 0.01 perms; due to this low permeance, these waterproofing membrane products also function as vapor barriers. The vapor barrier and waterproofing system is an Engineering Control for the remedial action. The remedial engineer will certify in the RAR that the vapor barrier system was designed and properly installed to mitigate soil vapor migration into the building. Approved equals may be used for the waterproofing and vapor barrier membranes.

15. Installation of an active sub-slab depressurization system (SSDS) consisting of a network of horizontal piping underneath the slab of the building set within an engineered gas permeable layer immediately beneath the building slab and vapor barrier system. The horizontal subsurface piping will consist of 4-inch, Schedule 40 PVC pipe, with approximately 28 sq. in. (approximately 18.6%) slotted opening area (or equivalent perforated open area), wrapped in a 6-oz/SY geotextile intended to prevent migration of fines into the piping, as well as to provide it with physical protection. The manifolded subsurface piping will be connected to a 4-inch steel riser pipe that penetrates the slab and travels through or on the side of the building (depending on building plans) to the roof, where it will terminate a minimum 3-feet above the highest point, or at a height that would be based on building air flow considerations (e.g., minimizing cavity effects, distance to intake locations, etc.), whichever is more restrictive. The gas permeable layer will consistent of a minimum 6-inch thick layer of minimum 1/2-inch Blue stone on all sides of piping. Please note

that the engineering specifications mentioned above are preliminary and will be finalized during the detailed design phase after final building plans are available. The active SSDS is an Engineering Control for the remedial action. A 122 cfm centrifugal duct fan (Fantech Model FR100, supplied by Grainger) is proposed for installation. This is equivalent to approximately five to six air changes per hour (5-6 ACH) of subsurface vapors from the 6" bedding zone from under the entire footprint of the building on the first floor. The remedial engineer will certify in the RAR that the active SSDS was designed and properly installed to establish a vacuum in the gas permeable layer and a negative (decreasing outward) pressure gradient across the building slab to prevent vapor migration into the building.

16. Construction and operation of a grade-level parking garage with high volume air exchange in conformance with NYC Building Code to be done as part of building construction plans. Part of the ground floor of the building will contain a parking garage and will mediate any potential accumulation of soil vapors inside the building.

17. Performance of all activities required for the remedial action, including acquisition of required permits and attainment of pretreatment requirements, in compliance with applicable laws and regulations.

18. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.

19. Submission of a RAR that describes the remedial activities certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site.

20. Submission of an approved Site Management Plan (SMP) in the Remedial Action Plan (RAR) for long-term management of residual contamination, including plans for

operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.

21. The property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.

4.2 Soil Cleanup Objectives and Soil/ Fill Management

The following Track 4 Site-Specific SCO's will be utilized for this project:

Contaminant	**Site-Specific SCO's**
Total SVOCs	250 ppm
Lead	1200 ppm
Mercury	3.0 ppm
Barium	800 ppm

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Appendix 4. Discrete contaminant sources (such as hotspots) identified during the remedial action will be identified by GPS or surveyed. This information will be provided in the Remedial Action Report.

Soil/Fill Excavation and Removal

The entire footprint of the Site will be excavated to a depth of approximately 2 feet below grade for development purposes. A small portion of property will be excavated to the depths of 8 feet below grade for hotspot areas and 4 feet below grade for piling pits. The location of planned excavations is shown in Figure 4. The total quantity of soil/fill expected to be excavated and

disposed off-Site is 2,658+ tons. For each disposal facility to be used in the remedial action, a letter from the developer/QEP to the receiving facility requesting approval for disposal and a letter back to the developer/QEP providing approval for disposal will be submitted to OER prior to any transport and disposal of soil at a facility. Disposal facilities will be reported to OER when they are identified and prior to the start of remedial action.

End-point Sampling

End-point samples will be analyzed for compounds and elements as described below utilizing the following methodology:

- Semi-volatile organic compounds by EPA Method 8270;
- Target Analyte List metals; and

New York State ELAP certified labs will be used for all end-point sample analyses. Labs performing end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all end-point sample results and will include all data including non-detects and applicable standards and/or guidance values.

Confirmation End-point Sampling

Removal actions for development purposes under this plan will be performed in conjunction with confirmation end-point soil sampling. Nine (9) confirmation samples will be collected from the base of the excavation at locations to be determined by OER. To evaluate attainment of Track 4 Site-specific SCOs, analytes will include those for which SCOs have been developed, including SVOCs and Metals, according to analytical methods described above. Figure 5 shows the end-point soil sampling locations.

Hotspot End-point Sampling

Hotspot end-point samples will be collected from the sidewalls and base of excavation at each of the two hotspot locations identified in the Remedial Investigation, according to the procedure listed below. Hotspots include SB-1, SB-5 and SB-8 for Metals and SVOCs. Hotspot End-point samples will be analyzed for Metals and SVOCs. Figure 6 shows the hotspot end-point soil sampling locations.

For any hotspots identified during this remedial program, including any hotspots identified during the remedial action, hotspot removal actions will be performed to ensure that hotspots are fully removed and end-point samples will be collected at the following frequency:

1. For excavations less than 20 feet in total perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff.
2. For excavations 20 to 300 feet in perimeter:
    - For surface removals, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
    - For subsurface removals, one sample from each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
3. For sampling of volatile organics, bottom samples should be taken within 24 hours of excavation, and should be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours should be taken at six to twelve inches.
4. For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

Post-remediation end-point sample locations and depth will be biased towards the areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that other locations and depths may be more heavily contaminated. In all cases, post-remediation samples should be biased toward locations and depths of the highest expected contamination.

If either LNAPL and/or DNAPL are detected, appropriate samples will be collected for characterization and “finger print analysis” and required regulatory reporting (i.e. spills hotline) will be performed.

Quality Assurance/Quality Control

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol.
The accuracy, precision and completeness requirements will be addressed by the laboratory for all data generated.

One blind duplicate sample for every 20 samples collected will be submitted to the approved laboratory for analysis of the same parameters. Trip blanks will be used whenever samples are transported to the laboratory for analysis of VOCs. One trip blank will be submitted to the laboratory with each shipment of soil samples. Trip blanks will not be used for samples to be analyzed for metals, SVOCs or pesticides.

Collected samples will be appropriately packaged, placed in coolers and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or “cold-paks” to maintain a temperature of $4^{o}C$.

Dedicated disposable sampling materials will be used for the collection endpoint samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of 1 for every eight samples collected. Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil
- Rinse with tap water
- Wash with alconox® detergent solution and scrub
- Rinse with tap water
- Rinse with distilled or deionized water

Field blanks will be prepared by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers.

Import of Soils

Import of soils onto the property will be performed in conformance with the Soil/Materials Management Plan in Appendix 4. Imported soil will meet the lower of:

- Track 2 Restricted Residential Use SCO's, and
- Groundwater Protection Standards in Part 375-6.8.

Reuse of Onsite Soils

Soil reuse is not planned on this project.

4.3 Engineering Controls

Engineering Controls will be employed in the remedial action to address residual contamination remaining at the site. The Site has 4 primary Engineering Control Systems. These are:

(1) Composite Cover System
(2) Soil Waterproofing and Vapor Barrier Membrane System
(3) Active Sub-Slab Depressurization System

Composite Cover System

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on the Site. This composite cover system will be comprised of poured reinforced concrete pile caps at a depth of four (4) feet with concrete walls/piers brought from the top of the pile caps to the surface. The limited excavation will be backfilled and a reinforced slab on grade poured under the entire first floor footprint of the building. Figure 7 shows the site-wide cover system plan (included in engineering Drawing 4 of 9). The balance of the Site will be paved. There might be tree wells, as required by the zoning. There will be no open/grassed areas on the site that will be used for anything other than new parking areas.

Locations of each cover type and engineering diagrams showing a cross section design of each cover type are shown in Figure 8 (included in engineering Drawings 5 and 9 of 9).

The composite cover system will be a permanent engineering control. The system will be inspected and its performance certified at specified intervals as required by this RAWP and the

Site Management Plan. A Soil and Materials Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual soil/fill is disturbed after the remedial action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the Remedial Action Report.

Vapor Barrier System

Migration of soil vapor from onsite or offsite sources into the building will be mitigated with a combination of building slab and vapor barrier. Because of a closely spaced pilings/pile caps foundation system (please see Foundation Plan), which would require numerous penetrations to a liner resulting in a need to effectively seal the numerous openings, in our experience, a polyethylene type barrier would be less optimum from a constructability and sealing perspective. Therefore, products that can integrally bond to poured concrete, and can be installed with greater efficiency and ease, will be chosen for this project. Specifically, the vapor barrier system will consist of W.R. Grace & Company's PREPRUFE 300R membrane for horizontal applications (46 mil thickness) below the slab throughout the full building first floor footprint area, PREPRUFE 160R membrane for vertical applications (32 mil thickness) outside all sub-grade foundation sidewalls, and associated ancillaries (tapes, sealants, etc.) which are part of their barrier system, required for proper installation and sealing. The vapor barrier will extend throughout the area occupied by the footprint of the first floor of the new building and up the foundation sidewalls and will be installed in accordance with manufacturer specifications. The selected PREPRUFE products 300R and 160R both have permeance to water vapor transmission of 0.01 perms; due to this low permeance, these waterproofing membrane products also function as vapor barriers. Approved equals may be used for the waterproofing and vapor barrier membranes.

A plan view of the location of the proposed vapor barrier system is shown in Figure 9 (included in engineering Drawings 5 and 6 of 9). Typical design sections for the vapor barrier on slab and sidewalls are also shown in Figure 9 (included in engineering Drawing 5 of 9). Product specification sheets are provided in Appendix 6. The Remedial Action Report will include as-built drawings and diagrams; manufacturer documentation; and photographs.

The Remedial Action Report will include a PE-certified letter (on company letterhead) from the primary contractor responsible for installation oversight and field inspections and a copy of the manufacturer's certificate of warranty.

The Vapor Barrier System is a permanent engineering control and will be inspected and its performance certified at specified intervals as required by this RAWP and the Site Management Plan. A Soil and Materials Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying vapor barrier system is disturbed after the remedial action is complete. Maintenance of these systems will be described in the Site Management Plan in the Remedial Action Report.

Sub-Slab Depressurization System

Migration of soil vapor into the building will be mitigated with the construction of an active sub-slab depressurization system (SSDS) consisting of a network of horizontal piping underneath the slab of the building set within an engineered gas permeable layer immediately beneath the building slab and vapor barrier system. The horizontal subsurface piping will consist of 4-inch, Schedule 40 PVC pipe, with approximately 28 sq. in, (approximately 18.6%) slotted opening area (or equivalent perforated open area), wrapped in a 6-oz/SY geotextile intended to prevent migration of fines into the piping, as well as to provide it with physical protection. The manifolded subsurface piping will be connected to a 4-inch steel riser pipe that penetrates the slab and travels through or on the side of the building (depending on building plans) to the roof, where it will terminate a minimum 3-feet above the highest point, or at a height that would be based on building air flow considerations (e.g., minimizing cavity effects, distance to intake locations, etc.), whichever is more restrictive. The gas permeable layer will consistent of a minimum 6-inch thick layer of minimum 1/2-inch Blue stone on all sides of piping. Please note that the engineering specifications mentioned above are preliminary and will be finalized during the detailed design phase after final building plans are available. The active SSDS is an Engineering Control for the remedial action. A 122 cfm centrifugal duct fan (Fantech Model FR100, supplied by Grainger) is proposed for installation. This is equivalent to approximately five to six air changes per hour (5-6 ACH) of subsurface vapors from the 6" bedding zone from under the entire footprint of the building on the first floor. The remedial engineer will certify in

the RAR that the active SSDS was designed and properly installed to establish a vacuum in the gas permeable layer and a negative (decreasing outward) pressure gradient across the building slab to prevent vapor migration into the building.

The SSDS is a permanent engineering control. The system will be inspected and its performance certified at specified intervals as required by this RAWP and the Site Management Plan. Maintenance of this SSDS will be described in the Site Management Plan in the Remedial Action Report. The location and layout of the SSDS is shown in Figure 10 (included in engineering Drawings 7 and 8 of 9). A typical section of the system is also shown in Figure 10 (included in engineering Drawing 9 of 9). SSDS and active venting system installation specifications are provided in Appendix 7.

Sub-grade ventilated garage

Part of the ground floor of the building will contain a parking garage with high volume air exchange that conforms to the NYC Building Code to be done as part of building construction plans, and will mediate any potential accumulation of soil vapors inside the building.

4.4 Institutional Controls

A series of Institutional Controls (IC's) are required under this Remedial Action to assure permanent protection of public health by elimination of exposure to residual materials. These IC's define the program to operate, maintain, inspect and certify the performance of Engineering Controls and Institutional Controls on this property. Institutional Controls would be implemented in accordance with a Site Management Plan included in the final Remedial Action Report (RAR). Institutional Controls would be:

- Continued registration of the E-Designation for the property. This RAWP includes a description of all ECs and ICs and summarizes the requirements of the SMP which will note that the property owner and property owner's successors and assigns must comply with the approved SMP;
- Submittal of a SMP in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, inspection, and certification of ECs and IC's. SMP will require that the property owner and property owner's successors and assigns will

submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted at a frequency to be determine by OER in the SMP and will comply with RCNY §43-1407(l)(3).

- Vegetable gardens and farming on the Site are prohibited in contact with residual soil materials;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP;
- The Site will be used for mixed-use for commercial/residential and will not be used for a higher level of use without prior approval by OER.

4.5 Site Management Plan

Site Management is the last phase of remediation and begins with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by this RAWP. The Site Management Plan is submitted as part of the RAR but will be written in a manner that allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all Site Management responsibilities defined in the Site Management Plan are implemented.

The SMP will provide a detailed description of the procedures required to manage residual soil/fill left in place following completion of the remedial action in accordance with the Voluntary Cleanup Agreement with OER. This includes a plan for: (1) implementation of EC's

and ICs; (2) operation and maintenance of EC's; (3) inspection and certification of IC's and EC's.

Site management activities and EC/IC certification will be scheduled by OER on a periodic basis to be established in the RAR and the SMP and will be subject to review and modification by OER. The Site Management Plan will be based on a calendar year and certification reports will be due for submission to OER by July 30 of the year following the reporting period.

4.6 Qualitative Human Health Exposure Assessment

The objective of the qualitative exposure assessment is to identify potential receptors and pathways for human exposure to the contaminants of concern (COC) that are present at, or migrating from, the Site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur.

Data and information reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA) for this project. As part of the VCP process, a QHHEA was performed to determine whether the Site poses an existing or future health hazard to the Site's exposed or potentially exposed population. The sampling data from the RI were evaluated to determine whether there is any health risk under current and future conditions by characterizing the exposure setting, identifying exposure pathways, and evaluating contaminant fate and transport. This QHHEA was prepared in accordance with Appendix 3B and Section 3.3 (b) 8 of the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation.

Known and Potential Contaminant Sources

Based on the results of the RIR, the contaminants of concern are:

Soil:

- Seven (7) SVOCs, all PAH compounds, were detected in five shallow samples and two deep samples at concentrations above their Track 2 Restricted Residential SCOs.
- Six (6) metals were detected above their Track 2 Restricted Residential SCOs. They include: arsenic (max of 28.1 mg/kg) in three shallow and three deep samples, barium

(max of 547 mg/kg) in one shallow and one deep samples, copper (max of 1,070 mg/kg) in two deep samples, lead (max of 2,450 mg/kg) in five shallow and five deep samples, mercury (max of 11.2 mg/kg) in four shallow and six deep samples, and nickel (max of 366 mg/kg) in one shallow sample.

Groundwater:

- Six (6) SVOCs, all PAH compounds, were detected in four samples above their NYSDEC GQS.
- Several metals were identified, but only iron, manganese and sodium exceeded their GQSs in dissolved groundwater samples.

Soil Vapor:

- Total BTEX were detected at a maximum concentration of 34.33 µg/m^3. Highest concentrations were detected for hexane (max. of 12,000 µg/m^3). Chlorinated VOCs including 1,1,1-Trichloroethane (TCA) in four samples at concentrations ranging from 1.98 µg/m^3 to 66.5 µg/m^3; Tetrachloroethene (PCE) in all seven samples at concentrations ranging from 1.1 µg/m^3 to 1,670 µg/m^3; Trichloroethene (TCE) in three samples ranging from 0.62 µg/m^3 to 2.08 µg/m^3; and Carbon Tetrachloride in one sample at a concentration of 326 µg/m^3. Concentrations of PCE and carbon tetrachloride are above the monitoring level ranges established within the NYSDOH soil vapor guidance matrix and require mitigation.

Nature, Extent, Fate and Transport of Contaminants

Soil: SVOCs, metals and pesticides are present in the historic fill materials throughout the Site. Overall, the findings were consistent with observations for other historic fill sites in NYC and did not indicate a significant source area.

Groundwater: SVOCs were detected in four samples above their NYSDEC GQS. Three metals, iron, manganese and sodium, were detected exceeded their GQSs in dissolved groundwater samples. Overall, the findings were consistent with observations for other historic fill sites in NYC and during the RI.

Soil Vapor: Concentrations of PCE and Carbon Tetrachloride were detected in two samples above the monitoring level ranges established within the NYSDOH soil vapor guidance matrix and require mitigation.

Receptor Populations

On-Site Receptors: The site is currently used for an industrial repair and machine shop and has been occupied by ACME Industrial Inc. for about 35 years. The Site can be accessed from Prospect Street and Front Street via truck and office entrances of the machine shops and parking lot entrance. Onsite receptors are currently limited to employees, site representatives and visitors granted access to the property. During construction, potential on-site receptors include construction workers, site representatives, and visitors. Under proposed future conditions, potential on-site receptors include adult and child building residents, workers and visitors.
Off-Site Receptors: Potential off-site receptors within a 500 foot radius of the Site include adult and child residents; commercial and construction workers; pedestrians; and trespassers based on the following land uses within 500 feet of the Site:

1. Commercial Businesses – existing and future
2. Residential Buildings – existing and future
3. Building Construction/ Renovation – existing and future
4. Pedestrians, Trespassers, Cyclists – existing and future
5. Schools – future

Potential Routes of Exposure

Three potential primary routes exist by which chemicals can enter the body: ingestion, inhalation, and dermal absorption. Exposure can occur based on the following potential media:

- Ingestion of groundwater or fill/ soil;
- Inhalation of vapors or particulates; and
- Dermal absorption of groundwater or fill/ soil.

Potential Exposure Points

Current Conditions: The site is currently capped with a concrete floor slab in the onsite buildings, and concrete and gravel paved on the parking lot/storage yard. Therefore, there are no potential exposure pathways from ingestion, inhalation, or dermal absorption of soil/ fill. Groundwater is not exposed at the site. The site is served by the public water supply and groundwater is not used at the site for potable supply and there is no potential for exposure.

Because the site is currently occupied, there is a potential for soil vapor to accumulate beneath the current buildings on site.

Construction/ Remediation Conditions: During the remedial action, onsite workers will come into direct contact with surface and subsurface soils as a result of on-Site construction and excavation activities. On-Site construction workers potentially could ingest, inhale or have dermal contact with exposed impacted soil and fill. Similarly, off-Site receptors could be exposed to dust and vapors from on-Site activities. Due to the depth of groundwater, direct contact with groundwater is expected. During construction, on-Site and off-Site exposures to contaminated dust from on-Site will be addressed through the Soil/Materials Management Plan, dust controls, and through the implementation of the Community Air-Monitoring Program and a Construction Health and Safety Plan.

Proposed Future Conditions: Under future remediated conditions, all top soils from 0 to 2 feet bg and hotspots in excess of Track 4 SCOs will be removed. The site will be fully capped, preventing potential direct exposure to soil and groundwater remaining in place, and engineering controls (vapor barrier/SSDS) will prevent any potential exposure due to inhalation by preventing soil vapor intrusion. The site is served by the public water supply, and groundwater is not used at the site. There are no plausible off-site pathways for oral, inhalation, or dermal exposure to contaminants derived from the site.

Overall Human Health Exposure Assessment

There are potential complete exposure pathways for the current site condition. There are potential complete exposure pathways that require mitigation during implementation of the remedy. There are no complete exposure pathways under future conditions after the site is developed. This assessment takes into consideration the reasonably anticipated use of the site, which includes a residential structure, site-wide surface cover, and a subsurface vapor barrier system for the building. Under current conditions, on-Site exposure pathways exist for those with access to the Site and trespassers. During remedial construction, on-Site and off-Site exposures to contaminated dust from historic fill material will be addressed through dust controls, and through the implementation of the Community Air Monitoring Program, the Soil/Materials Management Plan, and a Construction Health and Safety Plan. Potential post-construction use of groundwater is not considered an option because groundwater in this area of

New York City is not used as a potable water source. There are no surface waters in close proximity to the Site that could be impacted or threatened.

5.0 Remedial Action Management

5.1 Project Organization and Oversight

Principal personnel who will participate in the remedial action include Certified Industrial Hygienist, Mike Zouak. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project are Ravi Korlipara (PE), Mike Zouak and Christine Chen (QEPs).

5.2 Site Security

Site access will be controlled by a guarded gated entrance and an entirely fenced property.

5.3 Work Hours

The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. The hours of operation will be conveyed to OER during the pre-construction meeting.

5.4 Construction Health and Safety Plan

The Health and Safety Plan is included in Appendix 5. The Site Safety Coordinator will be Christine Chen. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

All field personnel involved in remedial activities will participate in training required under 29 CFR 1910.120, such as 40-hour hazardous waste operator training and annual 8-hour refresher training. Site Safety Officer will be responsible for maintaining workers training records. Personnel entering any exclusion zone will be trained in the provisions of the HASP and will comply with all requirements of 29 CFR 1910.120. Site-specific training will be provided to

field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

An emergency contact sheet with names and phone numbers is included in the CHASP. That document will define the specific project contacts for use in case of emergency.

5.5 Community Air Monitoring Plan

Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence. Exceedences of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work.

Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

All 15-minute readings must be recorded and be available for OER personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The

equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for OER personnel to review.

5.6 Agency Approvals

All permits or government approvals required for remedial construction have been or will be obtained prior to the start of remedial construction. Approval of this RAWP by OER does not constitute satisfaction of these requirements and will not be a substitute for any required permit.

5.7 Site Preparation

Pre-Construction Meeting

OER will be invited to attend the pre-construction meeting at the Site with all parties involved in the remedial process prior to the start of remedial construction activities.

Mobilization

Mobilization will be conducted as necessary for each phase of work at the Site. Mobilization includes field personnel orientation, equipment mobilization (including securing all sampling equipment needed for the field investigation), marking/staking sampling locations and utility

mark-outs. Each field team member will attend an orientation meeting to become familiar with the general operation of the Site, health and safety requirements, and field procedures.

Utility Marker Layouts, Easement Layouts

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. All invasive activities will be performed incompliance with applicable laws and regulations including NYC Building Code to assure safety. Utility companies and other responsible authorities will be contacted to locate and mark the locations, and a copy of the Mark-Out Ticket will be retained by the contractor prior to the start of drilling, excavation or other invasive subsurface operations. Overhead utilities may also be present within the anticipated work zones. Electrical hazards associated with drilling in the vicinity of overhead utilities will be prevented by maintaining a safe distance between overhead power lines and drill rig masts.

Proper safety and protective measures pertaining to utilities and easements, and compliance with all laws and regulations will be employed during invasive and other work contemplated under this RAWP. The integrity and safety of on-Site and off-Site structures will be maintained during all invasive, excavation or other remedial activity performed under the RAWP.

Dewatering

Dewatering is not anticipated during remediation and construction.

Equipment and Material Staging

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations.

Stabilized Construction Entrance

Steps will be taken to ensure that trucks departing the site will not track soil, fill or debris off-Site. Such actions may include use of cleaned asphalt or concrete pads or use of stone or other aggregate-based egress paths between the truck inspection station and the property exit.

Measures will be taken to ensure that adjacent roadways will be kept clean of project related soils, fill and debris.

Truck Inspection Station

An outbound-truck inspection station will be set up close to the Site exit. Before exiting the Site, trucks will be required to stop at the truck inspection station and will be examined for evidence of contaminated soil on the undercarriage, body, and wheels. Soil and debris will be removed. Brooms, shovels and clean water will be utilized for the removal of soil from vehicles and equipment, as necessary.

Extreme Storm Preparedness and Response Contingency Plan

Damage from flooding or storm surge can include dislocation of soil and stockpiled materials, dislocation of site structures and construction materials and equipment, and dislocation of support of excavation structures. Damage from wind during an extreme storm event can create unsafe or unstable structures, damage safety structures and cause downed power lines creating dangerous site conditions and loss of power. In the event of emergency conditions caused by an extreme storm event, the enrollee will undertake the following steps for site preparedness prior to the event and response after the event.

Storm Preparedness

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and generators will be removed from excavated areas, trenches and depressions on the property to high ground or removed from the property; an inventory of the property with photographs will be performed to establish conditions for the site and equipment prior to the event; stockpile covers for soil and fill will be secured by adding weights such as sandbags for added security and worn or ripped stockpile covers will be replaced with competent covers; stockpiled hazardous wastes will be removed from the property; stormwater management systems will be inspected and fortified, including, as necessary: clean and reposition silt fences, hay bales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

Storm Response

At the conclusion of an extreme storm event, as soon as it is safe to access the property, a complete inspection of the property will be performed. A site inspection report will be submitted to OER at the completion of site inspection and after the site security is assessed. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings, structures or equipment will be reported to public safety authorities via appropriate means such as calling 911. Petroleum spills will be reported to NYS DEC within 2 hours of identification and consistent with State regulations. Emergency and spill conditions will also be reported to OER. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed. Dewatering will be performed in compliance with existing laws and regulations and consistent with emergency notifications, if any, from proper authorities. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Stormwater control systems and structures will be inspected and maintained as necessary. If soil or fill materials are discharged off site to adjacent properties, property owners and OER will be notified and corrective measure plan designed to remove and clean dislocated material will be submitted to OER and implemented following approval by OER and granting of site access by the property owner. Impacted offsite areas may require characterization based on site conditions, at the discretion of OER. If onsite petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYS DEC's spill hotline at DEC 800-457-7362 within statutory defined timelines. If the source of the spill is ongoing and can be identified, it should be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYS DEC.

Storm Response Reporting

A site inspection report will be submitted to OER at the completion of site inspection. An inspection report established by OER is available on OER's website (www.nyc.gov/oer) and will

be used for this purpose. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. The site inspection report will be sent to the OER project manager and will include the site name, address, tax block and lot, site primary and alternate contact name and phone number. Damage and soil release assessment will include: whether the project had stockpiles; whether stockpiles were damaged; photographs of damage and notice of plan for repair; report of whether soil from the site was dislocated and whether any of the soil left the site; estimates of the volume of soil that left the site, nature of impact, and photographs; description of erosion damage; description of equipment damage; description of damage to the remedial program or the construction program, such as damage to the support of excavation; presence of onsite or offsite exposure pathways caused by the storm; presence of petroleum or other spills and status of spill reporting to NYS DEC; description of corrective actions; schedule for corrective actions. This report should be completed and submitted to OER project manager with photographs within 24 hours of the time of safe entry to the property after the storm event.

5.8 Traffic Control

Drivers of trucks leaving the Site with soil/fill will be instructed to proceed without stopping in the vicinity of the Site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the site will be reported to OER prior to start of remediation.

5.9 Demobilization

Demobilization will include:

- As necessary, restoration of temporary access areas and areas that may have been disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management areas, and access area);
- Removal of sediment from erosion control measures and truck wash and disposal of materials in accordance with applicable laws and regulations;
- Equipment decontamination, and;
- General refuse disposal.

Equipment will be decontaminated and demobilized at the completion of all field activities. Investigation equipment and large equipment (e.g., soil excavators) will be washed at the truck inspection station as necessary. In addition, all investigation and remediation derived waste will be appropriately disposed.

5.10 Reporting and Record Keeping

Daily reports

Daily reports providing a general summary of activities for each day of active remedial work will be emailed to the OER Project Manager by the end of the following business day. Those reports will include:

- Project number and statement of the activities and an update of progress made and locations of excavation and other remedial work performed;
- Quantities of material imported and exported from the Site;
- Status of on-Site soil/fill stockpiles;
- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);
- A summary of CAMP results noting all excursions. CAMP data may be reported;
- Photograph of notable Site conditions and activities.

The frequency of the reporting period may be revised in consultation with OER project manager based on planned project tasks. Daily email reports are not intended to be the primary mode of communication for notification to OER of emergencies (accidents, spills), requests for changes to the RAWP or other sensitive or time critical information. However, such information will be included in the daily reports. Emergency conditions and changes to the RAWP will be communicated directly to the OER project manager by personal communication. Daily reports will be included as an Appendix in the Remedial Action Report.

Record Keeping and Photo Documentation

Job-site record keeping for all remedial work will be performed. These records will be maintained on-Site during the project and will be available for inspection by OER staff. Representative photographs will be taken of the Site prior to any remedial activities and during

major remedial activities to illustrate remedial program elements and contaminant source areas. Photographs will be submitted at the completion of the project in the RAR in digital format (i.e. jpeg files).

5.11 Complaint Management

All complaints from citizens will be promptly reported to OER. Complaints will be addressed and outcomes will also be reported to OER in daily reports. Notices to OER will include the nature of the complaint, the party providing the complaint, and the actions taken to resolve any problems.

5.12 Deviations from the Remedial Action Work Plan

All changes to the RAWP will be reported to, and approved by, the OER Project Manager and will be documented in daily reports and reported in the Remedial Action Report. The process to be followed if there are any deviations from the RAWP will include a request for approval for the change from OER noting the following:

- Reasons for deviating from the approved RAWP;
- Effect of the deviations on overall remedy; and
- Determination with basis that the remedial action with the deviation(s) is protective of public health and the environment.

6.0 Remedial Action Report

A Remedial Action Report (RAR) will be submitted to OER following implementation of the remedial action defined in this RAWP. The RAR will document that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The RAR will include:

- Information required by this RAWP;
- Text description with thorough detail of all engineering and institutional controls (if Track 1 remedial action is not achieved);
- As-built drawings for all constructed remedial elements;
- Manifests for al soil or fill disposal;
- Photographic documentation of remedial work performed under this remedy;
- Site Management Plan (if Track 1 remedial action is not achieved);
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results (including all soil test results from the remedial investigation for soil that will remain on site) and all soil/fill waste characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all soil or fill material removed from the Site including a map showing the location of these excavations and hotspots, tanks or other contaminant source areas;
- Full accounting of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material;
- Account of the origin and required chemical quality testing for material imported onto the Site;
- Continue registration of the property with an E-Designation by the NYC Department of Buildings (if Track 1 remedial action is not achieved);

- The RAWP and Remedial Investigation Report will be included as appendices to the RAR;
- Reports and supporting material will be submitted in digital form and final PDF's will include bookmarks for each appendix.

Remedial Action Report Certification

I, Ravi Korlipara, am currently a registered professional engineer licensed by the State of New York. I performed professional engineering services and had primary direct responsibility for implementation of the remedial program for the 15 Prospect Street, 326 Front Street, 320-322 Front Street and Vacant Lot on Sands Street site in the Stapleton Waterfront section of Staten Island, New York (NYC OER Project Number: 16EH-N081R, VCP site number: 16CVCP071R. I certify to the following:

- I have reviewed this document, to which my signature and seal are affixed.
- Engineering Controls implemented during this remedial action were designed by me or a person under my direct supervision and achieve the goals established in the Remedial Action Work Plan for this site.
- The Engineering Controls constructed during this remedial action were professionally observed by me or by a person under my direct supervision and (1) are consistent with the Engineering Control design established in the Remedial action Work Plan and (2) are accurately reflected in the text and drawings for as-built design reported in this Remedial Action Report.
- The OER-approved Remedial Action Work Plan dated [date] and Stipulations in a letter dated [date] were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

Name

PE Stamp

PE License Number

Signature

Date

I, Mike Zouak, am a Qualified Environmental Professional. I had primary direct responsibility for implementation of the remedial program for the 15 Prospect Street, 326 Front Street, 320-322 Front Street and Vacant Lot on Sands Street site in the Stapleton Waterfront section of Staten Island, New York (NYC OER Project Number: 16EH-N081R, VCP site number: TBD). I certify to the following:

- The OER-approved Remedial Action Work Plan dated August 15, 2012 and Stipulations in a letter dated September 10, 2014 were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.

QEP Name

QEP Signature

Date

7.0 Schedule

The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a six to seven month remediation period is anticipated.

Schedule Milestone	**Weeks from Remedial Action Start**	**Duration (weeks)**
OER Approval of RAWP	0	-
Fact Sheet 2 announcing start of remedy	0	-
Mobilization	1	1
Remedial Excavation	2	4
Demobilization	5	1
Submit Remedial Action Report	15	-

FIGURES

AIRTEK ENVIRONMENTAL CORP.

39 – 37 29th Street, Long Island City, New York, 11101
Phone (718) 937-3720 Fax (718) 937-3721
www.airtekenv.com

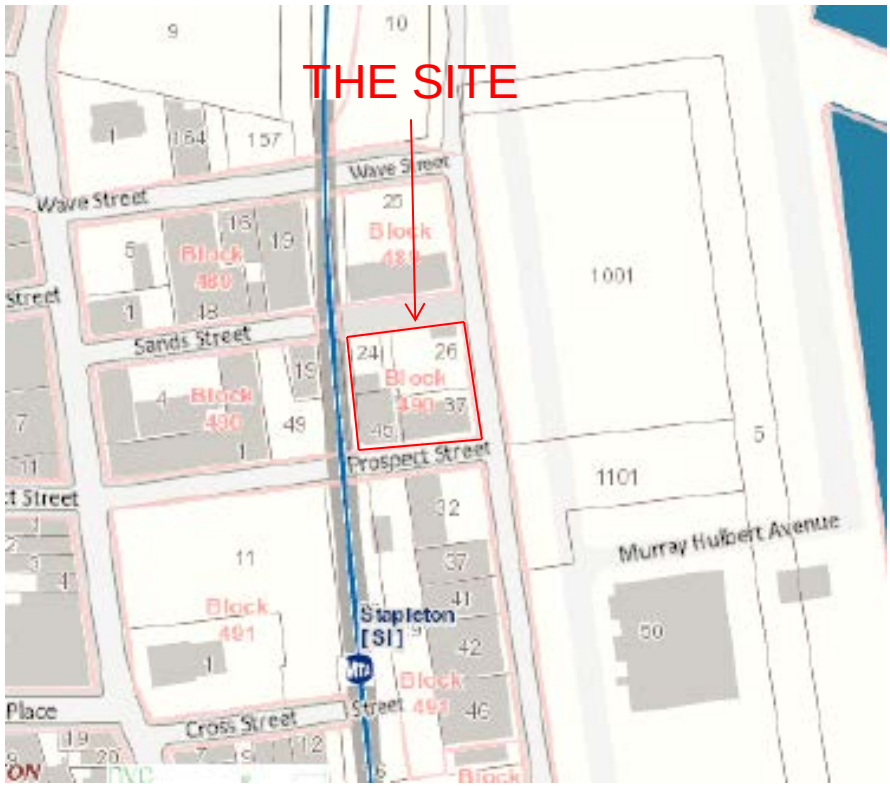


FIGURE 1: SITE LOCATION MAP	
Block: 490	**Lots: 24, 26, 37 and 45**
Address: 15 Prospect Street, 326 Front Street 320-322 Front Street and Vacant Lot on Sands Street Staten Island, NY 10304	
Airtek Project Number: 15-1185	**Date:** 02-23-2016

15 PROSPECT STREET

SUBSURFACE WATERPROOFING AND VAPOR BARRIER SYSTEM & SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYSTEM

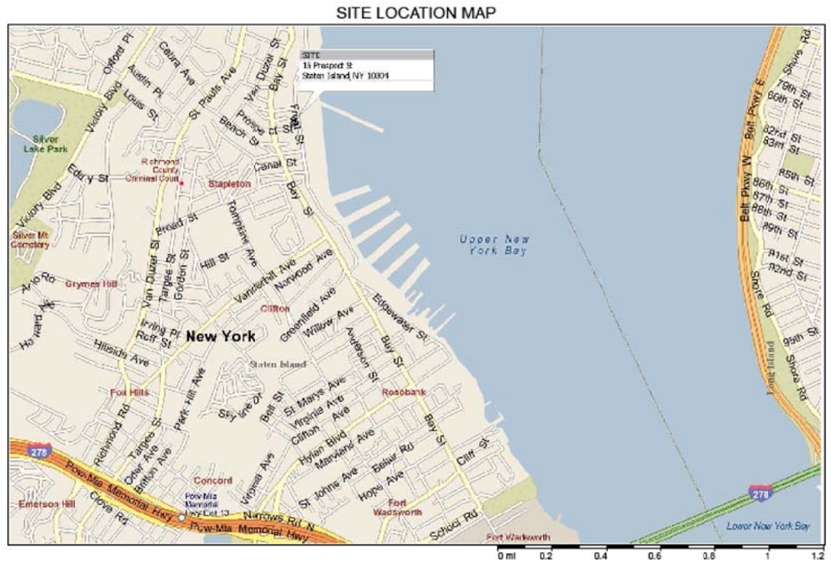
15 PROSPECT STREET 326 FRONT STREET, STATEN ISLAND
320–322 FRONT STREET AND VACANT LOT ON SAND STREET

DESIGN ENGINEER

RAVI K. KORLIPARA, PH.D., P.E.

DRAWING INDEX

SITE LOCATION MAP



NOTE:
CONTRACTOR SHALL INSTALL THE VAPOR BARRIER AND WATERPROOFING LINER AND SYSTEM PER MANUFACTURER'S INSTRUCTIONS. IN CASE OF DISCREPANCY BETWEEN THESE PLANS AND LINER MANUFACTURER'S INSTRUCTIONS, PRIOR TO COMMENCEMENT OF THE PROJECT'S CONSTRUCTION, CONTACT DESIGN ENGINEER AT LEAST 48 HOURS IN ADVANCE FOR FURTHER INSTRUCTIONS AND/OR CLARIFICATIONS ON ITEMS IN QUESTIONS, WHICH SHALL BE PROVIDED BY THE ENGINEER IN WRITING.

NOTE:
THESE DRAWINGS ARE FOR VAPOR BARRIER AND WATERPROOFING, AND SUBSLAB DEPRESSURIZATION AND ACTIVE VAPOR VENTING APPLICATIONS ONLY, AND SHALL NOT BE USED FOR CONSTRUCTION OF ANY OTHER FEATURES. THE STRUCTURAL DESIGN FOR THIS DEVELOPMENT HAS NOT BEEN COMPLETED. THEREFORE, ANTICIPATED STRUCTURAL FEATURES WERE ASSUMED FOR THIS DESIGN TO DEPITCT CONSTRUCTION OF VAPOR BARRIER AND WATERPROOFING MEMBRANE, AND SUBSLAB DEPRESSURIZATION AND VENTING SYSTEM FEATURES UNDER POTENTIALLY LIKELY STRUCTURAL DESIGN CONDITIONS, AND THIS DESIGN MUST BE ADAPTED TO THE FINAL STRUCTURAL DESIGN IF IT IS AT VARIANCE FROM THE ASSUMED FOUNDATION AND OTHER STRUCTURAL DESIGN FEATURES SHOWN IN THESE DRAWINGS. ALL ADAPTATIONS AND MODIFICATIONS TO THESE MEMBRANE AND VENTING SYSTEM PLANS SHALL BE APPROVED IN WRITING BY THE DESIGN ENGINEER OR A NEW YORK STATE LICENSED PROFESSIONAL ENGINEER ***PRIOR TO*** *COMMENCEMENT OF CONSTRUCTION. ALTHOUGH STRUCTURAL ELEMENTS ARE SHOWN IN THESE DRAWINGS, THEY ARE INCLUDED FOR REPRESENTATIONAL PURPOSE ONLY AND ARE NOT BASED ON FORMAL STRUCTURAL DESIGN AND CALCULATIONS, AND SHALL NOT BE USED FOR CONSTRUCTION OF FOUNDATION AND OTHER STRUCTURAL ELEMENTS.*

THIS DRAWING CROSS–REFERENCED TO:

FIGURE 1 OF RAWP

NO.	DATE	DESCRIPTION	APP.

REVISIONS

KORLIPARA ENGINEERING
CONSULTING SERVICES
150 Broadhollow Road (Rt. 110)
Suite PH7
Melville, NY 11747
(631)421–2969

AIRTEK ENVIRONMENTAL CORPORATION
39–37 29th Street
Long Island City, NY 11101
(718)937–3720

PROJECT TITLE: SUBSURFACE WATERPROOFING AND VAPOR BARRIER SYSTEM & SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYTEM
15 PROSPECT STREET, STATEN ISLAND NY

TITLE: TITLE SHEET WITH SITE LOCATION MAP

DESIGNED: RKK
DRAWN: REK
CHECKED: RKK
N.T.S.

DATE: 06–06–16
SCALE: N.T.S
PAPER SIZE: D (ANSI) 22x34

DWG. NO. 1 OF 9

AIRTEK ENVIRONMENTAL CORP.

39 – 37 29th Street, Long Island City, New York, 11101
Phone (718) 937-3720 Fax (718) 937-3721
www.airtekenv.com

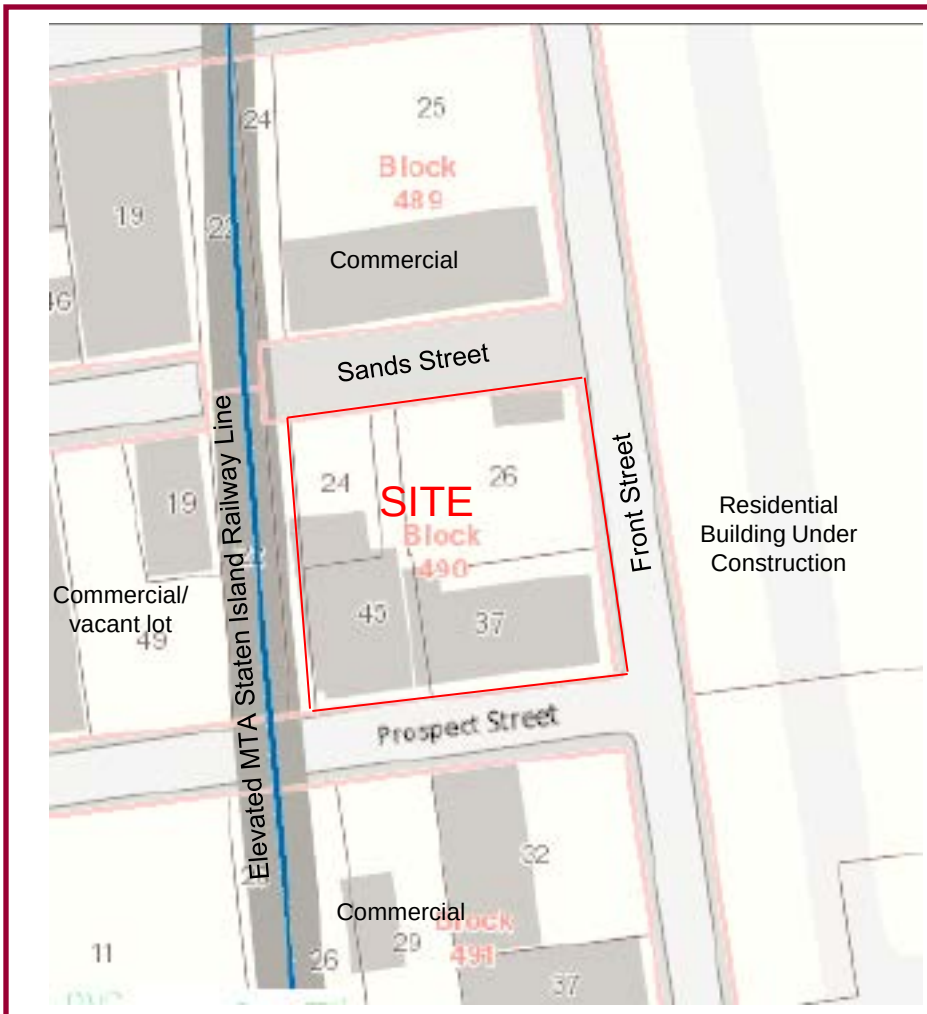
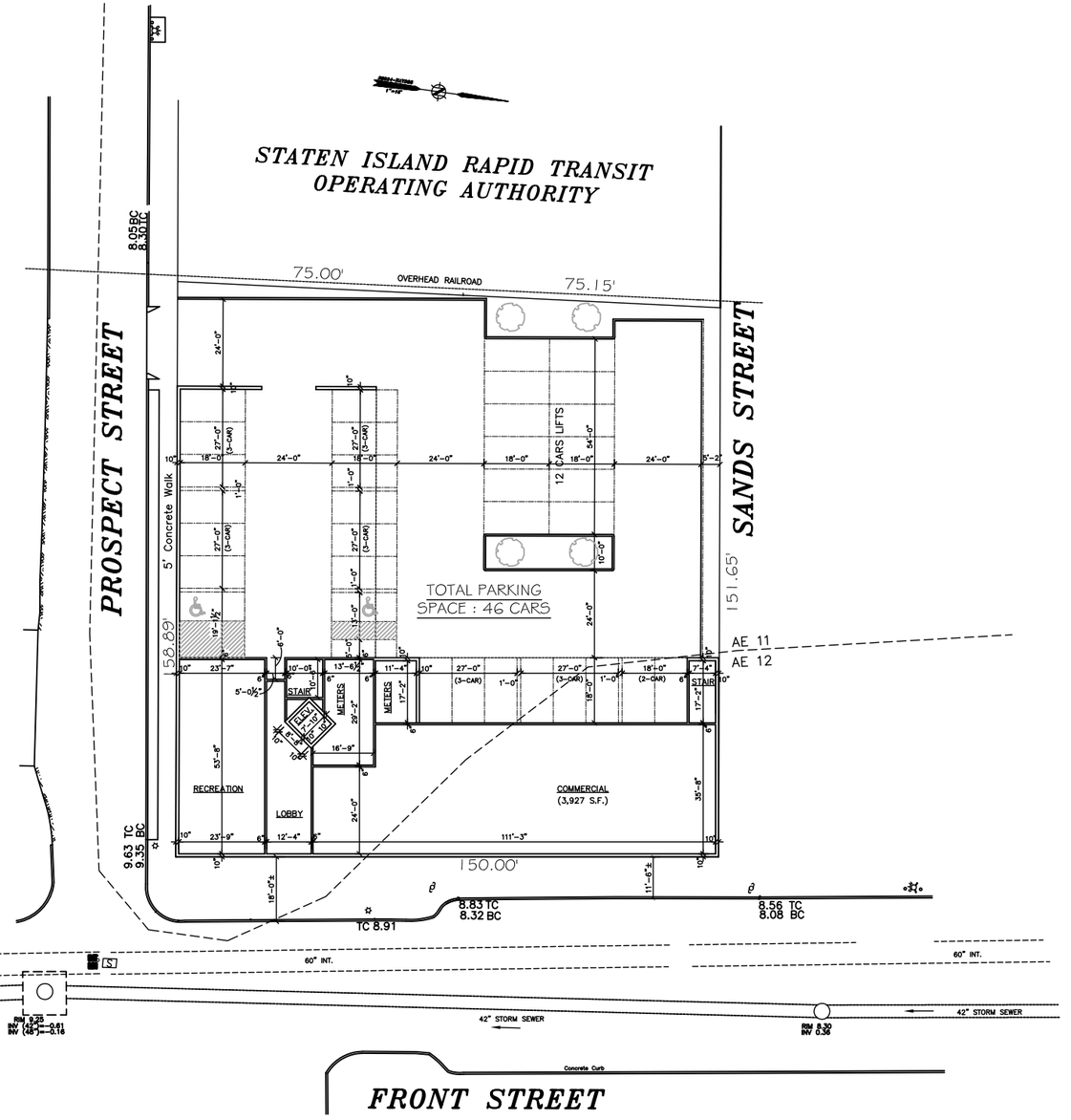


FIGURE 2: SITE BOUNDARY MAP	
Block: 490	**Lots: 24, 26, 37 and 45**
Address: 15 Prospect Street, 326 Front Street 320-322 Front Street and Vacant Lot on Sands Street Staten Island, NY 10304	
Airtek Project Number: 15-1185	**Date:** 02-23-2016



NOTE:
CONTRACTOR SHALL INSTALL THE VAPOR BARRIER AND WATERPROOFING LINER AND SYSTEM PER MANUFACTURER'S INSTRUCTIONS. IN CASE OF DISCREPANCY BETWEEN THESE PLANS AND LINER MANUFACTURER'S INSTRUCTIONS, PRIOR TO COMMENCEMENT OF THE PROJECT'S CONSTRUCTION, CONTACT DESIGN ENGINEER AT LEAST 48 HOURS IN ADVANCE FOR FURTHER INSTRUCTIONS AND/OR CLARIFICATIONS ON ITEMS IN QUESTIONS, WHICH SHALL BE PROVIDED BY THE ENGINEER IN WRITING.

NOTE:
THESE DRAWINGS ARE FOR VAPOR BARRIER AND WATERPROOFING, AND SUBSLAB DEPRESSURIZATION AND ACTIVE VAPOR VENTING APPLICATIONS ONLY, AND SHALL NOT BE USED FOR CONSTRUCTION OF ANY OTHER FEATURES. THE STRUCTURAL DESIGN FOR THIS DEVELOPMENT HAS NOT BEEN COMPLETED. THEREFORE, ANTICIPATED STRUCTURAL FEATURES WERE ASSUMED FOR THIS DESIGN TO DEPITCT CONSTRUCTION OF VAPOR BARRIER AND WATERPROOFING MEMBRANE, AND SUBSLAB DEPRESSURIZATION AND VENTING SYSTEM FEATURES UNDER POTENTIALLY LIKELY STRUCTURAL DESIGN CONDITIONS, AND THIS DESIGN MUST BE ADAPTED TO THE FINAL STRUCTURAL DESIGN IF IT IS AT VARIANCE FROM THE ASSUMED FOUNDATION AND OTHER STRUCTURAL DESIGN FEATURES SHOWN IN THESE DRAWINGS. ALL ADAPTATIONS AND MODIFICATIONS TO THESE MEMBRANE AND VENTING SYSTEM PLANS SHALL BE APPROVED IN WRITING BY THE DESIGN ENGINEER OR A NEW YORK STATE LICENSED PROFESSIONAL ENGINEER ***PRIOR TO*** *COMMENCEMENT OF CONSTRUCTION. ALTHOUGH STRUCTURAL ELEMENTS ARE SHOWN IN THESE DRAWINGS, THEY ARE INCLUDED FOR REPRESENTATIONAL PURPOSE ONLY AND ARE NOT BASED ON FORMAL STRUCTURAL DESIGN AND CALCULATIONS, AND SHALL NOT BE USED FOR CONSTRUCTION OF FOUNDATION AND OTHER STRUCTURAL ELEMENTS.*

SITE PLAN
SCALE: 1" = 20'-0" (D-SIZE)
1" = 40'-0" [IF PRINTED ON 11"X17" (TABLOID-SIZE) PAPER]

THIS DRAWING CROSS-REFERENCED TO:

FIGURE 2 AND FIGURE 3 OF RAWP

STATE OF NEW YORK
RAVI KUMAR KORLIPARA
No. 070038
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION	APP.

REVISIONS

KORLIPARA ENGINEERING
CONSULTING SERVICES
150 Broadhollow Road (Rt. 110)
Suite PH7
Melville, NY 11747
(631)421-2969

AIRTEK ENVIRONMENTAL CORPORATION
39-37 29th Street
Long Island City, NY 11101
(718)937-3720

PROJECT TITLE: SUBSURFACE WATERPROOFING AND VAPOR BARRIER SYSTEM & SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYTEM
15 PROSPECT STREET, STATEN ISLAND NY

TITLE: SITE PLAN

DESIGNED: RKK
DRAWN: REK
CHECKED: RKK

DATE: 06-06-16
SCALE: 1" = 20'
PAPER SIZE: D (ANSI) 22x34

DWG. NO. 2 OF 9

AIRTEK ENVIRONMENTAL CORP.

39 – 37 29th Street, Long Island City, New York, 11101
Phone (718) 937-3720 Fax (718) 937-3721
www.airtekenv.com

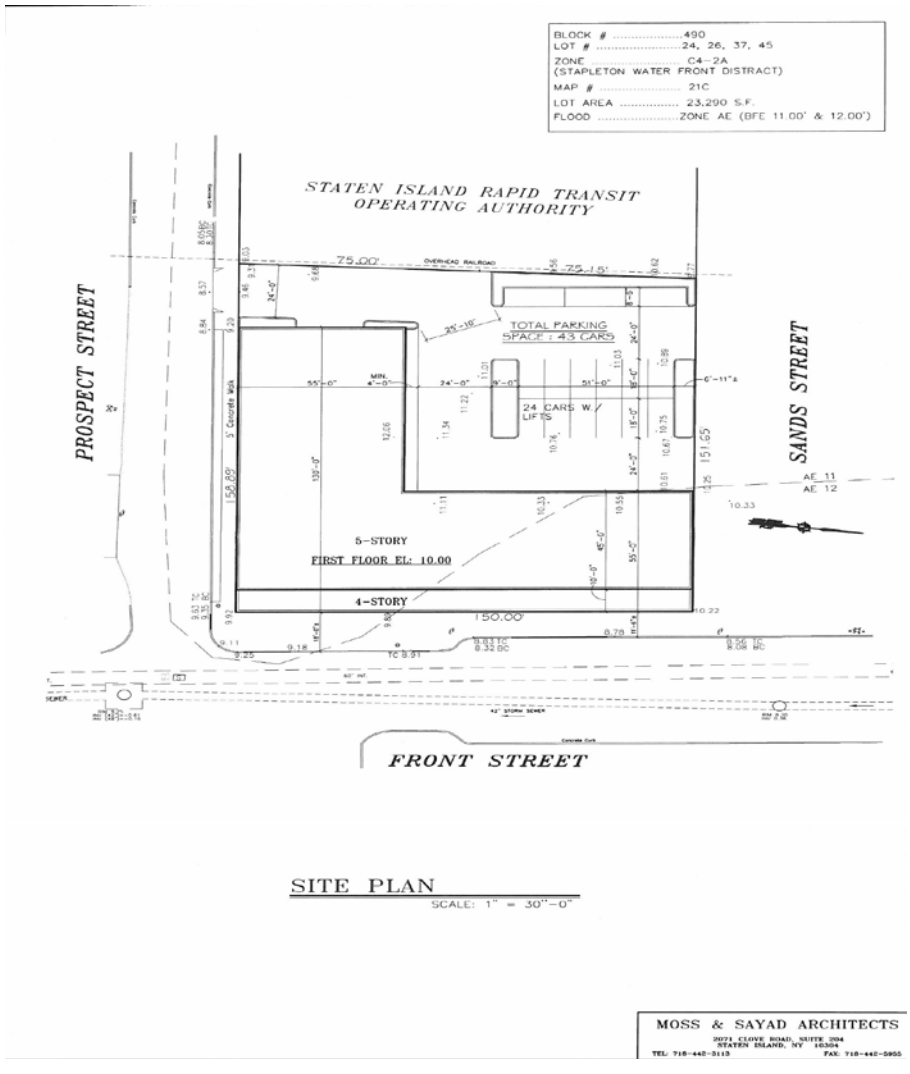
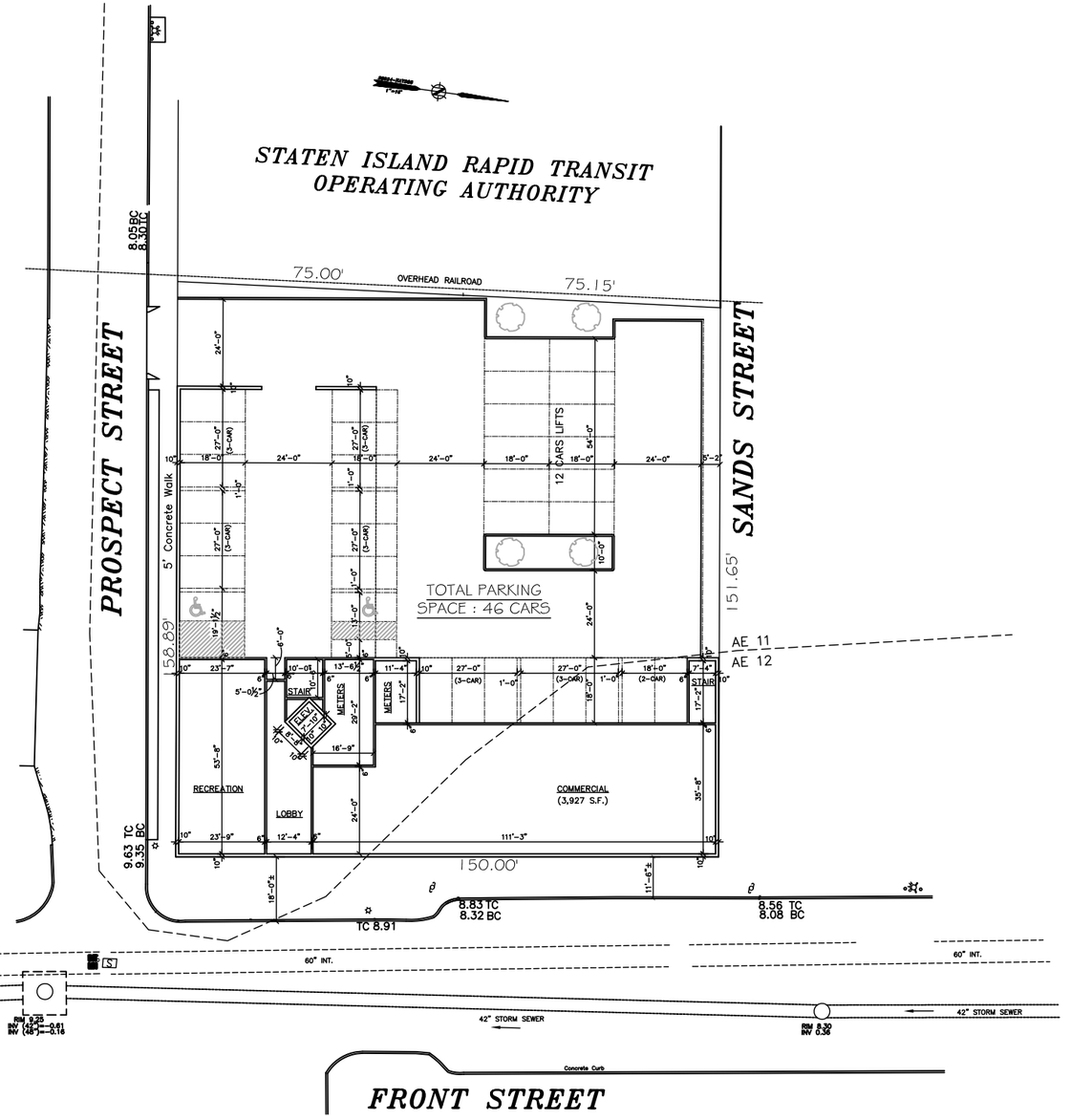


FIGURE 3: PROPOSED DEDEVELOPMENT PLAN	
Block: 490	**Lots: 24, 26, 37 and 45**
Address: 15 Prospect Street, 326 Front Street 320-322 Front Street and Vacant Lot on Sands Street Staten Island, NY 10304	
Airtek Project Number: 15-1185	**Date:** 02-23-2016



NOTE:
CONTRACTOR SHALL INSTALL THE VAPOR BARRIER AND WATERPROOFING LINER AND SYSTEM PER MANUFACTURER'S INSTRUCTIONS. IN CASE OF DISCREPANCY BETWEEN THESE PLANS AND LINER MANUFACTURER'S INSTRUCTIONS, PRIOR TO COMMENCEMENT OF THE PROJECT'S CONSTRUCTION, CONTACT DESIGN ENGINEER AT LEAST 48 HOURS IN ADVANCE FOR FURTHER INSTRUCTIONS AND/OR CLARIFICATIONS ON ITEMS IN QUESTIONS, WHICH SHALL BE PROVIDED BY THE ENGINEER IN WRITING.

NOTE:
THESE DRAWINGS ARE FOR VAPOR BARRIER AND WATERPROOFING, AND SUBSLAB DEPRESSURIZATION AND ACTIVE VAPOR VENTING APPLICATIONS ONLY, AND SHALL NOT BE USED FOR CONSTRUCTION OF ANY OTHER FEATURES. THE STRUCTURAL DESIGN FOR THIS DEVELOPMENT HAS NOT BEEN COMPLETED. THEREFORE, ANTICIPATED STRUCTURAL FEATURES WERE ASSUMED FOR THIS DESIGN TO DEPITCT CONSTRUCTION OF VAPOR BARRIER AND WATERPROOFING MEMBRANE, AND SUBSLAB DEPRESSURIZATION AND VENTING SYSTEM FEATURES UNDER POTENTIALLY LIKELY STRUCTURAL DESIGN CONDITIONS, AND THIS DESIGN MUST BE ADAPTED TO THE FINAL STRUCTURAL DESIGN IF IT IS AT VARIANCE FROM THE ASSUMED FOUNDATION AND OTHER STRUCTURAL DESIGN FEATURES SHOWN IN THESE DRAWINGS. ALL ADAPTATIONS AND MODIFICATIONS TO THESE MEMBRANE AND VENTING SYSTEM PLANS SHALL BE APPROVED IN WRITING BY THE DESIGN ENGINEER OR A NEW YORK STATE LICENSED PROFESSIONAL ENGINEER ***PRIOR TO*** *COMMENCEMENT OF CONSTRUCTION. ALTHOUGH STRUCTURAL ELEMENTS ARE SHOWN IN THESE DRAWINGS, THEY ARE INCLUDED FOR REPRESENTATIONAL PURPOSE ONLY AND ARE NOT BASED ON FORMAL STRUCTURAL DESIGN AND CALCULATIONS, AND SHALL NOT BE USED FOR CONSTRUCTION OF FOUNDATION AND OTHER STRUCTURAL ELEMENTS.*

SITE PLAN
SCALE: 1" = 20'-0" (D-SIZE)
1" = 40'-0" [IF PRINTED ON 11"X17" (TABLOID-SIZE) PAPER]

THIS DRAWING CROSS-REFERENCED TO:

FIGURE 2 AND FIGURE 3 OF RAWP

STATE OF NEW YORK
RAVI KUMAR KORLIPARA
No. 070038
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION	APP.

REVISIONS

KORLIPARA ENGINEERING
CONSULTING SERVICES
150 Broadhollow Road (Rt. 110)
Suite PH7
Melville, NY 11747
(631)421-2969

AIRTEK ENVIRONMENTAL CORPORATION
39-37 29th Street
Long Island City, NY 11101
(718)937-3720

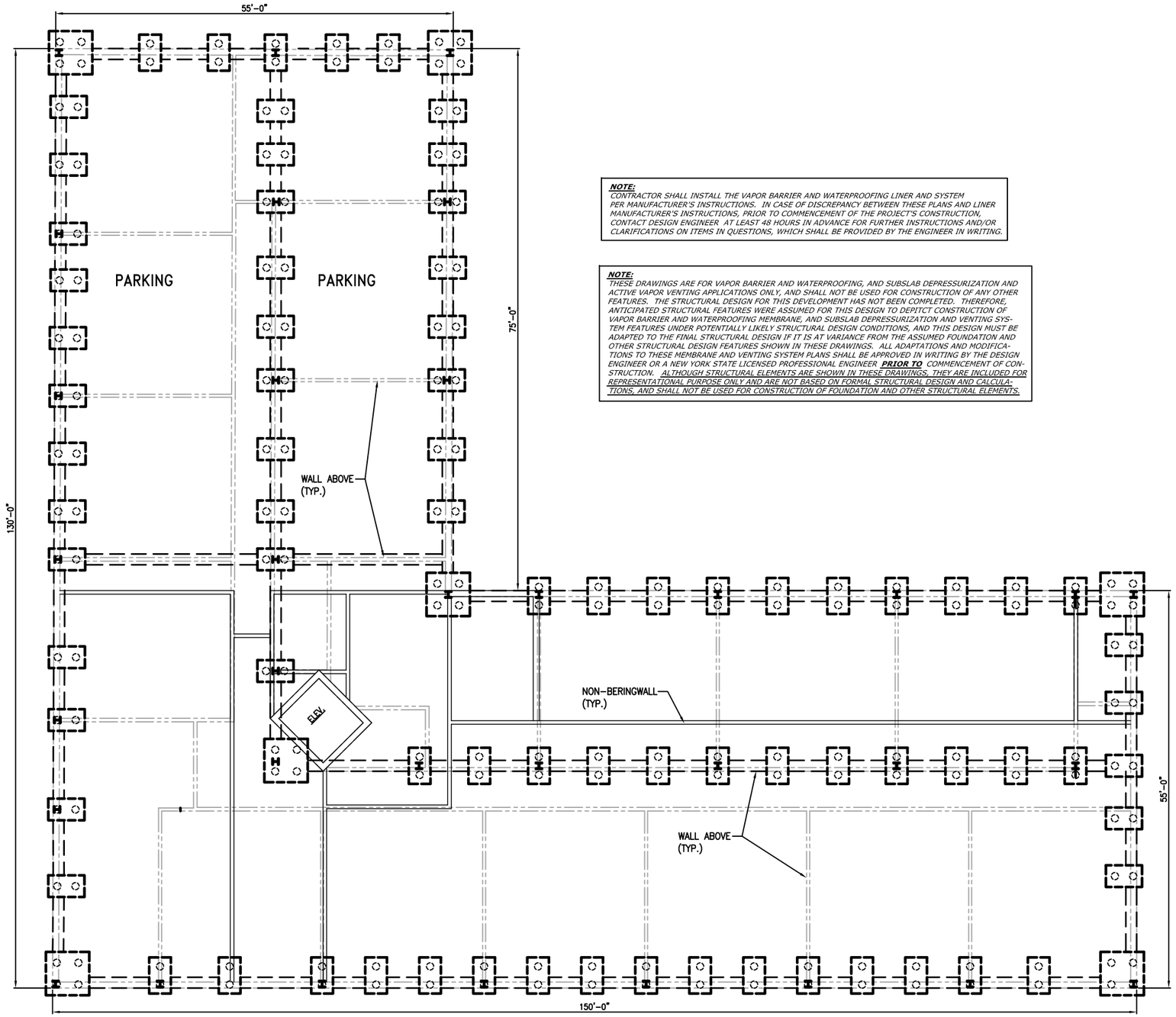
PROJECT TITLE: SUBSURFACE WATERPROOFING AND VAPOR BARRIER SYSTEM & SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYTEM
15 PROSPECT STREET, STATEN ISLAND NY

TITLE: SITE PLAN

DESIGNED: RKK
DRAWN: REK
CHECKED: RKK

DATE: 06-06-16
SCALE: 1" = 20'
PAPER SIZE: D (ANSI) 22x34

DWG. NO. 2 OF 9



PROSPECT STREET

SANDS STREET

FRONT STREET

N

LEGEND:

INDICATES WALL ABOVE

INDICATES NON-BEARING WALL

INDICATES STRAP BEAM

NOTE:
CONTRACTOR SHALL INSTALL THE VAPOR BARRIER AND WATERPROOFING LINER AND SYSTEM PER MANUFACTURER'S INSTRUCTIONS. IN CASE OF DISCREPANCY BETWEEN THESE PLANS AND LINER MANUFACTURER'S INSTRUCTIONS, PRIOR TO COMMENCEMENT OF THE PROJECT'S CONSTRUCTION, CONTACT DESIGN ENGINEER AT LEAST 48 HOURS IN ADVANCE FOR FURTHER INSTRUCTIONS AND/OR CLARIFICATIONS ON ITEMS IN QUESTIONS, WHICH SHALL BE PROVIDED BY THE ENGINEER IN WRITING.

NOTE:
THESE DRAWINGS ARE FOR VAPOR BARRIER AND WATERPROOFING, AND SUBSLAB DEPRESSURIZATION AND ACTIVE VAPOR VENTING APPLICATIONS ONLY, AND SHALL NOT BE USED FOR CONSTRUCTION OF ANY OTHER FEATURES. THE STRUCTURAL DESIGN FOR THIS DEVELOPMENT HAS NOT BEEN COMPLETED. THEREFORE, ANTICIPATED STRUCTURAL FEATURES WERE ASSUMED FOR THIS DESIGN TO DEPITCT CONSTRUCTION OF VAPOR BARRIER AND WATERPROOFING MEMBRANE, AND SUBSLAB DEPRESSURIZATION AND VENTING SYSTEM FEATURES UNDER POTENTIALLY LIKELY STRUCTURAL DESIGN CONDITIONS, AND THIS DESIGN MUST BE ADAPTED TO THE FINAL STRUCTURAL DESIGN IF IT IS AT VARIANCE FROM THE ASSUMED FOUNDATION AND OTHER STRUCTURAL DESIGN FEATURES SHOWN IN THESE DRAWINGS. ALL ADAPTATIONS AND MODIFICATIONS TO THESE MEMBRANE AND VENTING SYSTEM PLANS SHALL BE APPROVED IN WRITING BY THE DESIGN ENGINEER OR A NEW YORK STATE LICENSED PROFESSIONAL ENGINEER ***PRIOR TO*** *COMMENCEMENT OF CONSTRUCTION. ALTHOUGH STRUCTURAL ELEMENTS ARE SHOWN IN THESE DRAWINGS, THEY ARE INCLUDED FOR REPRESENTATIONAL PURPOSE ONLY AND ARE NOT BASED ON FORMAL STRUCTURAL DESIGN AND CALCULATIONS, AND SHALL NOT BE USED FOR CONSTRUCTION OF FOUNDATION AND OTHER STRUCTURAL ELEMENTS.*

FOUNDATION PLAN
SCALE: 1/8" = 1'-0" (D-SIZE)
1/16" = 1'-0" [IF PRINTED ON 11"X17" (TABLOID-SIZE) PAPER]

THIS DRAWING CROSS-REFERENCED TO:

FIGURE 3 OF RAWP

STATE OF NEW YORK · RAVI KUMAR KORLIPARA · No. 070038 · LICENSED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION	APP.

REVISIONS

KORLIPARA ENGINEERING
CONSULTING SERVICES
150 Broadhollow Road (Rt. 110)
Suite PH7
Melville, NY 11747
(631)421-2969

AIRTEK ENVIRONMENTAL CORPORATION
39-37 29th Street
Long Island City, NY 11101
(718)937-3720

PROJECT TITLE: SUBSURFACE WATERPROOFING AND VAPOR BARRIER SYSTEM & SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYTEM
15 PROSPECT STREET, STATEN ISLAND NY

TITLE: FOUNDATION PLAN

DESIGNED: RKK
DRAWN: REK
CHECKED: RKK

DATE: 06-06-16
SCALE: 1/8" = 1'-0"
PAPER SIZE: D (ANSI) 22x34

DWG. NO. 3 OF 9

AIRTEK ENVIRONMENTAL CORP.

39 – 37 29th Street, Long Island City, New York, 11101
Phone (718) 937-3720 Fax (718) 937-3721
www.airtekenv.com

LEGEND

- Hotspot Excavation Areas to 8' bgs*
- Excavation Area to 2' bgs*

* bgs: below ground surface

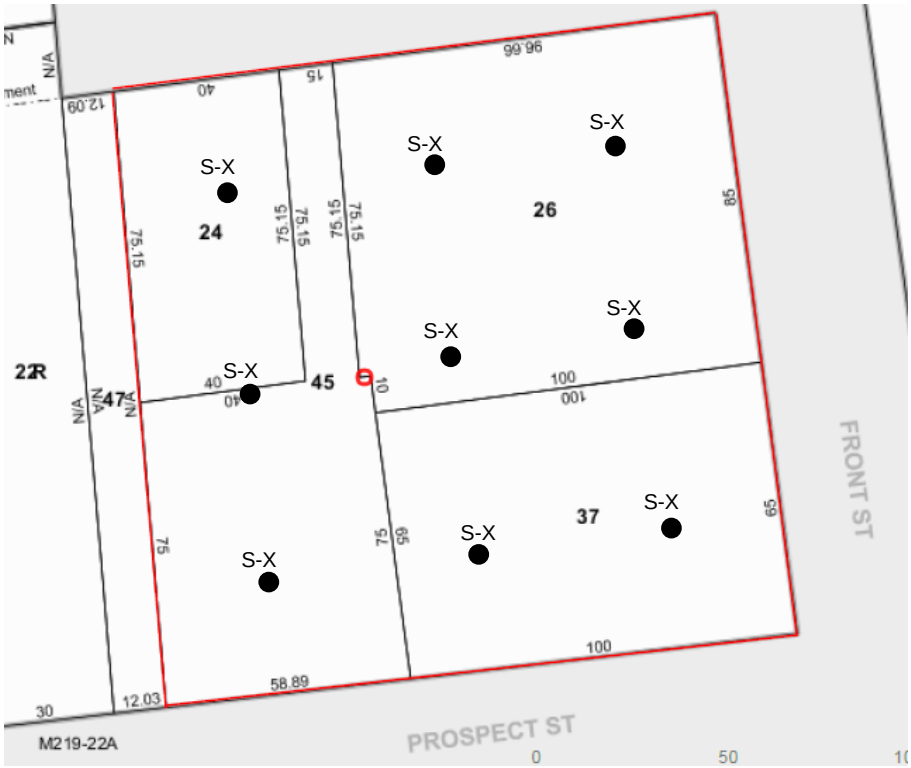
Note: Excavation Locations for Supporting Pilings are TBD. Excavation will be to 4' bgs

FIGURE 4: SITE EXCAVATION DIAGRAM

Block: 490	**Lots: 24, 26, 37 and 45**
Address: 15 Prospect Street, 326 Front Street 320-322 Front Street and Vacant Lot on Sands Street Staten Island, NY 10304	
Airtek Project Number: 15-1185	**Date:** 02-23-2016

AIRTEK ENVIRONMENTAL CORP.

39 – 37 29th Street, Long Island City, New York, 11101
Phone (718) 937-3720 Fax (718) 937-3721
www.airtekenv.com



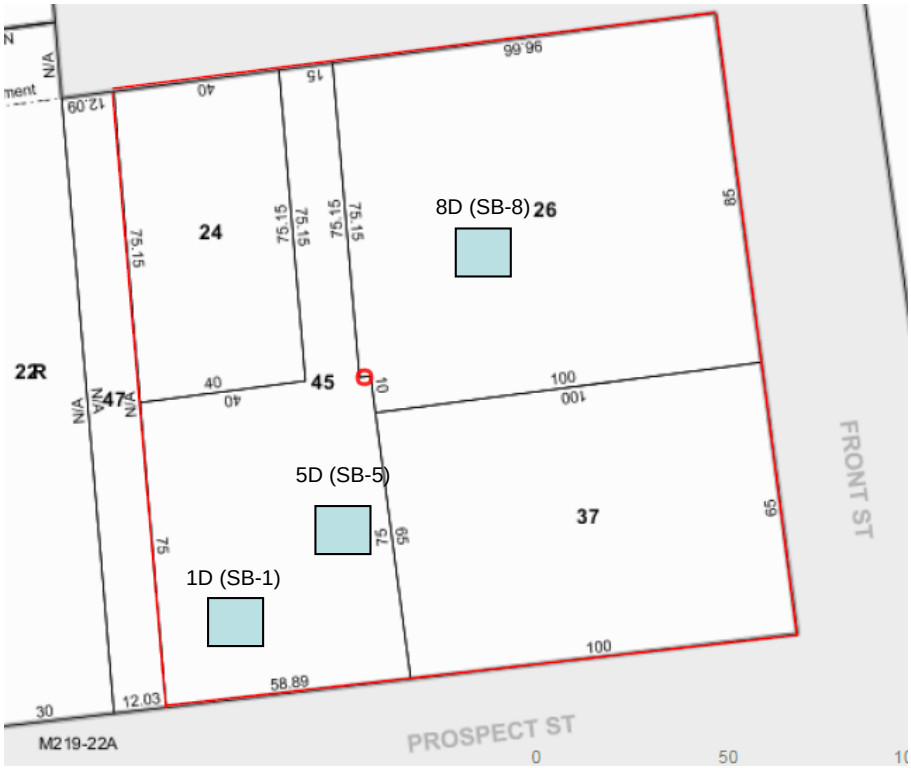
LEGEND

S-X End-point Sampling Location

FIGURE 5: MAP OF END-POINT SAMPLE LOCATIONS	
Block: 490	**Lots: 24, 26, 37 and 45**
Address: 15 Prospect Street, 326 Front Street 320-322 Front Street and Vacant Lot on Sands Street Staten Island, NY 10304	
Airtek Project Number: 15-1185	**Date:** 02-23-2016

AIRTEK ENVIRONMENTAL CORP.

39 – 37 29th Street, Long Island City, New York, 11101
Phone (718) 937-3720 Fax (718) 937-3721
www.airtekenv.com



LEGEND

Localized Metals/SVOCs Hotspot Areas in Soil to 8' bgs

SB-1, SB-8: Soil Boring Locations During RI

FIGURE 6: MAP OF HOTSPOT END-POINT SAMPLE LOCATIONS

Block: 490	**Lots: 24, 26, 37 and 45**

Address: 15 Prospect Street, 326 Front Street
320-322 Front Street and Vacant Lot on Sands Street
Staten Island, NY 10304

Airtek Project Number: 15-1185	**Date:** 02-23-2016

LEGEND:

INDICATES PREPRUFE VAPOR BARRIER & WATERPROOFING MEMBRANE

INDICATES WALL ABOVE

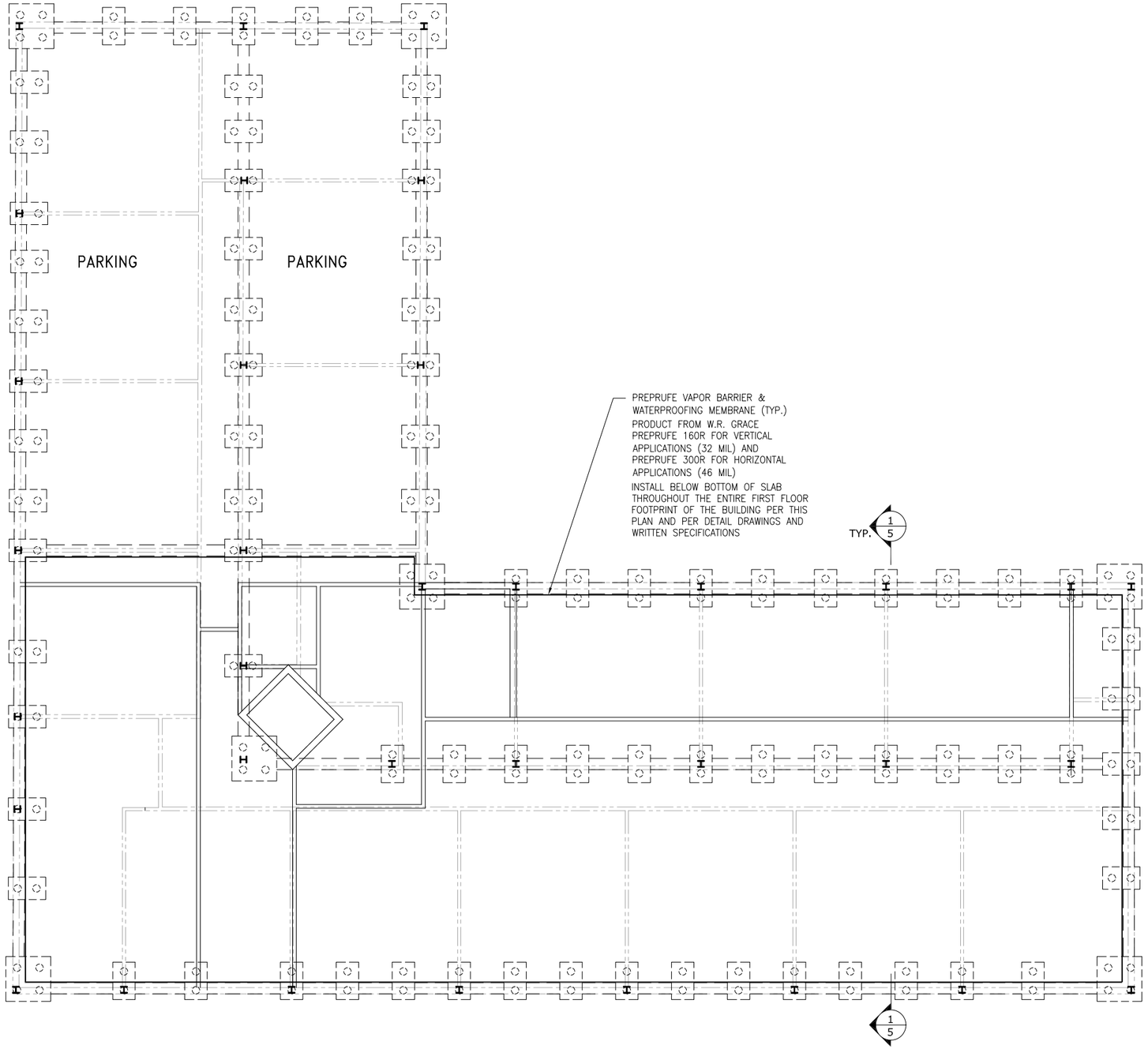
INDICATES NON–BEARING WALL

INDICATES STRAP BEAM

NOTE:
THE WATERPROOFING AND VAPOR BARRIER MEMBRANE SHALL BE INSTALLED PER PREPRUFE MANUFACTURER'S (W.R. GRACE'S) INSTRUCTIONS UTILIZING ALL PREPRUFE MANUFACTURER SUPPLIED AND/OR RECOMMENDED SYSTEM COMPONENTS RELATED TO SEALING THE OVERLAPS, JOINTS, CORNERS, ETC. THE INSTALLATION SHALL BE PERFORMED BY A CONTRACTOR WITH EXPERIENCE IN THE PROPOSED PRODUCT, AND SHALL BE CERTIFIED BY THE INSTALLATION CONTRACTOR, AND BY W.R. GRACE APPROVED SITE REPRESENTATIVE, AS A SEAL–TIGHT, PROTECTIVE INSTALLATION.

NOTE:
CONTRACTOR SHALL INSTALL THE VAPOR BARRIER AND WATERPROOFING LINER AND SYSTEM PER MANUFACTURER'S INSTRUCTIONS. IN CASE OF DISCREPANCY BETWEEN THESE PLANS AND LINER MANUFACTURER'S INSTRUCTIONS, PRIOR TO COMMENCEMENT OF THE PROJECT'S CONSTRUCTION, CONTACT DESIGN ENGINEER AT LEAST 48 HOURS IN ADVANCE FOR FURTHER INSTRUCTIONS AND/OR CLARIFICATIONS ON ITEMS IN QUESTIONS, WHICH SHALL BE PROVIDED BY THE ENGINEER IN WRITING.

NOTE:
*THESE DRAWINGS ARE FOR VAPOR BARRIER AND WATERPROOFING, AND SUB-SLAB DEPRESSURIZATION AND ACTIVE VAPOR VENTING APPLICATIONS ONLY, AND SHALL NOT BE USED FOR CONSTRUCTION OF ANY OTHER FEATURES. THE STRUCTURAL DESIGN FOR THIS DEVELOPMENT HAS NOT BEEN COMPLETED. THEREFORE, ANTICIPATED STRUCTURAL FEATURES WERE ASSUMED FOR THIS DESIGN TO DEPITCT CONSTRUCTION OF VAPOR BARRIER AND WATERPROOFING MEMBRANE, AND SUBSLAB DEPRESSURIZATION AND VENTING SYSTEM FEATURES UNDER POTENTIALLY LIKELY STRUCTURAL DESIGN CONDITIONS, AND THIS DESIGN MUST BE ADAPTED TO THE FINAL STRUCTURAL DESIGN IF IT IS AT VARIANCE FROM THE ASSUMED FOUNDATION AND OTHER STRUCTURAL DESIGN FEATURES SHOWN IN THESE DRAWINGS. ALL ADAPTATIONS AND MODIFICATIONS TO THESE MEMBRANE AND VENTING SYSTEM PLANS SHALL BE APPROVED IN WRITING BY THE DESIGN ENGINEER OR A NEW YORK STATE LICENSED PROFESSIONAL ENGINEER **PRIOR TO** COMMENCEMENT OF CON- STRUCTION. ALTHOUGH STRUCTURAL ELEMENTS ARE SHOWN IN THESE DRAWINGS, THEY ARE INCLUDED FOR REPRESENTATIONAL PURPOSE ONLY AND ARE NOT BASED ON FORMAL STRUCTURAL DESIGN AND CALCULATIONS, AND SHALL NOT BE USED FOR CONSTRUCTION OF FOUNDATION AND OTHER STRUCTURAL ELEMENTS.*



WATERPROOFING AND VAPOR BARRIER PLAN
SCALE: 1/8"=1'–0" (D–SIZE)
1/16"=1'–0" [IF PRINTED ON 11"X17" (TABLOID–SIZE) PAPER]

THIS DRAWING CROSS–REFERENCED TO:

FIGURE 7 OF RAWP

N

STATE OF NEW YORK · RAVI KUMAR KORLIPARA · No. 070038 · LICENSED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION	APP.

REVISIONS

KORLIPARA ENGINEERING
CONSULTING SERVICES
150 Broadhollow Road (Rt. 110)
Suite PH7
Melville, NY 11747
(631)421–2969

AIRTEK ENVIRONMENTAL CORPORATION
39–37 29th Street
Long Island City, NY 11101
(718)937–3720

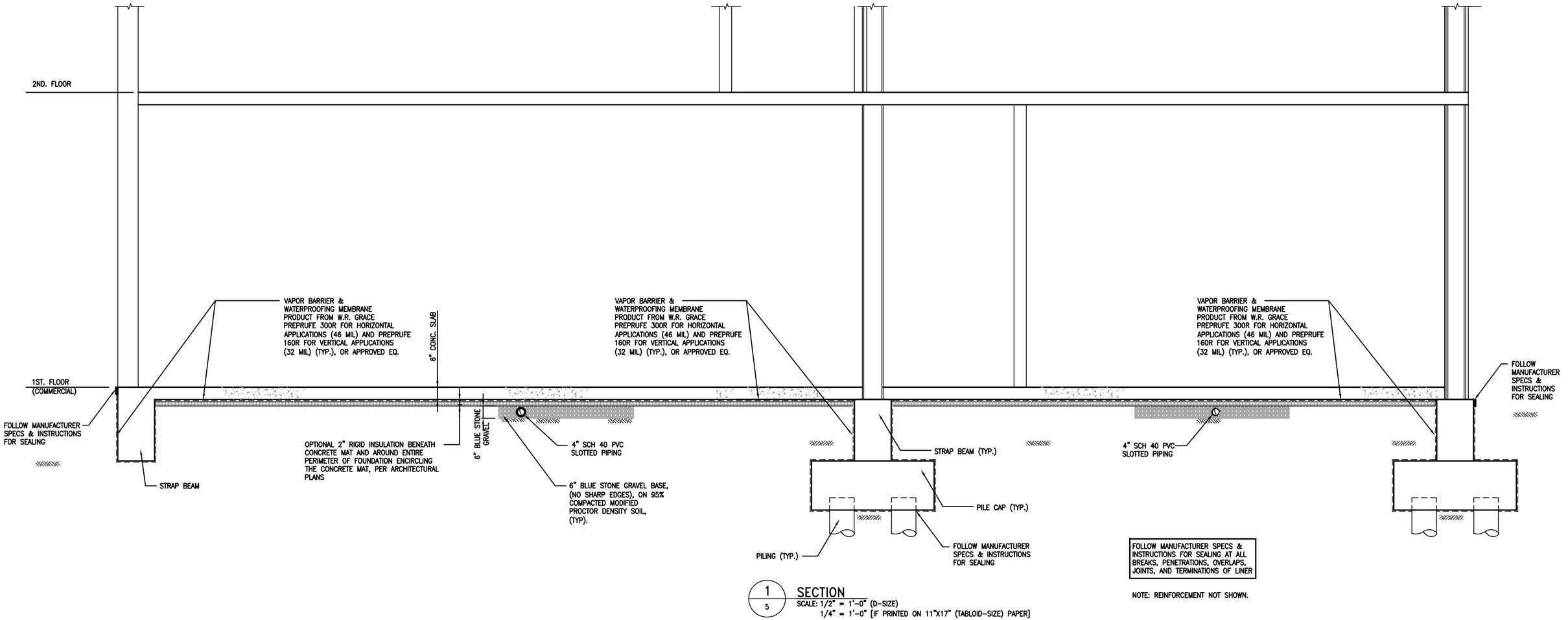
PROJECT TITLE: SUBSURFACE WATERPROOFING AND VAPOR BARRIER SYSTEM & SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYTEM
15 PROSPECT STREET, STATEN ISLAND NY

TITLE: WATERPROOFING AND VAPOR BARRIER MEMBRANE PLAN

DESIGNED: RKK
DRAWN: REK
CHECKED: RKK

DATE: 06–06–16
SCALE: 1/8" = 1'–0"
PAPER SIZE: D (ANSI) 22x34

DWG. NO. 4 OF 9



1/5 SECTION
SCALE: 1/2" = 1'-0" (D-SIZE)
1/4" = 1'-0" [IF PRINTED ON 11"X17" (TABLOID-SIZE) PAPER]

NOTE:
CONTRACTOR SHALL INSTALL THE VAPOR BARRIER AND WATERPROOFING LINER AND SYSTEM PER MANUFACTURER'S INSTRUCTIONS. IN CASE OF DISCREPANCY BETWEEN THESE PLANS AND LINER MANUFACTURER'S INSTRUCTIONS, PRIOR TO COMMENCEMENT OF THE PROJECT'S CONSTRUCTION, CONTACT DESIGN ENGINEER AT LEAST 48 HOURS IN ADVANCE FOR FURTHER INSTRUCTIONS AND/OR CLARIFICATIONS ON ITEMS IN QUESTIONS, WHICH SHALL BE PROVIDED BY THE ENGINEER IN WRITING.

NOTE:
THESE DRAWINGS ARE FOR VAPOR BARRIER AND WATERPROOFING, AND SUBSLAB DEPRESSURIZATION AND ACTIVE VAPOR VENTING APPLICATIONS ONLY, AND SHALL NOT BE USED FOR CONSTRUCTION OF ANY OTHER FEATURES. THE STRUCTURAL DESIGN FOR THIS DEVELOPMENT HAS NOT BEEN COMPLETED. THEREFORE, ANTICIPATED STRUCTURAL FEATURES WERE ASSUMED FOR THIS DESIGN TO DEPITCT CONSTRUCTION OF VAPOR BARRIER AND WATERPROOFING MEMBRANE, AND SUBSLAB DEPRESSURIZATION AND VENTING SYSTEM FEATURES UNDER POTENTIALLY LIKELY STRUCTURAL DESIGN CONDITIONS, AND THIS DESIGN MUST BE ADAPTED TO THE FINAL STRUCTURAL DESIGN IF IT IS AT VARIANCE FROM THE ASSUMED FOUNDATION AND OTHER STRUCTURAL DESIGN FEATURES SHOWN IN THESE DRAWINGS. ALL ADAPTATIONS AND MODIFICATIONS TO THESE MEMBRANE AND VENTING SYSTEM PLANS SHALL BE APPROVED IN WRITING BY THE DESIGN ENGINEER OR A NEW YORK STATE LICENSED PROFESSIONAL ENGINEER ***PRIOR TO*** *COMMENCEMENT OF CONSTRUCTION. ALTHOUGH STRUCTURAL ELEMENTS ARE SHOWN IN THESE DRAWINGS, THEY ARE INCLUDED FOR REPRESENTATIONAL PURPOSE ONLY AND ARE NOT BASED ON FORMAL STRUCTURAL DESIGN AND CALCULATIONS, AND SHALL NOT BE USED FOR CONSTRUCTION OF FOUNDATION AND OTHER STRUCTURAL ELEMENTS.*

THIS DRAWING CROSS-REFERENCED TO:

FIGURE 8 AND FIGURE 9 OF RAWP

NO.	DATE	DESCRIPTION	APP.
		REVISIONS	

KORLIPARA ENGINEERING
CONSULTING SERVICES
150 Broadhollow Road (Rt. 110)
Suite PH7
Melville, NY 11747
(631)421-2969

AIRTEK ENVIRONMENTAL CORPORATION
39-37 29th Street
Long Island City, NY 11101
(718)937-3720

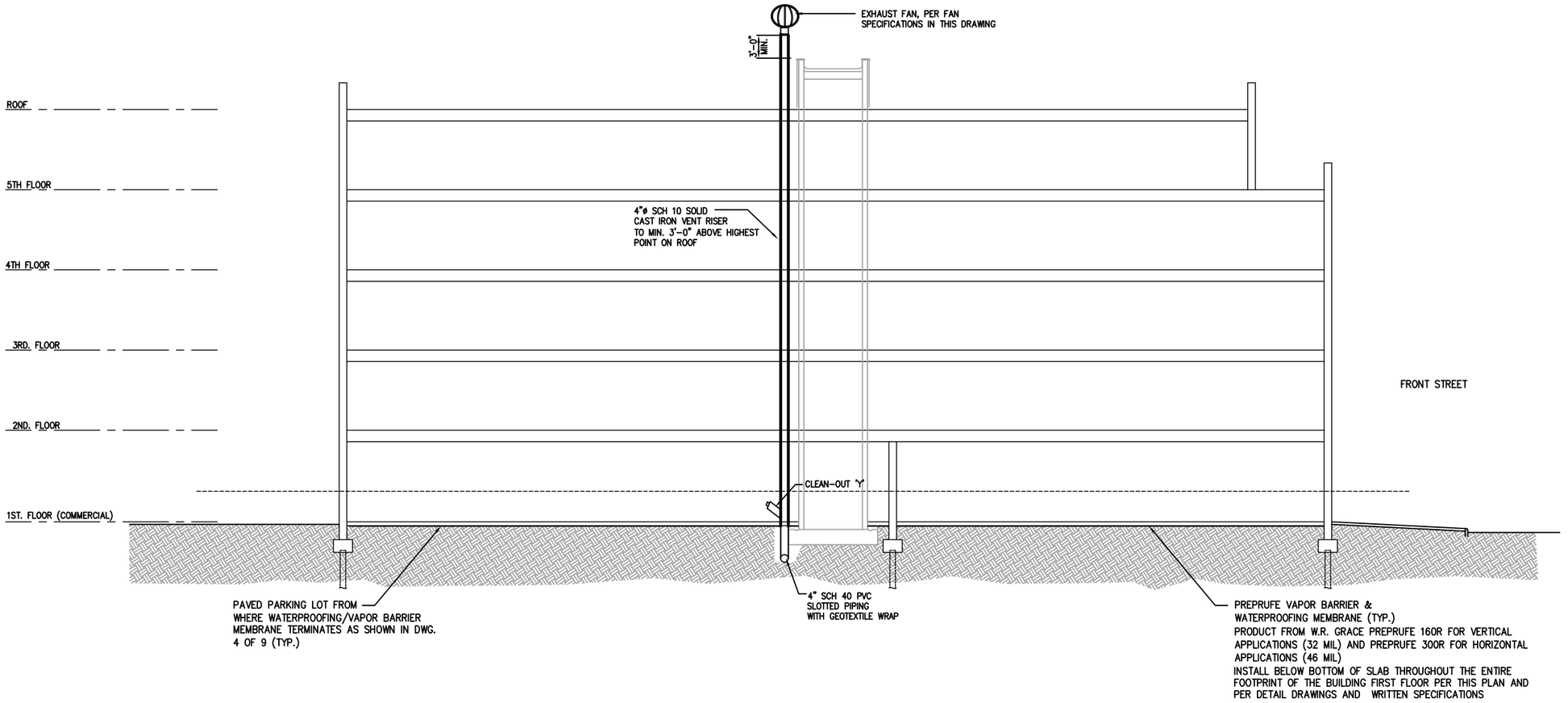
PROJECT TITLE: SUBSURFACE WATERPROOFING AND VAPOR BARRIER SYSTEM & SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYTEM
15 PROSPECT STREET, STATEN ISLAND NY

TITLE: WATERPROOFING AND VAPOR BARRIER MEMBRANE SECTIONAL DETAILS

DESIGNED: RKK
DRAWN: REK
CHECKED: RKK

DATE: 06-06-16
SCALE: AS SHOWN
PAPER SIZE: D (ANSI) 22x34

DWG. NO. 5 OF 9



1/9 RISER ELEVATION
SCALE: NTS

NOTES:

1. APPLY LABEL TO VENT RISER – "VAPOR EXTRACTION SYSTEM". ATTACH VENT PIPE SECURELY TO WALL WITH BRACKETS SPACED MAX. 10' APART.
2. SECURE VENT PIPE ABOVE ROOF WITH COLLAR AND GUY WIRES, OR OTHER FORM OF PIPE SUPPORT ABOVE ROOF.
3. INSTALL EXHAUST FAN PER MANUFACTURER'S INSTRUCTIONS.
4. THE VERTICAL (RISER) VENT PIPES SHALL BE SOLID (NOT SLOTTED OR PERFORATED).
5. INSTALL 'Y' CLEAN-OUT ON VENT RISER AT A HEIGHT NOT EXCEEDING ONE FOOT (1') ABOVE TOP OF SLAB OR BASE.
6. ALL CLEAN-OUTS TO BE SAME SIZE (DIA.) AS ASSOCIATED PIPING.

EXHAUST FAN SPECIFICATIONS

THE EXHAUST FAN SHALL BE INLINE CENTRIFUGAL DUCT FAN, 9-5/8 IN L, DUCT DIA. 4', 115V, 0.18A, 122 CFM @ 0' SP, FANTECH MODEL FR100, SUPPLIER: GRAINGER, OR APPROVED EQUIVALENT.

FUTURE ALTERNATIVE (TO BE IMPLEMENTED ONLY WITH PRIOR APPROVAL FROM NYSDEC AND NYCOER):
IF, AFTER INSTALLATION OF VAPOR BARRIER AND VENTING SYSTEM AND OPERATION OF THE ACTIVE SYSTEM OVER A PERIOD OF TIME, IF UPON INSPECTION AND POST-SAMPLING FOR AIR QUALITY, APPROVAL IS RECEIVED FROM THE REGULATORY AGENCY FOR OPERATING AS A PASSIVE SYSTEM, THEN, THE ABOVE SPECIFIED MECHANICAL FAN SHALL BE REPLACED WITH THE FOLLOWING WIND-DRIVEN FAN: TURBINE VENTILATOR EMPIRE 126 CFM @ 4-MILE WIND, 4" NECK (GRAINGER), OR APPROVED EQUIVALENT

NOTE:
CONTRACTOR SHALL INSTALL THE VAPOR BARRIER AND WATERPROOFING LINER AND SYSTEM PER MANUFACTURER'S INSTRUCTIONS. IN CASE OF DISCREPANCY BETWEEN THESE PLANS AND LINER MANUFACTURER'S INSTRUCTIONS, PRIOR TO COMMENCEMENT OF THE PROJECT'S CONSTRUCTION, CONTACT DESIGN ENGINEER AT LEAST 48 HOURS IN ADVANCE FOR FURTHER INSTRUCTIONS AND/OR CLARIFICATIONS ON ITEMS IN QUESTIONS, WHICH SHALL BE PROVIDED BY THE ENGINEER IN WRITING.

NOTE:
*THESE DRAWINGS ARE FOR VAPOR BARRIER AND WATERPROOFING, AND SUBSLAB DEPRESSURIZATION AND ACTIVE VAPOR VENTING APPLICATIONS ONLY, AND SHALL NOT BE USED FOR CONSTRUCTION OF ANY OTHER FEATURES. THE STRUCTURAL DESIGN FOR THIS DEVELOPMENT HAS NOT BEEN COMPLETED. THEREFORE, ANTICIPATED STRUCTURAL FEATURES WERE ASSUMED FOR THIS DESIGN TO DEPITCT CONSTRUCTION OF VAPOR BARRIER AND WATERPROOFING MEMBRANE, AND SUBSLAB DEPRESSURIZATION AND VENTING SYSTEM FEATURES UNDER POTENTIALLY LIKELY STRUCTURAL DESIGN CONDITIONS, AND THIS DESIGN MUST BE ADAPTED TO THE FINAL STRUCTURAL DESIGN IF IT IS AT VARIANCE FROM THE ASSUMED FOUNDATION AND OTHER STRUCTURAL DESIGN FEATURES SHOWN IN THESE DRAWINGS. ALL ADAPTATIONS AND MODIFICATIONS TO THESE MEMBRANE AND VENTING SYSTEM PLANS SHALL BE APPROVED IN WRITING BY THE DESIGN ENGINEER OR A NEW YORK STATE LICENSED PROFESSIONAL ENGINEER **PRIOR TO** COMMENCEMENT OF CONSTRUCTION. ALTHOUGH STRUCTURAL ELEMENTS ARE SHOWN IN THESE DRAWINGS, THEY ARE INCLUDED FOR REPRESENTATIONAL PURPOSE ONLY AND ARE NOT BASED ON FORMAL STRUCTURAL DESIGN AND CALCULATIONS, AND SHALL NOT BE USED FOR CONSTRUCTION OF FOUNDATION AND OTHER STRUCTURAL ELEMENTS.*

THIS DRAWING CROSS-REFERENCED TO:
FIGURE 8 AND FIGURE 10 OF RAWP

NO.	DATE	DESCRIPTION	APP.

REVISIONS

KORLIPARA ENGINEERING
CONSULTING SERVICES
150 Broadhollow Road (Rt. 110)
Suite PH7
Melville, NY 11747
(631)421-2969

AIRTEK ENVIRONMENTAL CORPORATION
39-37 29th Street
Long Island City, NY 11101
(718)937-3720

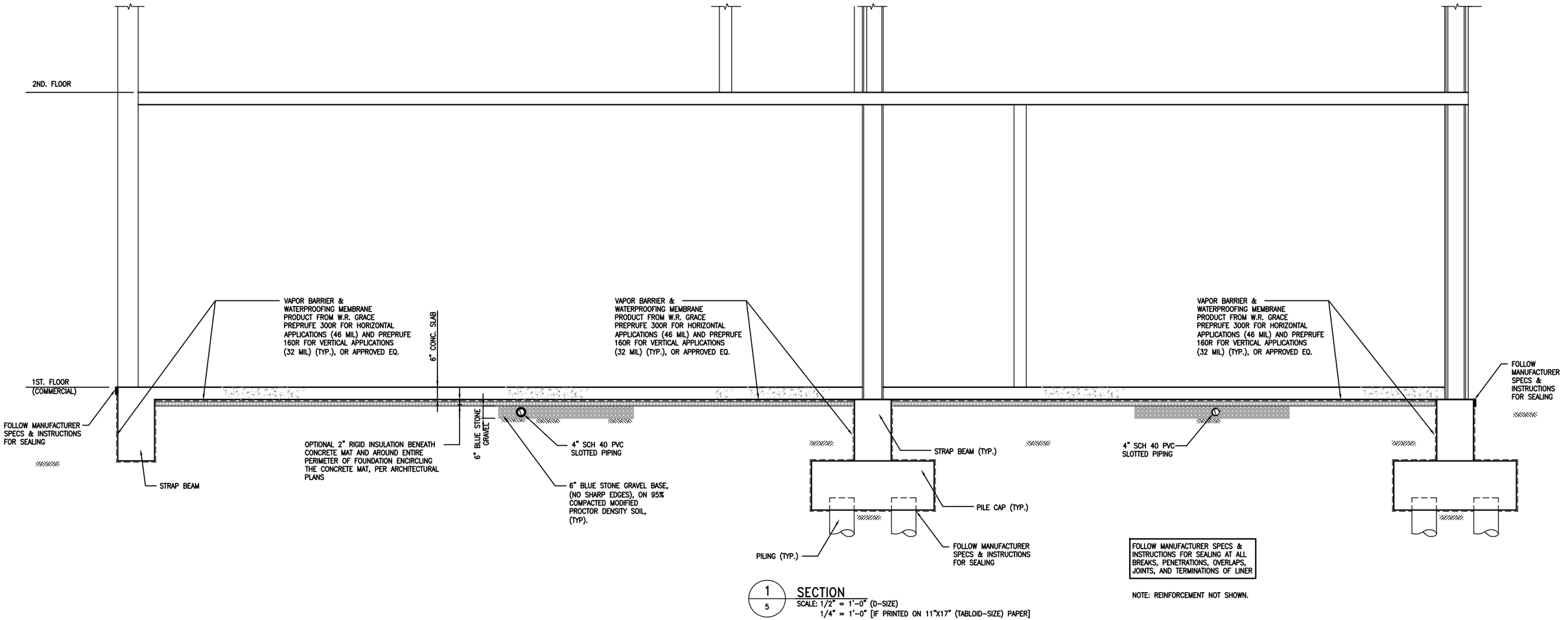
PROJECT TITLE: SUBSURFACE WATERPROOFING AND VAPOR BARRIER SYSTEM & SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYTEM
15 PROSPECT STREET, STATEN ISLAND NY

TITLE: VENTING SYSTEM ELEVATIONS

DESIGNED: RKK
DRAWN: REK
CHECKED: RKK

DATE: 06-06-16
SCALE: NTS
PAPER SIZE: D (ANSI) 22x34

DWG. NO. 9 OF 9



1/5 SECTION
SCALE: 1/2" = 1'-0" (D-SIZE)
1/4" = 1'-0" [IF PRINTED ON 11"X17" (TABLOID-SIZE) PAPER]

NOTE:
CONTRACTOR SHALL INSTALL THE VAPOR BARRIER AND WATERPROOFING LINER AND SYSTEM PER MANUFACTURER'S INSTRUCTIONS. IN CASE OF DISCREPANCY BETWEEN THESE PLANS AND LINER MANUFACTURER'S INSTRUCTIONS, PRIOR TO COMMENCEMENT OF THE PROJECT'S CONSTRUCTION, CONTACT DESIGN ENGINEER AT LEAST 48 HOURS IN ADVANCE FOR FURTHER INSTRUCTIONS AND/OR CLARIFICATIONS ON ITEMS IN QUESTIONS, WHICH SHALL BE PROVIDED BY THE ENGINEER IN WRITING.

NOTE:
THESE DRAWINGS ARE FOR VAPOR BARRIER AND WATERPROOFING, AND SUBSLAB DEPRESSURIZATION AND ACTIVE VAPOR VENTING APPLICATIONS ONLY, AND SHALL NOT BE USED FOR CONSTRUCTION OF ANY OTHER FEATURES. THE STRUCTURAL DESIGN FOR THIS DEVELOPMENT HAS NOT BEEN COMPLETED. THEREFORE, ANTICIPATED STRUCTURAL FEATURES WERE ASSUMED FOR THIS DESIGN TO DEPITCT CONSTRUCTION OF VAPOR BARRIER AND WATERPROOFING MEMBRANE, AND SUBSLAB DEPRESSURIZATION AND VENTING SYSTEM FEATURES UNDER POTENTIALLY LIKELY STRUCTURAL DESIGN CONDITIONS, AND THIS DESIGN MUST BE ADAPTED TO THE FINAL STRUCTURAL DESIGN IF IT IS AT VARIANCE FROM THE ASSUMED FOUNDATION AND OTHER STRUCTURAL DESIGN FEATURES SHOWN IN THESE DRAWINGS. ALL ADAPTATIONS AND MODIFICATIONS TO THESE MEMBRANE AND VENTING SYSTEM PLANS SHALL BE APPROVED IN WRITING BY THE DESIGN ENGINEER OR A NEW YORK STATE LICENSED PROFESSIONAL ENGINEER ***PRIOR TO*** *COMMENCEMENT OF CONSTRUCTION. ALTHOUGH STRUCTURAL ELEMENTS ARE SHOWN IN THESE DRAWINGS, THEY ARE INCLUDED FOR REPRESENTATIONAL PURPOSE ONLY AND ARE NOT BASED ON FORMAL STRUCTURAL DESIGN AND CALCULATIONS, AND SHALL NOT BE USED FOR CONSTRUCTION OF FOUNDATION AND OTHER STRUCTURAL ELEMENTS.*

THIS DRAWING CROSS-REFERENCED TO:

FIGURE 8 AND FIGURE 9 OF RAWP

NO.	DATE	DESCRIPTION	APP.
		REVISIONS	

KORLIPARA ENGINEERING
CONSULTING SERVICES
150 Broadhollow Road (Rt. 110)
Suite PH7
Melville, NY 11747
(631)421-2969

AIRTEK ENVIRONMENTAL CORPORATION
39-37 29th Street
Long Island City, NY 11101
(718)937-3720

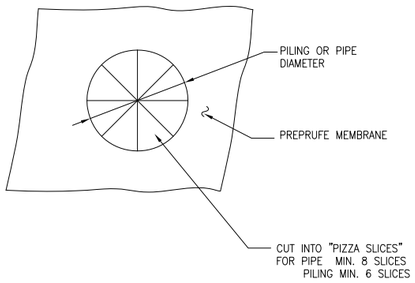
PROJECT TITLE: SUBSURFACE WATERPROOFING AND VAPOR BARRIER SYSTEM & SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYTEM
15 PROSPECT STREET, STATEN ISLAND NY

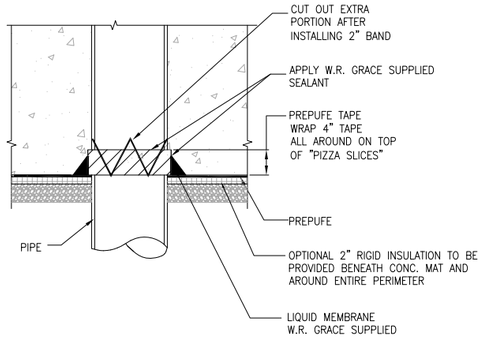
TITLE: WATERPROOFING AND VAPOR BARRIER MEMBRANE SECTIONAL DETAILS

DESIGNED: RKK
DRAWN: REK
CHECKED: RKK

DATE: 06-06-16
SCALE: AS SHOWN
PAPER SIZE: D (ANSI) 22x34

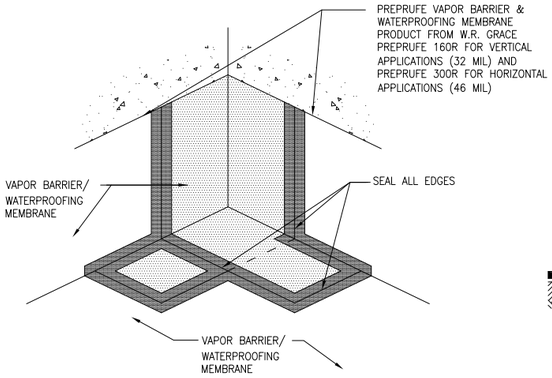
DWG. NO. 5 OF 9



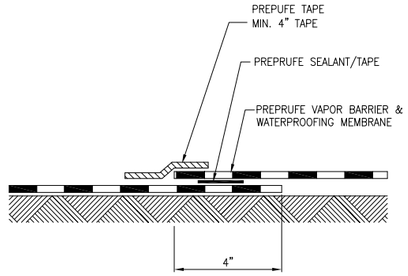


1/6 PIPE PENETRATION DETAIL FOR PIPE SIZE DIFFERENT FROM MFR. BOOT SIZES

NOTE:
FOR MULTIPLE PIPE CONFIGURATIONS (IF ANY) FOLLOW MFR'S DIRECTIONS WITH PRIOR APPROVAL FROM ENGINEER.
MFR'S SPEC SHEETS SHOWING TYPICAL DETAILS FOR SUCH SITUATIONS ARE INCLUDED IN THE WRITTEN SPECIFICATIONS.

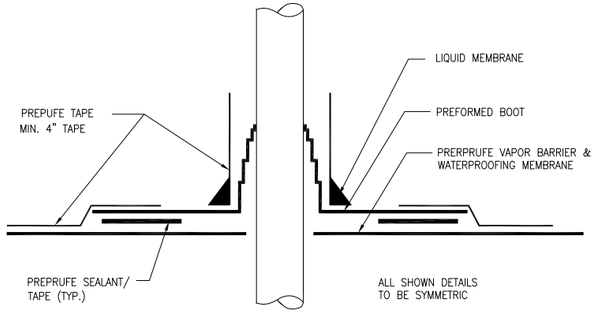


INSIDE CORNER

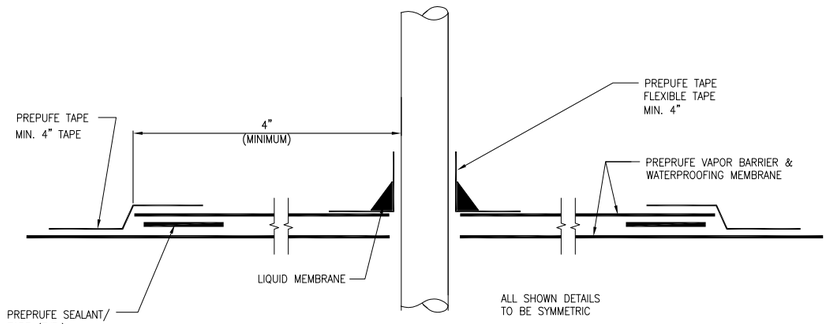


TAPE OVERLAP METHOD

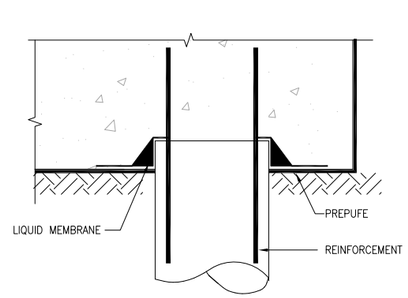
2/6 OVERLAP AND CORNER SEALING DETAILS
N.T.S.



3/6 PREFORMED PIPE BOOT



4/6 RECTANGULAR/SQUARE MATERIAL PIPE BOOT



5/6 PILE DETAIL

NOTE:
FOLLOW MANUFACTURER SPECS & INSTRUCTIONS FOR ACTUAL INSTALLATION. THESE DETAILS ARE PROVIDED FOR INFORMATION AND GENERAL DEPICTION OF CONSTRUCTION.

NOTE:
THESE DRAWINGS ARE FOR VAPOR BARRIER AND WATERPROOFING, AND SUBSLAB DEPRESSURIZATION AND ACTIVE VAPOR VENTING APPLICATIONS ONLY, AND SHALL NOT BE USED FOR CONSTRUCTION OF ANY OTHER FEATURES. THE STRUCTURAL DESIGN FOR THIS DEVELOPMENT HAS NOT BEEN COMPLETED. THEREFORE, ANTICIPATED STRUCTURAL FEATURES WERE ASSUMED FOR THIS DESIGN TO DEPITCT CONSTRUCTION OF VAPOR BARRIER AND WATERPROOFING MEMBRANE, AND SUBSLAB DEPRESSURIZATION AND VENTING SYSTEM FEATURES UNDER POTENTIALLY LIKELY STRUCTURAL DESIGN CONDITIONS, AND THIS DESIGN MUST BE ADAPTED TO THE FINAL STRUCTURAL DESIGN IF IT IS AT VARIANCE FROM THE ASSUMED FOUNDATION AND OTHER STRUCTURAL DESIGN FEATURES SHOWN IN THESE DRAWINGS. ALL ADAPTATIONS AND MODIFICATIONS TO THESE MEMBRANE AND VENTING SYSTEM PLANS SHALL BE APPROVED IN WRITING BY THE DESIGN ENGINEER OR A NEW YORK STATE LICENSED PROFESSIONAL ENGINEER ***PRIOR TO*** *COMMENCEMENT OF CONSTRUCTION. ALTHOUGH STRUCTURAL ELEMENTS ARE SHOWN IN THESE DRAWINGS, THEY ARE INCLUDED FOR REPRESENTATIONAL PURPOSE ONLY AND ARE NOT BASED ON FORMAL STRUCTURAL DESIGN AND CALCULATIONS, AND SHALL NOT BE USED FOR CONSTRUCTION OF FOUNDATION AND OTHER STRUCTURAL ELEMENTS.*

NOTE:
CONTRACTOR SHALL INSTALL THE VAPOR BARRIER AND WATERPROOFING LINER AND SYSTEM PER MANUFACTURER'S INSTRUCTIONS. IN CASE OF DISCREPANCY BETWEEN THESE PLANS AND LINER MANUFACTURER'S INSTRUCTIONS, PRIOR TO COMMENCEMENT OF THE PROJECT'S CONSTRUCTION, CONTACT DESIGN ENGINEER AT LEAST 48 HOURS IN ADVANCE FOR FURTHER INSTRUCTIONS AND/OR CLARIFICATIONS ON ITEMS IN QUESTIONS, WHICH SHALL BE PROVIDED BY THE ENGINEER IN WRITING.

THIS DRAWING CROSS-REFERENCED TO:

FIGURE 9 OF RAWP

NO.	DATE	DESCRIPTION	APP.

REVISIONS

KORLIPARA ENGINEERING
CONSULTING SERVICES
150 Broadhollow Road (Rt. 110)
Suite PH7
Melville, NY 11747
(631)421-2969

AIRTEK ENVIRONMENTAL CORPORATION
39-37 29th Street
Long Island City, NY 11101
(718)937-3720

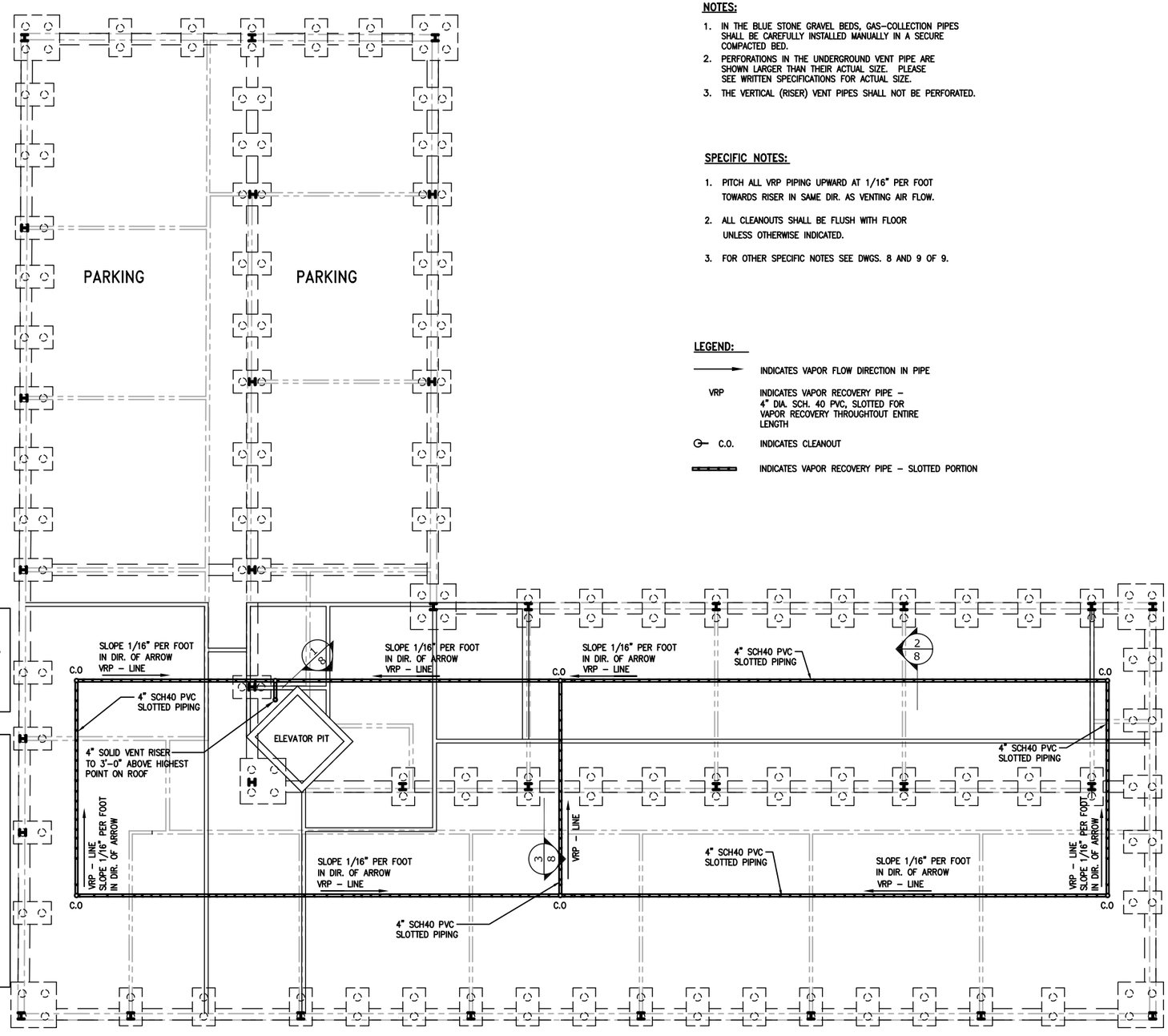
PROJECT TITLE: SUBSURFACE WATERPROOFING AND VAPOR BARRIER SYSTEM & SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYTEM
15 PROSPECT STREET, STATEN ISLAND NY

TITLE: MEMBRANE (LINER) SEALING DETAILS

DESIGNED: RKK
DRAWN: REK
CHECKED: RKK

DATE: 06-06-16
SCALE: N.T.S.
PAPER SIZE: D (ANSI) 22x34

DWG. NO. 6 OF 9



NOTES:

1. IN THE BLUE STONE GRAVEL BEDS, GAS–COLLECTION PIPES SHALL BE CAREFULLY INSTALLED MANUALLY IN A SECURE COMPACTED BED.
2. PERFORATIONS IN THE UNDERGROUND VENT PIPE ARE SHOWN LARGER THAN THEIR ACTUAL SIZE. PLEASE SEE WRITTEN SPECIFICATIONS FOR ACTUAL SIZE.
3. THE VERTICAL (RISER) VENT PIPES SHALL NOT BE PERFORATED.

N

SPECIFIC NOTES:

1. PITCH ALL VRP PIPING UPWARD AT 1/16" PER FOOT TOWARDS RISER IN SAME DIR. AS VENTING AIR FLOW.
2. ALL CLEANOUTS SHALL BE FLUSH WITH FLOOR UNLESS OTHERWISE INDICATED.
3. FOR OTHER SPECIFIC NOTES SEE DWGS. 8 AND 9 OF 9.

LEGEND:

——→	INDICATES VAPOR FLOW DIRECTION IN PIPE
VRP	INDICATES VAPOR RECOVERY PIPE – 4" DIA. SCH. 40 PVC, SLOTTED FOR VAPOR RECOVERY THROUGHTOUT ENTIRE LENGTH
C.O.	INDICATES CLEANOUT
▬▬	INDICATES VAPOR RECOVERY PIPE – SLOTTED PORTION

NOTE:
CONTRACTOR SHALL INSTALL THE VAPOR BARRIER AND WATERPROOFING LINER AND SYSTEM PER MANUFACTURER'S INSTRUCTIONS. IN CASE OF DISCREPANCY BETWEEN THESE PLANS AND LINER MANUFACTURER'S INSTRUCTIONS, PRIOR TO COMMENCEMENT OF THE PROJECT'S CONSTRUCTION, CONTACT DESIGN ENGINEER AT LEAST 48 HOURS IN ADVANCE FOR FURTHER INSTRUCTIONS AND/OR CLARIFICATIONS ON ITEMS IN QUESTIONS, WHICH SHALL BE PROVIDED BY THE ENGINEER IN WRITING.

NOTE:
THESE DRAWINGS ARE FOR VAPOR BARRIER AND WATERPROOFING, AND SUB-SLAB DEPRESSURIZATION AND ACTIVE VAPOR VENTING APPLICATIONS ONLY, AND SHALL NOT BE USED FOR CONSTRUCTION OF ANY OTHER FEATURES. THE STRUCTURAL DESIGN FOR THIS DEVELOPMENT HAS NOT BEEN COMPLETED. THEREFORE, ANTICIPATED STRUCTURAL FEATURES WERE ASSUMED FOR THIS DESIGN TO DEPITCT CONSTRUCTION OF VAPOR BARRIER AND WATERPROOFING MEMBRANE, AND SUBSLAB DEPRESSURIZATION AND VENTING SYSTEM FEATURES UNDER POTENTIALLY LIKELY STRUCTURAL DESIGN CONDITIONS, AND THIS DESIGN MUST BE ADAPTED TO THE FINAL STRUCTURAL DESIGN IF IT IS AT VARIANCE FROM THE ASSUMED FOUNDATION AND OTHER STRUCTURAL DESIGN FEATURES SHOWN IN THESE DRAWINGS. ALL ADAPTATIONS AND MODIFICATIONS TO THESE MEMBRANE AND VENTING SYSTEM PLANS SHALL BE APPROVED IN WRITING BY THE DESIGN ENGINEER OR A NEW YORK STATE LICENSED PROFESSIONAL ENGINEER ***PRIOR TO*** *COMMENCEMENT OF CON- STRUCTION. ALTHOUGH STRUCTURAL ELEMENTS ARE SHOWN IN THESE DRAWINGS, THEY ARE INCLUDED FOR REPRESENTATIONAL PURPOSE ONLY AND ARE NOT BASED ON FORMAL STRUCTURAL DESIGN AND CALCULATIONS, AND SHALL NOT BE USED FOR CONSTRUCTION OF FOUNDATION AND OTHER STRUCTURAL ELEMENTS.*

LAYOUT OF SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYSTEM

SCALE: 1/8"=1'–0" (D–SIZE)
1/16"=1'–0" [IF PRINTED ON 11"X17" (TABLOID–SIZE) PAPER]

THIS DRAWING CROSS–REFERENCED TO:

FIGURE 10 OF RAWP

STATE OF NEW YORK · RAVI KUMAR KORLIPARA · No. 070038 · LICENSED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION	APP.

REVISIONS

KORLIPARA ENGINEERING
CONSULTING SERVICES
150 Broadhollow Road (Rt. 110)
Suite PH7
Melville, NY 11747
(631)421–2969

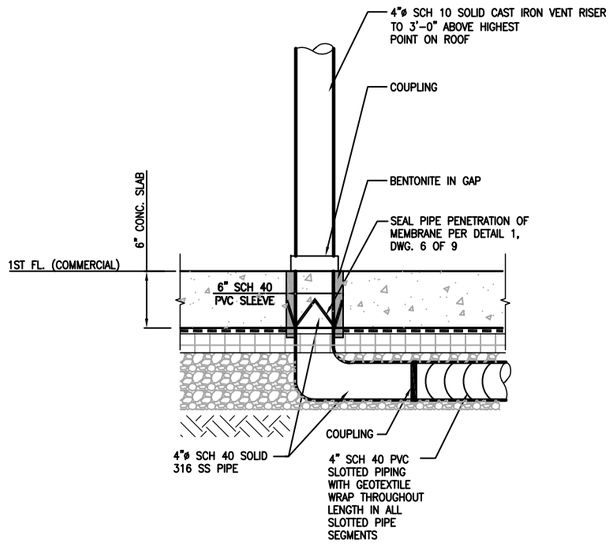
AIRTEK ENVIRONMENTAL CORPORATION
39–37 29th Street
Long Island City, NY 11101
(718)937–3720

PROJECT TITLE: SUBSURFACE WATERPROOFING AND VAPOR BARRIER SYSTEM & SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYTEM
15 PROSPECT STREET, STATEN ISLAND NY

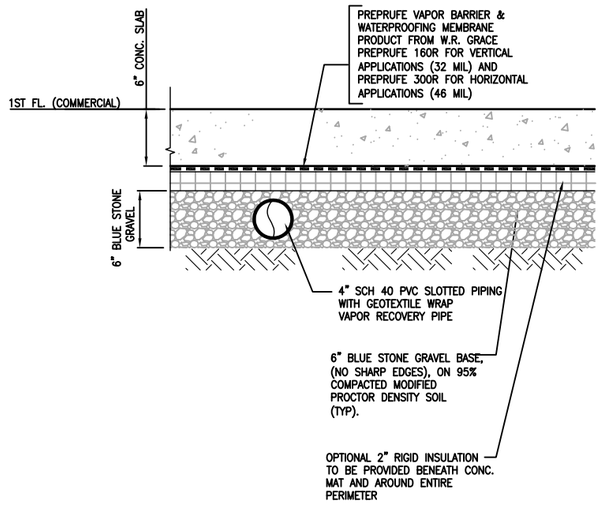
TITLE: LAYOUT OF SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYSTEM

DESIGNED:	RKK
DRAWN:	REK
CHECKED:	RKK
DATE:	06–06–16
SCALE:	1/8" = 1'–0"
PAPER SIZE:	D (ANSI) 22x34

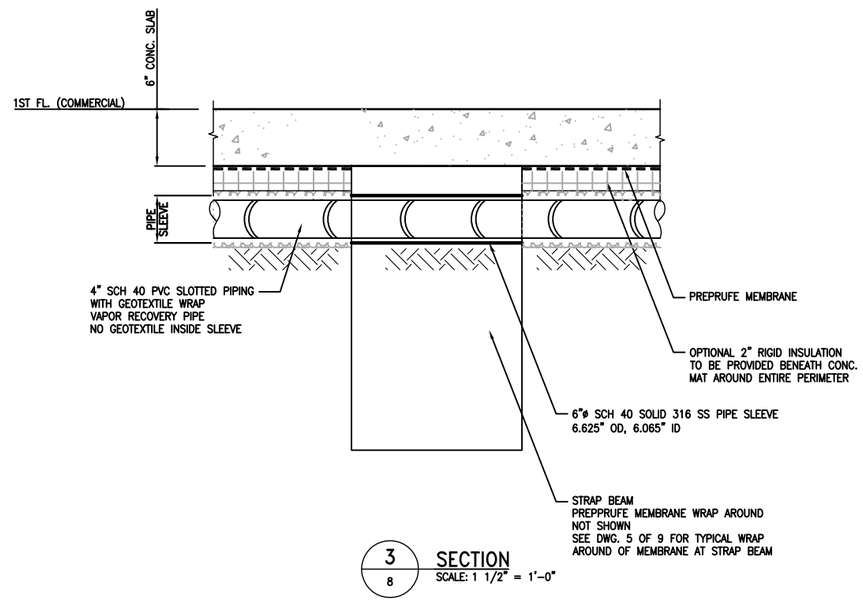
DWG. NO. 7 OF 9



1/8 SECTION
SCALE: 1 1/2" = 1'-0"



2/8 SECTION
SCALE: 1 1/2" = 1'-0"



3/8 SECTION
SCALE: 1 1/2" = 1'-0"

NOTE:
CONTRACTOR SHALL INSTALL THE VAPOR BARRIER AND WATERPROOFING LINER AND SYSTEM PER MANUFACTURER'S INSTRUCTIONS. IN CASE OF DISCREPANCY BETWEEN THESE PLANS AND LINER MANUFACTURER'S INSTRUCTIONS, PRIOR TO COMMENCEMENT OF THE PROJECT'S CONSTRUCTION, CONTACT DESIGN ENGINEER AT LEAST 48 HOURS IN ADVANCE FOR FURTHER INSTRUCTIONS AND/OR CLARIFICATIONS ON ITEMS IN QUESTIONS, WHICH SHALL BE PROVIDED BY THE ENGINEER IN WRITING.

NOTE:
THESE DRAWINGS ARE FOR VAPOR BARRIER AND WATERPROOFING, AND SUBSLAB DEPRESSURIZATION AND ACTIVE VAPOR VENTING APPLICATIONS ONLY, AND SHALL NOT BE USED FOR CONSTRUCTION OF ANY OTHER FEATURES. THE STRUCTURAL DESIGN FOR THIS DEVELOPMENT HAS NOT BEEN COMPLETED. THEREFORE, ANTICIPATED STRUCTURAL FEATURES WERE ASSUMED FOR THIS DESIGN TO DEPITCT CONSTRUCTION OF VAPOR BARRIER AND WATERPROOFING MEMBRANE, AND SUBSLAB DEPRESSURIZATION AND VENTING SYSTEM FEATURES UNDER POTENTIALLY LIKELY STRUCTURAL DESIGN CONDITIONS, AND THIS DESIGN MUST BE ADAPTED TO THE FINAL STRUCTURAL DESIGN IF IT IS AT VARIANCE FROM THE ASSUMED FOUNDATION AND OTHER STRUCTURAL DESIGN FEATURES SHOWN IN THESE DRAWINGS. ALL ADAPTATIONS AND MODIFICATIONS TO THESE MEMBRANE AND VENTING SYSTEM PLANS SHALL BE APPROVED IN WRITING BY THE DESIGN ENGINEER OR A NEW YORK STATE LICENSED PROFESSIONAL ENGINEER ***PRIOR TO*** *COMMENCEMENT OF CONSTRUCTION. ALTHOUGH STRUCTURAL ELEMENTS ARE SHOWN IN THESE DRAWINGS, THEY ARE INCLUDED FOR REPRESENTATIONAL PURPOSE ONLY AND ARE NOT BASED ON FORMAL STRUCTURAL DESIGN AND CALCULATIONS, AND SHALL NOT BE USED FOR CONSTRUCTION OF FOUNDATION AND OTHER STRUCTURAL ELEMENTS.*

SPECIFICATION FOR VENT PIPING:

1. THE SLOTTED VENT PIPING SHALL BE 4" DIA., SCH 40 PVC, MANUFACTURED BY JOHNSON SCREENS OR APPROVED ALTERNATIVE SOURCE. THE PIPES SHALL HAVE RECTANGULAR SLOTS LOCATED THROUGHOUT THE PIPE, IN 4 TO 6 ROWS, ORIENTED ALONG PIPE CIRCUMFERENCE, WITH SLOT WIDTH OF 0.125", ON CENTER SEPARATION BETWEEN ADJACENT SLOTS IN A ROW OF 0.25", AND SHALL HAVE MINIMUM 5% OPEN AREA.
2. PERFORATED PIPING MAY BE USED IN LIEU OF SLOTTED PIPING PROVIDED IT IS ALSO OF 4" DIA., SCH 40 PVC, THE PERFORATIONS HAVE THE SAME OPENING AREA PER FOOT OF PIPE AS THE SLOTTED PIPE (5% OPEN AREA), AND THE PERFORATIONS ARE UNIFORMLY DISTRIBUTED OVER PIPE SURFACE.
3. THE VENT PIPING SHALL BE INSTALLED UNDERNEATH THE LINER AS SHOWN IN THE DRAWINGS. TO PREVENT THE OPENINGS FROM BEING CLOGGED BY MIGRATING FINE SAND PARTICLES, THE SLOTTED (OR PERFORATED) VENT PIPES ARE TO BE PROTECTED BY WRAPPING THEM IN A NONWOVEN GEOTEXTILE LINER WITH 6 OZ./SQ. YD DENSITY, MANUFACTURED BY GSE (MODEL NW6), OR APPROVED ALTERNATIVE SOURCE. THE VENT PIPING SHALL BE WRAPPED FIRST AND THEN INSTALLED.

THIS DRAWING CROSS-REFERENCED TO:

FIGURE 10 OF RAWP

STATE OF NEW YORK
RAVIKUMAR KORLIPARA
No. 070038
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	DESCRIPTION	APP.

REVISIONS

KORLIPARA ENGINEERING
CONSULTING SERVICES
150 Broadhollow Road (Rt. 110)
Suite PH7
Melville, NY 11747
(631)421-2969

AIRTEK ENVIRONMENTAL CORPORATION
39-37 29th Street
Long Island City, NY 11101
(718)937-3720

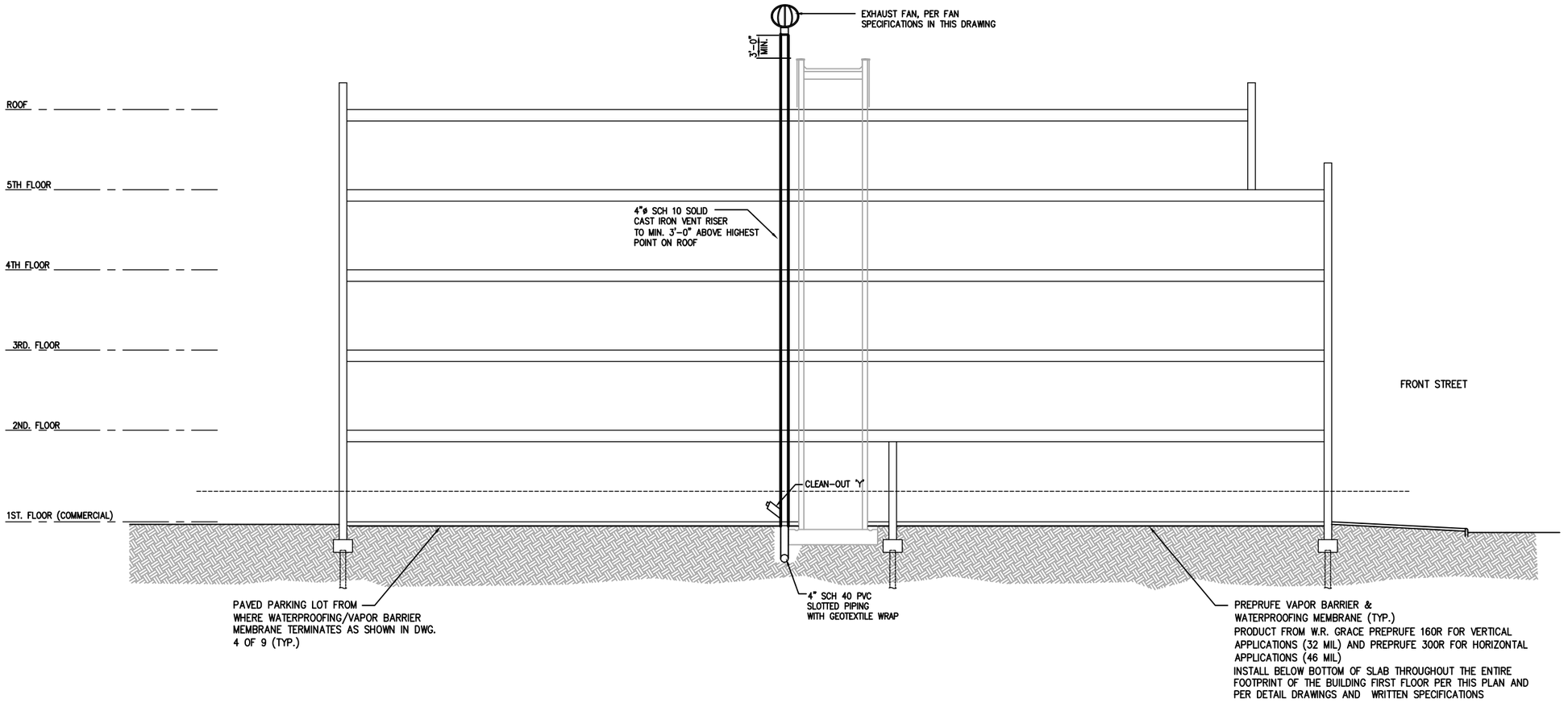
PROJECT TITLE: SUBSURFACE WATERPROOFING AND VAPOR BARRIER SYSTEM & SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYTEM
15 PROSPECT STREET, STATEN ISLAND NY

TITLE:
DEPRESSURIZATION VENTING SYSTEM DETAILS

DESIGNED: RKK
DRAWN: REK
CHECKED: RKK

DATE: 06-06-16
SCALE: AS SHOWN
PAPER SIZE: D (ANSI) 22x34

DWG. NO.
8 OF 9



1/9 RISER ELEVATION
SCALE: NTS

NOTES:

1. APPLY LABEL TO VENT RISER – "VAPOR EXTRACTION SYSTEM". ATTACH VENT PIPE SECURELY TO WALL WITH BRACKETS SPACED MAX. 10' APART.
2. SECURE VENT PIPE ABOVE ROOF WITH COLLAR AND GUY WIRES, OR OTHER FORM OF PIPE SUPPORT ABOVE ROOF.
3. INSTALL EXHAUST FAN PER MANUFACTURER'S INSTRUCTIONS.
4. THE VERTICAL (RISER) VENT PIPES SHALL BE SOLID (NOT SLOTTED OR PERFORATED).
5. INSTALL 'Y' CLEAN-OUT ON VENT RISER AT A HEIGHT NOT EXCEEDING ONE FOOT (1') ABOVE TOP OF SLAB OR BASE.
6. ALL CLEAN-OUTS TO BE SAME SIZE (DIA.) AS ASSOCIATED PIPING.

EXHAUST FAN SPECIFICATIONS

THE EXHAUST FAN SHALL BE INLINE CENTRIFUGAL DUCT FAN, 9-5/8 IN L, DUCT DIA. 4', 115V, 0.18A, 122 CFM @ 0' SP, FANTECH MODEL FR100, SUPPLIER: GRAINGER, OR APPROVED EQUIVALENT.

FUTURE ALTERNATIVE (TO BE IMPLEMENTED ONLY WITH PRIOR APPROVAL FROM NYSDEC AND NYCOER):
IF, AFTER INSTALLATION OF VAPOR BARRIER AND VENTING SYSTEM AND OPERATION OF THE ACTIVE SYSTEM OVER A PERIOD OF TIME, IF UPON INSPECTION AND POST-SAMPLING FOR AIR QUALITY, APPROVAL IS RECEIVED FROM THE REGULATORY AGENCY FOR OPERATING AS A PASSIVE SYSTEM, THEN, THE ABOVE SPECIFIED MECHANICAL FAN SHALL BE REPLACED WITH THE FOLLOWING WIND-DRIVEN FAN: TURBINE VENTILATOR EMPIRE 126 CFM @ 4-MILE WIND, 4" NECK (GRAINGER), OR APPROVED EQUIVALENT

NOTE:
CONTRACTOR SHALL INSTALL THE VAPOR BARRIER AND WATERPROOFING LINER AND SYSTEM PER MANUFACTURER'S INSTRUCTIONS. IN CASE OF DISCREPANCY BETWEEN THESE PLANS AND LINER MANUFACTURER'S INSTRUCTIONS, PRIOR TO COMMENCEMENT OF THE PROJECT'S CONSTRUCTION, CONTACT DESIGN ENGINEER AT LEAST 48 HOURS IN ADVANCE FOR FURTHER INSTRUCTIONS AND/OR CLARIFICATIONS ON ITEMS IN QUESTIONS, WHICH SHALL BE PROVIDED BY THE ENGINEER IN WRITING.

NOTE:
*THESE DRAWINGS ARE FOR VAPOR BARRIER AND WATERPROOFING, AND SUBSLAB DEPRESSURIZATION AND ACTIVE VAPOR VENTING APPLICATIONS ONLY, AND SHALL NOT BE USED FOR CONSTRUCTION OF ANY OTHER FEATURES. THE STRUCTURAL DESIGN FOR THIS DEVELOPMENT HAS NOT BEEN COMPLETED. THEREFORE, ANTICIPATED STRUCTURAL FEATURES WERE ASSUMED FOR THIS DESIGN TO DEPITCT CONSTRUCTION OF VAPOR BARRIER AND WATERPROOFING MEMBRANE, AND SUBSLAB DEPRESSURIZATION AND VENTING SYSTEM FEATURES UNDER POTENTIALLY LIKELY STRUCTURAL DESIGN CONDITIONS, AND THIS DESIGN MUST BE ADAPTED TO THE FINAL STRUCTURAL DESIGN IF IT IS AT VARIANCE FROM THE ASSUMED FOUNDATION AND OTHER STRUCTURAL DESIGN FEATURES SHOWN IN THESE DRAWINGS. ALL ADAPTATIONS AND MODIFICATIONS TO THESE MEMBRANE AND VENTING SYSTEM PLANS SHALL BE APPROVED IN WRITING BY THE DESIGN ENGINEER OR A NEW YORK STATE LICENSED PROFESSIONAL ENGINEER **PRIOR TO** COMMENCEMENT OF CONSTRUCTION. ALTHOUGH STRUCTURAL ELEMENTS ARE SHOWN IN THESE DRAWINGS, THEY ARE INCLUDED FOR REPRESENTATIONAL PURPOSE ONLY AND ARE NOT BASED ON FORMAL STRUCTURAL DESIGN AND CALCULATIONS, AND SHALL NOT BE USED FOR CONSTRUCTION OF FOUNDATION AND OTHER STRUCTURAL ELEMENTS.*

THIS DRAWING CROSS-REFERENCED TO:
FIGURE 8 AND FIGURE 10 OF RAWP

NO.	DATE	DESCRIPTION	APP.

REVISIONS

KORLIPARA ENGINEERING
CONSULTING SERVICES
150 Broadhollow Road (Rt. 110)
Suite PH7
Melville, NY 11747
(631)421-2969

AIRTEK ENVIRONMENTAL CORPORATION
39-37 29th Street
Long Island City, NY 11101
(718)937-3720

PROJECT TITLE: SUBSURFACE WATERPROOFING AND VAPOR BARRIER SYSTEM & SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYTEM
15 PROSPECT STREET, STATEN ISLAND NY

TITLE: VENTING SYSTEM ELEVATIONS

DESIGNED: RKK
DRAWN: REK
CHECKED: RKK

DATE: 06-06-16
SCALE: NTS
PAPER SIZE: D (ANSI) 22x34

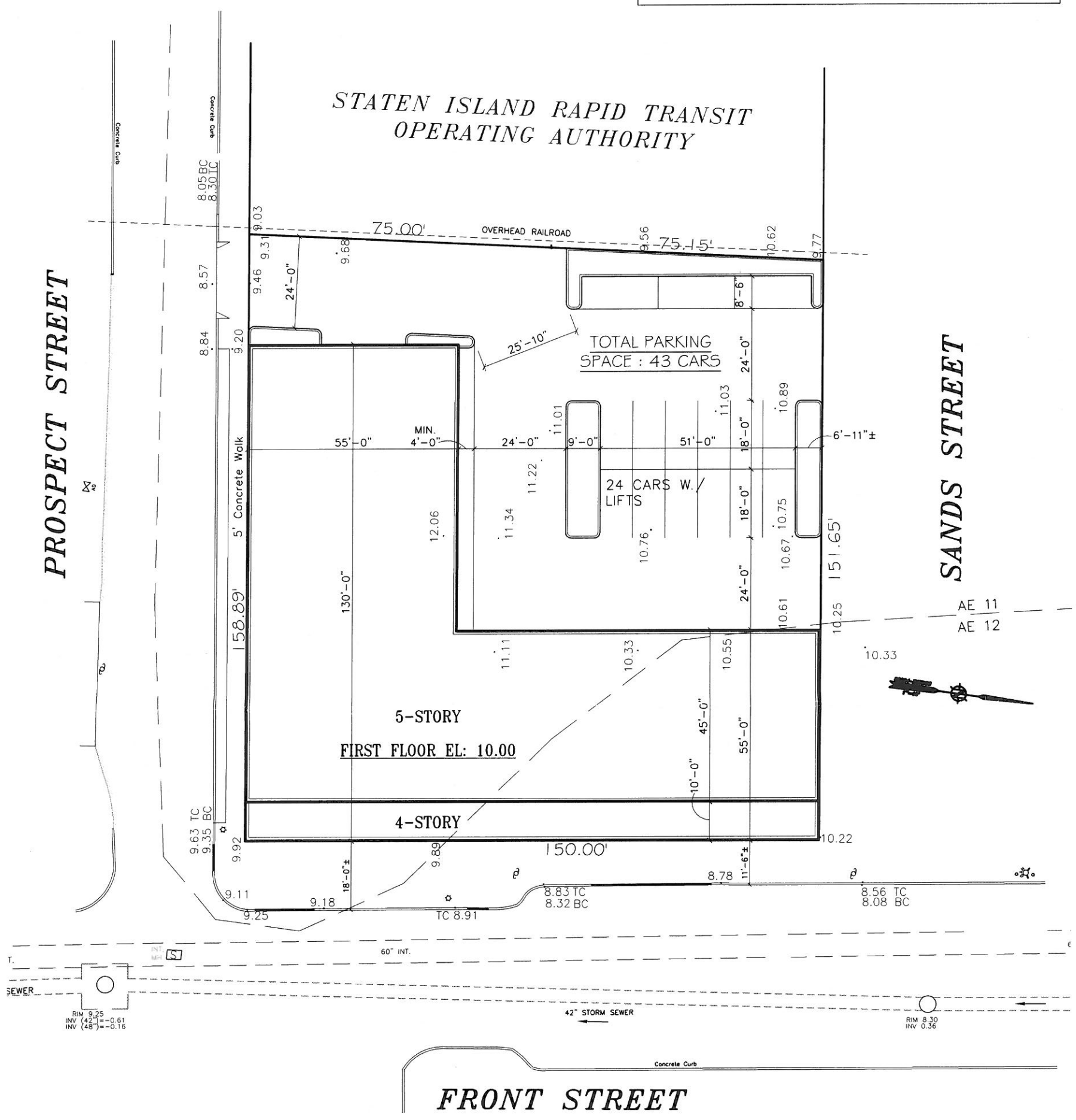
DWG. NO. 9 OF 9

APPENDICES

APPENDIX 1

PROPOSED DEVELOPMENT PLANS

BLOCK #	490
LOT #	24, 26, 37, 45
ZONE	C4-2A (STAPLETON WATER FRONT DISTRACT)
MAP #	21C
LOT AREA	23,290 S.F.
FLOOD	ZONE AE (BFE 11.00' & 12.00')



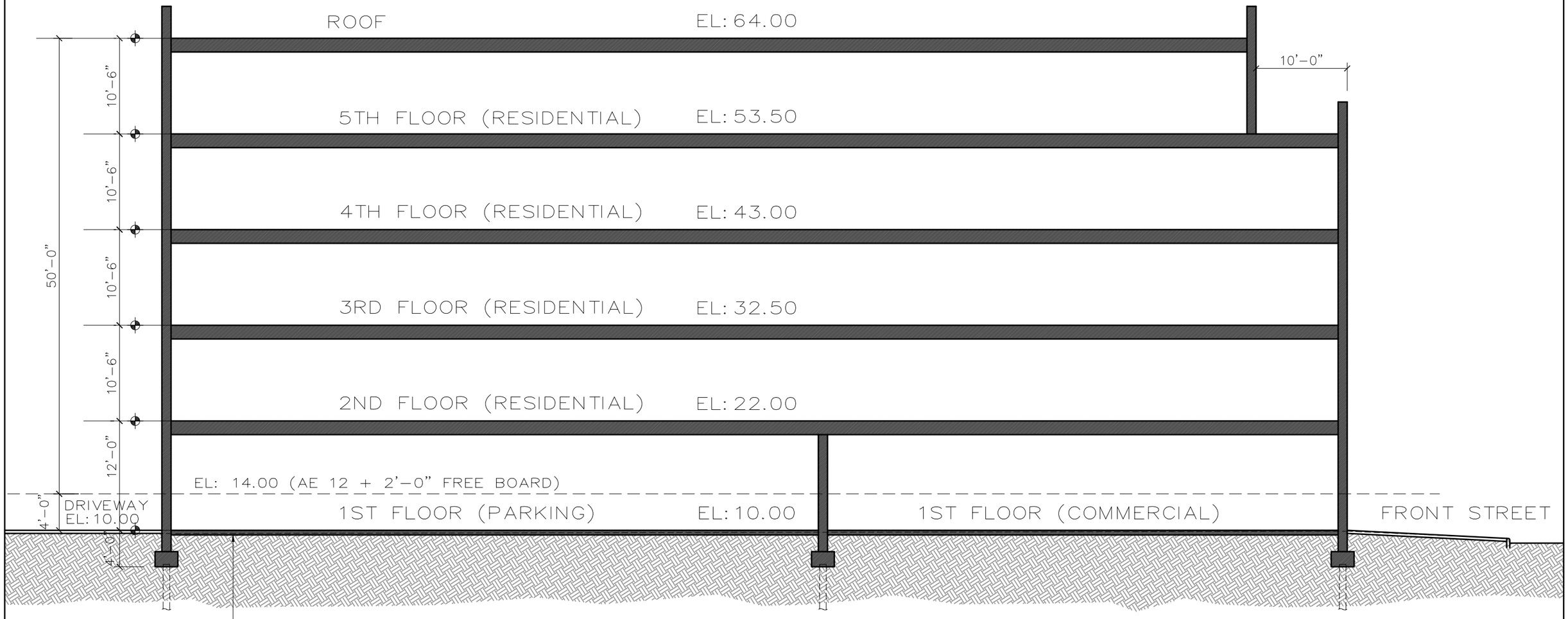
SITE PLAN

SCALE: 1" = 30''-0"

MOSS & SAYAD ARCHITECTS

2071 CLOVE ROAD, SUITE 204
STATEN ISLAND, NY 10304

TEL: 718-442-3113 FAX: 718-442-5955



SECTION A–A

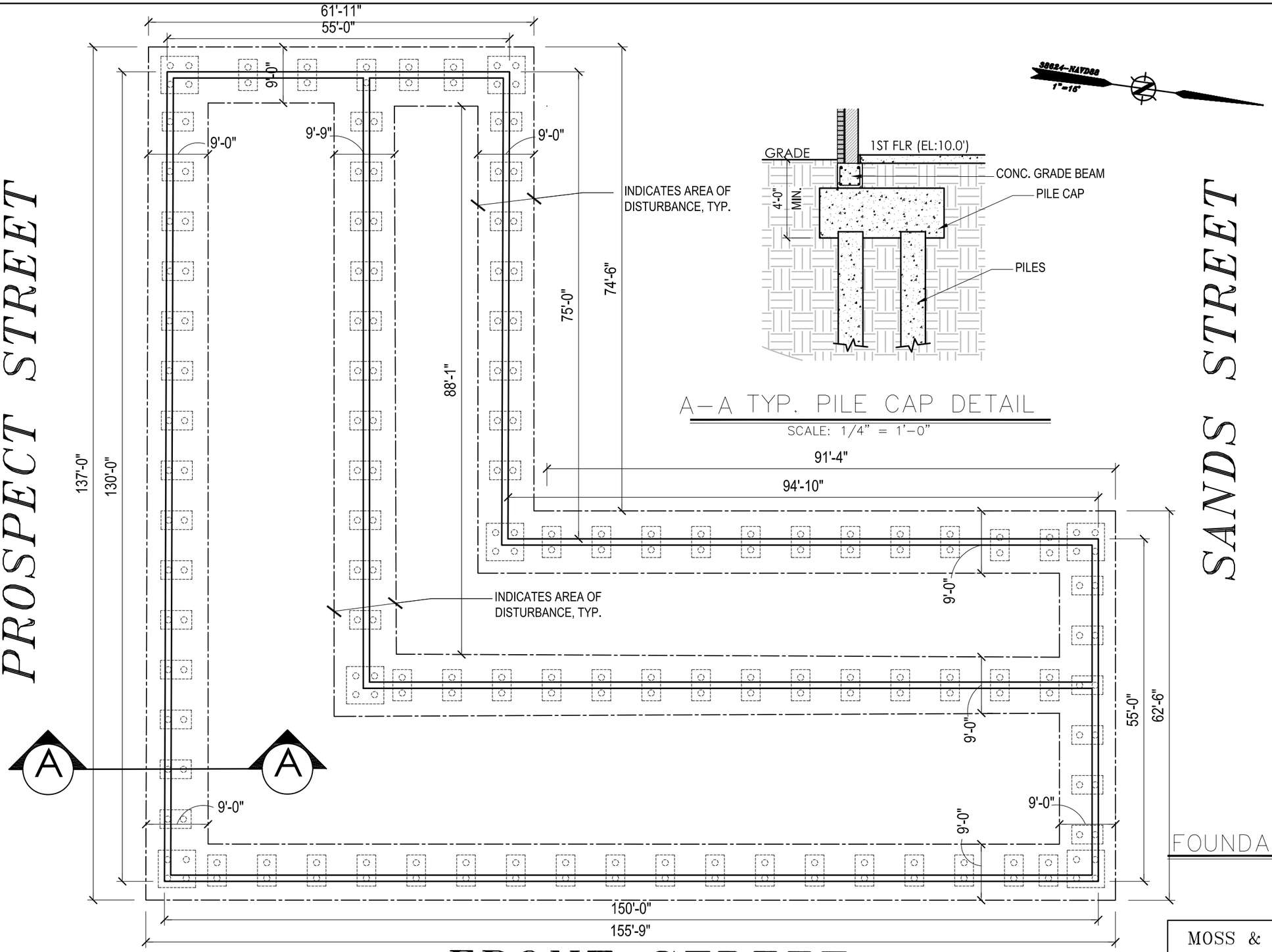
SCALE: 3/32" = 1'-0"

MOSS & SAYAD ARCHITECTS
2071 CLOVE ROAD, SUITE 204
STATEN ISLAND, NY 10304
TEL: 718-442-3113 FAX: 718-442-5955

PROSPECT STREET

SAMPSON STREET

FRONT STREET



A–A TYP. PILE CAP DETAIL

SCALE: 1/4" = 1'–0"

FOUNDATION PLAN

SCALE: 1/16" = 1'–0"

MOSS & SAYAD ARCHITECTS

2071 CLOVE ROAD, SUITE 204
STATEN ISLAND, NY 10304

TEL: 718-442-3113 FAX: 718-442-5955

APPENDIX 2

CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and Blue Star Front Street, LLC have established this Citizen Participation Plan because the opportunity for citizen participation is an important component of the NYC Voluntary Cleanup Program. This Citizen Participation Plan describes how information about the project will be disseminated to the Community during the remedial process. As part of its obligations under the NYC VCP, Blue Star Front Street, LLC will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (OER) until public comment periods have expired and all comments are formally reviewed. An explanation of cleanup plans in the form of a public meeting or informational session is available upon request to OER's project manager assigned to this Site, William Wong, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841.

Project Contact List: OER has established a Site Contact List for this project to provide public notices in the form of fact sheets to interested members of the Community. Communications will include updates on important information relating to the progress of the cleanup program at the Site as well as to request public comments on the cleanup plan. The Project Contact List includes owners and occupants of adjacent buildings and homes, principal administrators of nearby schools, hospitals and day care centers, the public water supplier that serves the area, established document repositories, the representative Community Board, City Council members, other elected representatives and any local Brownfield Opportunity Area (BOA) grantee organizations. Any member of the public or organization will be added to the

Site Contact List on request. A copy of the Site Contact List is maintained by OER's project manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at brownfields@cityhall.nyc.gov.

Repositories: A document repository is maintained online. Internet access to view OER's document repositories is available at public libraries. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action work plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. The library nearest the Site is:

New York Public Library Stapleton Branch
132 Canal Street, Staten Island, NY 10304
Tel. No.: (718) 727-0427
Regular Hours:

Sunday:	Closed
Monday:	10 am – 7 pm
Tuesday:	12 pm – 8 pm
Wednesday:	10 am – 7 pm
Thursday:	10 am – 7 pm
Friday:	10 am – 5 pm
Saturday:	10 am – 5 pm

Digital Documentation: NYC OER requires the use of digital documents in our repository as a means of minimizing paper use while also increasing convenience in access and ease of use.

Issues of Public Concern: No issues of concern are anticipated for this project.

Public Notice and Public Comment: Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by OER. Notices will include Fact Sheets with

descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be reviewed and approved by OER prior to distribution and mailed by the Enrollee. Public comment is solicited in public notices for all work plans developed under the NYC Voluntary Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

Citizen Participation Milestones: Public notice and public comment activities occur at several steps during a typical NYC VCP project. These steps include:

- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan:** Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.
- **Public Notice announcing the approval of the RAWP and the start of remediation:** Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.
- **Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion:** Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion.

APPENDIX 3

SUSTAINABILITY STATEMENT

This Sustainability Statement documents sustainable activities and green remediation efforts planned under this remedial action.

Reuse of Clean, Recyclable Materials and Reduced Consumption of Non-Renewable Resources: Reuse of clean, locally-derived recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction.

An estimate of the quantity (in tons) of clean, non-virgin materials (reported by type of material) reused under this plan will be quantified and reported in the RAR.

Reduced Energy Consumption and Promotion of Greater Energy Efficiency:

Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings.

Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

Conversion to Clean Fuels: Use of clean fuel improves NYC's air quality by reducing harmful emissions.

An estimate of the volume of clean fuels used during remedial activities will be quantified and reported in the RAR.

Recontamination Control: Recontamination after cleanup and redevelopment is completed undermines the value of work performed, may result in a property that is less

protective of public health or the environment, and may necessitate additional cleanup work later or impede future redevelopment. Recontamination can arise from future releases that occur within the property or by influx of contamination from off-Site.
An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

Stormwater Retention: Stormwater retention improves water quality by lowering the rate of combined stormwater and sewer discharges to NYC's sewage treatment plants during periods of precipitation, and reduces the volume of untreated influent to local surface waters.
An estimate of the enhanced stormwater retention capability of the redevelopment project will be included in the RAR.

Linkage with Green Building: Green buildings provide a multitude of benefits to the city across a broad range of areas, such as reduction of energy consumption, conservation of resources, and reduction in toxic materials use.
The number of Green Buildings that are associated with this brownfield redevelopment property will be reported in the RAR. The total square footage of green building space created as a function of this brownfield redevelopment will be quantified for residential, commercial and industrial/manufacturing uses.

Paperless Voluntary Cleanup Program: Blue Star Front Street, LLC is participating in OER's Paperless Voluntary Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

Low-Energy Project Management Program: Blue Star Front Street, LLC is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion associated with personal transportation.

Trees and Plantings: Trees and other plantings provide habitat and add to NYC's environmental quality in a wide variety of ways. Native plant species and native habitat provide optimal support to local fauna, promote local biodiversity, and require less maintenance. An estimate of the land area that will be vegetated, including the number of trees planted or preserved, will be reported in square feet in the RAR.

APPENDIX 4

SOIL/MATERIALS MANAGEMENT PLAN

1.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional and will be reported in the final remedial report. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of final signoff by OER.

1.2 Stockpile Methods

Excavated soil from suspected areas of contamination (e.g., hot spots, USTs, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials. Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.
All stockpile activities will be compliant with applicable laws and regulations. Soil stockpile areas will be appropriately graded to control run-off in accordance with applicable laws and regulations. Stockpiles of excavated soils and other materials shall be located at least of 50 feet from the property boundaries, where possible. Hay bales or equivalent will surround soil stockpiles except for areas where access by equipment is required. Silt fencing and hay bales will be used as needed near catch basins, surface waters and other discharge points.

1.3 Characterization of Excavated Materials

Soil/fill or other excavated media that is transported off-Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils proposed for reuse on-Site will be managed as defined in this plan.

1.4 Materials Excavation, Load-Out, and Departure

The PE/QEP overseeing the remedial action will:

- oversee remedial work and the excavation and load-out of excavated material;
- ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;
- ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this RAWP;
- ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this plan are properly addressed by appropriate parties;
- ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site;
- ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

Open and uncontrolled mechanical processing of historical fill and contaminated soil on-Site will not be performed without prior OER approval.

1.5 Off-Site Materials Transport

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. If loads contain wet material capable of causing leakage from trucks, truck liners will be used. Queuing of trucks will be performed on-Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized.

Outbound truck transport routes are described in the remedial report. This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

1.6 Materials Disposal Off-Site

The following documentation will be established and reported by the PE/QEP for each disposal destination used in this project to document that the disposal of regulated material exported from the Site conforms with applicable laws and regulations: (1) a letter from the PE/QEP or Enrollee to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in New York City under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Enrollee. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the final remedial report.

The Remedial Action Report will include an itemized account of the destination of all material removed from the Site during this remedial action. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the final remedial report.

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility). Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be

reported in the final remedial report. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the final remedial report. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e., clean soil removed for development purposes), including transport to a Part 360-16 Registration Facility, a formal request will be made for approval by OER with an associated plan compliant with 6NYCRR Part 360-16. This request and plan will include the location, volume and a description of the material to be recycled, including verification that the material is not impacted by site uses and that the material complies with receipt requirements for recycling under 6NYCRR Part 360. This material will be appropriately handled on-Site to prevent mixing with impacted material.

1.7 Materials Reuse On-Site

Soil and fill that is derived from the property that meets the Soil Cleanup Objectives (SCOs) established in this plan may be reused on-Site. Although reuse of excavated materials on-Site is not anticipated for this project, the SCOs for on-Site reuse are listed in Section 4.2 of this cleanup plan. 'Reuse on-Site' means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on land with comparable levels of contaminants in soil/fill material, compliant with applicable laws and regulations, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this remedial plan are followed. The expected location for placement of reused material is shown in Section 4.2.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

1.8 Demarcation

After completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement

of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer. A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

This demarcation will constitute the top of the site management horizon. Materials within this horizon require adherence to special conditions during future invasive activities as defined in the Site Management Plan.

1.9 Import of Backfill Soil From Off-Site Sources

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. Imported soils will not exceed groundwater protection standards established in Part 375. Imported soils for Track 1 remedial action projects will not exceed Track 1 SCO's.

A process will be established to evaluate sources of backfill and cover soil to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The following potential sources may be used pending attainment of backfill and cover soil quality objectives:

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.

- All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this remedial plan. The final remedial report will report the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.
- All material will be subject to source screening and chemical testing.
- Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:
- Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
- The PE/QEP is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and
- Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Composite samples of imported material will be taken at a minimum frequency of one sample for every 500 cubic yards of material. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.
Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the final remedial report. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

1.10 Fluids Management

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Liquids discharged into the

New York City sewer system will receive prior approval by New York City Department of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

Discharge of water generated during remedial construction to surface waters (i.e. a stream or river) is prohibited without a SPDES permit issued by New York State Department of Environmental Conservation.

1.11 Stormwater Pollution Prevention

Applicable laws and regulations pertaining to stormwater pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this remedial plan (silt fences and barriers, and hay bale checks) will be installed around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receptors. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence toe anchor will be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

1.12 Contingency Plan for Unknown Contamination Sources

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings

will be included in the daily report. If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

1.13 Odor, Dust, and Nuisance Control

Odor Control

All necessary means will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. OER will be notified of all odor complaint events. Implementation of all odor controls, including halt of work, will be the responsibility of the PE/QEP's certifying this remedial plan.

Dust Control

Dust management during invasive on-Site work will include, at a minimum:

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.
- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry and high-wind periods.
- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work

will not resume until all nuisance dust emissions have been abated. OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the PE/QEP's responsible for certifying this remedial plan.

Other Nuisances

Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to NYC noise control standards.

Rodent control will be provided during Site clearing and grubbing and during the remedial program, as necessary, to prevent nuisances.

APPENDIX 5

CONSTRUCTION HEALTH AND SAFETY PLAN

SITE-SPECIFIC CONSTRUCTION HEALTH & SAFETY PLAN

For

15 Prospect Street, 326 Front Street

320-322 Front Street and Vacant Lot on Sands Street

Staten Island, NY 10304

OER Project Number 16EH-N081R

Submitted To:

Mayor's Office of Environmental Remediation
E-Designation Program
c/o William Wong, Senior Project Manager
100 Gold Street, 2nd Floor
New York, NY 10038

Prepared By:

Airtek Environmental Corp.
39 -37 29th Street
Long Island City, New York 11101

MARCH 1, 2016

SITE-SPECIFIC HEALTH & SAFETY PLAN APPROVALS

By their signature, the undersigned certify that this Site-Specific Construction Health & Safety Plan (HASP) is approved and will be utilized at 15 Prospect Street, 326 Front Street, 320-322 Front Street and Vacant Lot on Sands Street, Staten Island, NY 10304, for the disturbance of onsite soil for the sampling of subsurface soil and vapor.

_____ _____
SIGNATURE Date
NAME and TITLE:

_____ _____
SIGNATURE Date
NAME and TITLE:

_____ _____
SIGNATURE Date
NAME and TITLE:

NOTES:

1. SECTION 14.0 WILL NOT BE UTILIZED IN THIS HASP.

TABLE OF CONTENTS

Attachments

1.0 TITLE PAGE

PROJECT:	Airtek Project #15-1185
OER PROJECT NUMBER	16EH-N081R
SITE:	15 Prospect Street, 326 Front Street, 320-322 Front Street and Vacant Lot on Sands Street Staten Island, NY 10304
SUBMITTED TO:	Mayor's Office of Environmental Remediation E-Designation Program c/o William Wong, Senior Project Manager 100 Gold Street, 2nd Floor New York, NY 10038
PREPARED BY:	Airtek Environmental Corp. 39-37 29th Street Long Island City, New York 11101
DATE:	February 26, 2016

Through preparation of this Site-Specific Construction Health and Safety Plan (HASP), Airtek Environmental Corp. (Airtek), Bluestar Group, LLC (potential buyer of the site), and all Subcontractors (if any) do not guarantee the health or safety of any person entering this site. Due to the nature of this site and the activities occurring thereon, it is not possible to discover, evaluate and provide protection for all possible hazards that may be encountered. The site owner, tenants, and Bluestar Group, LLC shall assume the responsibility for implementation of this plan. Only those portions of this HASP that specifically apply to the activities at the site will be enacted by authorized personnel of the site owner and Bluestar Group, LLC . Strict adherence to the applicable portions of these health and safety guidelines set forth herein will reduce, but not eliminate, the potential for injury at this site. The health and safety guidelines in this plan were prepared specifically for this site and should not be utilized for any other site without prior research and evaluation by trained health and safety specialists and approval by Airtek. The responsibilities of Airtek with regards to site safety procedures shall be limited to the preparation of this Health and Safety Plan, and strict compliance with all plan specifications by all Airtek personnel onsite during site activities.

2.0 CONSTRUCTION HEALTH AND SAFETY PLAN

2.1 General

This HASP has been prepared in conformance with applicable regulations, safe work practices, and the project's requirements. It addresses those activities associated with disturbance of the onsite Soil. The site owner and Bluestar Group, LLC have selected a Project Manager (PM) and Site Safety Officer (SSO) to be responsible for site safety during all site activities. The PM, SSO, the site owner, and Bluestar Group, LLC field staff will implement the plan during site work. Compliance with this HASP is required of all persons and third parties who perform fieldwork for this project. Assistance in implementing this HASP can be obtained, upon request and with appropriate compensation, from Airtek. The content of this HASP may change or undergo revision based upon additional information that is made available to health and safety personnel, monitoring results, or changes in the technical scope of work. Any changes proposed must be reviewed by the SSO.

2.2 Scope of Work

The Scope of Work activities may include the following:

- Disturbance of the onsite soil for the sampling of subsurface soil and vapor.

2.3 Emergency Numbers

2.3.1 Emergency Agencies

The following phone numbers for the following services will be provided:

Richmond University Medical Center-Bayley Seton Hospital	718-818-2070
New York City EMS	911
New York Police Department	911
New York Fire Department	911
National Response Center	800-424-8802
Poison Information Center	800-562-8816
CHEMTREC	800-262-8200

2.3.2 Project Management/Health and Safety Personnel

Title	Contact	Phone Number
Project Manager	Ms. Christine Chen	718-937-3720
Site Safety Officer	Ms. Christine Chen	718-937-3720

2.3.3 Directions to Richmond University Medical Center-Bayley Seton Hospital

Address: 75 Vanderbilt Avenue, Staten Island, NY 10304 (0.7 mi South)

1. Head east on Prospect St toward Front St.
2. Turn right onto Front St.
3. Turn right onto Thompson St.
4. Turn left at the 1st cross street onto Bay St.

5. Turn right onto Vanderbilt Ave
6. Turn right to stay on Vanderbilt Ave. Hospital will be on the right.

A map from the Site to the hospital is attached.

3.0 HEALTH AND SAFETY STAFF

This section briefly describes the personnel and their health and safety responsibilities for the project:

3.1 Project Manager

Ms. Christine Chen, Sr. Project Manager

- Has the overall responsibility for the health and safety of site personnel
- Ensures that adequate resources are provided to the field health and safety staff to carry out their responsibilities as outlined below.
- Ensures that fieldwork is scheduled with adequate personnel and equipment resources to complete the job safely.
- Ensures that adequate telephone communication between field crews and emergency response personnel is maintained.
- Ensures that field site personnel are adequately trained and qualified to work at the site.

3.2 Site Safety Officer

Ms. Christine Chen, Sr. Project Manager

- Directs and coordinates health and safety monitoring activities.
- Ensures that field teams utilize proper personal protective equipment (PPE).
- Conducts initial on-site, specific training prior to personnel and/or subcontractors proceeding to work.
- Conducts and documents periodic safety briefings; ensures that field team members comply with this HASP.
- Completes and maintains Accident/Incident Report Forms.
- Notifies Contractor of all accidents/incidents.
- Determines upgrade or downgrade of PPE based on site conditions and/or downgrade of PPE based on site conditions and/or real-time monitoring results.
- Ensures that monitoring instruments are calibrated daily or as determined by manufactured suggested instructions.
- Maintains health and safety field log books.
- Develops and ensures implementation of the HASP.
- Approves revised or new safety protocols for field operations.
- Coordinates revisions of this HASP with field personnel and the SSO Division Contracting Officer.
- Responsible for the development of new company safety protocols and procedures and resolution of any outstanding safety issues which may arise during the conduction of site work.
- Reviews personnel and subcontractors current and up-to-date medical examination and acceptability of health and safety training.

3.3 Field Personnel and Subcontractors

- Report any unsafe or potentially hazardous conditions to the SSO
- Maintain knowledge of the information, instructions, and emergency response actions contained in this HASP.
- Comply with rules, regulations and procedures as set forth in this HASP and any revisions that are instituted.
- Prevent admittance to work sites by unauthorized personnel.

4.0 SITE LOCATION

The Site consists of the property located at 15 Prospect Street, 326 Front Street, 320-322 Front Street and Vacant Lot on Sands Street, Staten Island, NY 10304. As of the date of this HASP, the Site was improved with two (2) one-story machine shop buildings at 15 Prospect Street and 326 Front Street, a storage shed, a trailer office, a two-story storage trailer, and a one-story storage trailer. The rest of the property is used as a storage yard/parking lot. The Site can be accessed from Prospect Street bounding the Site to the south and Front Street bounding the Site to the east.

5.0 CHEMICAL & WASTE DESCRIPTION/CHARACTERIZATION

5.1 General

The following information references are presented in order to identify the properties and hazards of the materials that may/will be encountered at the Site.

- Lewis, Richard J. Sr. Sax's Dangerous Properties of Industrial Materials. John Wiley & Sons, 2004.
- Hathaway, Gloria J., and Nick H. Proctor. Proctor and Hughes' Chemical Hazards of the Workplace, 5th Edition. Wiley-Interscience, June 25, 2004.
- Lewis, Richard J. Hawley's Condensed Chemical Dictionary, 15th Edition. John Wiley & Sons, January 2007.
- Lewis, Richard J. Rapid Guide to Hazardous Chemicals in the Workplace, 4th Edition. John Wiley & Sons, March 2000.
- National Institute for Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards.
- American Conference of Governmental Industrial Hygienists. 2009 Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) with 7th Edition Documentation.

6.0 HAZARD ASSESSMENT

The potential hazards associated with planned site activities include chemical, physical and biological hazards. This section discusses those hazards that are anticipated to be encountered during the activities listed in the scope of work in Section 2.2 of this HASP.

The potential to encounter chemical hazards is dependent upon the work activity performed (invasive or non-invasive), the duration and location of the work activity. Such hazards could include inhalation or skin contact with chemicals that could cause: dermatitis, skin burn, being overcome by vapors or asphyxiation. In addition, the handling of contaminated materials and chemicals could result in fire and/or explosion.

The potential to encounter physical hazards during site work includes: heat stress, exposure to excessive noise, loss of limbs, being crushed, head injuries, cuts and bruises, and other physical hazards due to motor vehicle operation, heavy equipment and power tools.

6.1 Chemical Hazards

The potential for personnel and subcontractors to come in contact with chemical hazards may occur during the following tasks:

- Soil excavation through potentially contaminated soil and vapor.

Material safety data sheets (MSDS) of the chemicals being analyzed for soil and vapor are provided as Attachment A. Analytes are listed as follows:

VOCs		**SVOCs**	
1,1,1,2-Tetrachloroethane	630-20-6	1,2,4,5-Tetrachlorobenzene	95-94-3
1,1,1-Trichloroethane	71-55-6	1,2,4-Trichlorobenzene	120-82-1
1,1,2,2-Tetrachloroethane	79-34-5	1,2-Dichlorobenzene	95-50-1
1,1,2-Trichloroethane	79-00-5	1,3-Dichlorobenzene	541-73-1
1,1-Dichloroethane	75-34-3	1,4-Dichlorobenzene	106-46-7
1,1-Dichloroethene	75-35-4	2,4,5-Trichlorophenol	95-95-4
1,1-Dichloropropene	563-58-6	2,4,6-Trichlorophenol	88-06-2
1,2,3-Trichlorobenzene	87-61-6	2,4-Dichlorophenol	120-83-2
1,2,3-Trichloropropane	96-18-4	2,4-Dimethylphenol	105-67-9
1,2,4,5-Tetramethylbenzene	95-93-2	2,4-Dinitrophenol	51-28-5
1,2,4-Trichlorobenzene	120-82-1	2,4-Dinitrotoluene	121-14-2
1,2,4-Trimethylbenzene	95-63-6	2,6-Dinitrotoluene	606-20-2
1,2-Dibromo-3-chloropropane	96-12-8	2-Chlorophenol	95-57-8
1,2-Dibromoethane	106-93-4	2-Methylphenol	95-48-7
1,2-Dichlorobenzene	95-50-1	2-Nitroaniline	88-74-4
1,2-Dichloroethane	107-06-2	2-Nitrophenol	88-75-5
1,2-Dichloropropane	78-87-5	3,3'-Dichlorobenzidine	91-94-1
1,3,5-Trimethylbenzene	108-67-8	3-Methylphenol/4-Methylphenol	108-39-4
1,3-Dichlorobenzene	541-73-1	3-Nitroaniline	99-09-2
1,3-Dichloropropane	142-28-9	4,6-Dinitro-o-cresol	534-52-1
1,4-Dichlorobenzene	106-46-7	4-Bromophenyl phenyl ether	101-55-3
1,4-Diethylbenzene	105-05-5	4-Chloroaniline	106-47-8
2,2-Dichloropropane	594-20-7	4-Chlorophenyl phenyl ether	7005-72-3
2-Butanone	78-93-3	4-Nitroaniline	100-01-6

2-Hexanone	591-78-6	4-Nitrophenol	100-02-7
4-Ethyltoluene	622-96-8	Acetophenone	98-86-2
4-Methyl-2-pentanone	108-10-1	Benzoic Acid	65-85-0
Acetone	67-64-1	Benzyl Alcohol	100-51-6
Acrylonitrile	107-13-1	Biphenyl	92-52-4
Benzene	71-43-2	Bis(2-chloroethoxy)methane	111-91-1
Bromobenzene	108-86-1	Bis(2-chloroethyl)ether	111-44-4
Bromochloromethane	74-97-5	Bis(2-chloroisopropyl)ether	108-60-1
Bromodichloromethane	75-27-4	Bis(2-Ethylhexyl)phthalate	117-81-7
Bromoform	75-25-2	Butyl benzyl phthalate	85-68-7
Bromomethane	74-83-9	Carbazole	86-74-8
Carbon disulfide	75-15-0	Dibenzofuran	132-64-9
Carbon tetrachloride	56-23-5	Diethyl phthalate	84-66-2
Chlorobenzene	108-90-7	Dimethyl phthalate	131-11-3
Chloroethane	75-00-3	Di-n-butylphthalate	84-74-2
Chloroform	67-66-3	Di-n-octylphthalate	117-84-0
Chloromethane	74-87-3	Hexachlorocyclopentadiene	77-47-4
cis-1,2-Dichloroethene	156-59-2	Isophorone	78-59-1
cis-1,3-Dichloropropene	10061-01-5	Nitrobenzene	98-95-3
Dibromochloromethane	124-48-1	NitrosoDiPhenylAmine (NDPA)/DPA	86-30-6
Dibromomethane	74-95-3	n-Nitrosodi-n-propylamine	621-64-7
Dichlorodifluoromethane	75-71-8	P-Chloro-M-Cresol	59-50-7
Ethyl ether	60-29-7	Phenol	108-95-2
Ethylbenzene	100-41-4	**Pesticides**	
Hexachlorobutadiene	87-68-3	4,4'-DDD	72-54-8
Isopropylbenzene	98-82-8	4,4'-DDE	72-55-9
Methyl tert butyl ether	1634-04-4	4,4'-DDT	50-29-3
Methylene chloride	75-09-2	Aldrin	309-00-2
m-Xylene	108-38-3	Alpha-BHC	319-84-6
Naphthalene	91-20-3	Beta-BHC	319-85-7
n-Butylbenzene	104-51-8	Chlordane	57-74-9
n-Propylbenzene	103-65-1	Delta-BHC	319-86-8
o-Chlorotoluene	95-49-8	Dieldrin	60-57-1
o-Xylene	95-47-6	Endosulfan I	959-98-8
p-Chlorotoluene	106-43-4	Endosulfan II	33213-65-9
p-Isopropyltoluene	99-87-6	Endosulfan sulfate	1031-07-8
p-Xylene	106-42-3	Endrin	72-20-8
sec-Butylbenzene	135-98-8	Endrin ketone	53494-70-5
Styrene	100-42-5	Heptachlor	76-44-8
tert-Butylbenzene	98-06-6	Heptachlor epoxide	1024-57-3
Tetrachloroethene	127-18-4	Lindane	58-89-9
Toluene	108-88-3	Methoxychlor	72-43-5
trans-1,2-Dichloroethene	156-60-5	Toxaphene	8001-35-2
trans-1,3-Dichloropropene	10061-02-6	trans-Chlordane	5103-74-2
trans-1,4-Dichloro-2-butene	110-57-6	cis-Chlordane	5103-71-9
Trichloroethene	79-01-6	**TAL Metals**	
Trichlorofluoromethane	75-69-4	Aluminum, Total	7429-90-5
Vinyl acetate	108-05-4	Antimony, Total	7440-36-0

Vinyl chloride	75-01-4	Arsenic, Total	7440-38-2
PCBs		Barium, Total	7440-39-3
Aroclor 1016	12674-11-2	Beryllium, Total	7440-41-7
Aroclor 1221	11104-28-2	Cadmium, Total	7440-43-9
Aroclor 1232	11141-16-5	Calcium, Total	7440-70-2
Aroclor 1242	53469-21-9	Chromium, Total	7440-47-3
Aroclor 1248	12672-29-6	Cobalt, Total	7440-48-4
Aroclor 1254	11097-69-1	Copper, Total	7440-50-8
Aroclor 1260	11096-82-5	Iron, Total	7439-89-6
Aroclor 1262	37324-23-5	Lead, Total	7439-92-1
Aroclor 1268	11100-14-4	Magnesium, Total	7439-95-4
		Manganese, Total	7439-96-5
		Mercury, Total	7439-97-6
		Nickel, Total	7440-02-0
		Potassium, Total	9/7/7440
		Selenium, Total	7782-49-2
		Silver, Total	7440-22-4
		Sodium, Total	7440-23-5
		Thallium, Total	7440-28-0
		Vanadium, Total	7440-62-2
		Zinc, Total	7440-66-6

6.1.1 Exposure Pathways

Exposure to these compounds during ongoing activities may occur through inhalation of contaminated dust particles, inhalation of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs), by way of dermal absorption, and accidental ingestion of the contaminant by either direct or indirect cross contamination activities (eating, smoking, poor hygiene). Indirectly, inhalation of contaminated dust particles (metals, silica, VOCs, SVOCs) can occur during adverse weather conditions (high or changing wind directions) or during operations that may generate airborne dust such as excavation, and sampling activities. Dust control measures such as applying water to roadways and work sites will be implemented, where visible dust is generated from non-contaminated and contaminated soils. Where dust control measures are not feasible or effective, respiratory protection will be used.

6.1.2 Additional Precautions

Dermal absorption or skin contact with chemical compounds is possible during invasive activities at the site, including removal of product, excavation of tanks, and handling of contaminated soils. The use of PPE in accordance with Section 9.2 and strict adherence to proper decontamination procedures should significantly reduce the risk of skin contact.

The potential for accidental ingestion of potentially hazardous chemicals is expected to be remote when good hygiene practices are used.

6.2 Physical Hazards

A variety of physical hazards may be present during site activities. These hazards are similar to those associated with any construction project. These physical hazards are due to motor vehicles and heavy equipment operation, the use or improper use of power and hand tools, misuse of pressurized cylinders, walking on objects, tripping over objects, working on surfaces which have the potential to promote falling, mishandling and improper storage of solid and hazardous materials, skin burns, crushing of fingers, toes, limbs, being hit on the head by falling objects or

hitting one's head due to not seeing the object of concern, temporary loss of one's hearing and/or eyesight. These hazards are not unique and are generally familiar to most hazardous waste site workers at construction sites. Additional task-specific safety requirements will be covered during safety briefings.

6.2.1 Noise

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps, and generators. High noise operators will be evaluated at the discretion of the SSO. Employees with an 8-hour time weighted average exposure exceeding 85 decibels (db) will be included in the hearing conservation program in accordance with 29 Code of Federal Regulations (CFR) 1910.85.

It is mandated that employees working around heavy equipment or using power tools that create noise levels exceeding 95 db are to wear hearing protection consisting of earplugs and earphones.

6.2.2 Heat/Cold Stress

Extremes in temperature and the effects of hard work in impervious clothing can result in heat stress and/or hypothermia. The human body is designed to function at a certain internal temperature. When metabolism or external sources (fire, hot summer day, winter weather, etc.) cause the body temperature to rise or fall excessively, the body seeks to protect itself by triggering cooling/warming mechanisms. Profuse sweating is an example of a cooling mechanism, while uncontrollable shivering is an example of a warming mechanism. The SSO will monitor the ambient temperature to determine potential adverse effects to onsite personnel.

Protective clothing worn to guard against chemical contact effectively stops the evaporation of perspiration. Thus the use of protective clothing increases heat stress problems. Cold stress can occur in winter with sub-freezing ambient temperatures. Workers in protective garments may heat-up and sweat, only to rapidly cool once out of the PPE. The major disorders due to heat stress are heat cramps, heat exhaustion, and heat stroke.

HEAT CRAMPS are painful spasms that occur in the skeletal muscles of workers who sweat profusely in the heat and drink large quantities of water, but fail to replace the body's lost salts or electrolytes. Drinking water while continuing to lose salt tends to dilute the body's extra cellular fluids. Soon water seeps by osmosis into active muscles and causes pain. Muscles fatigued from work are usually most susceptible to cramps.

HEAT EXHAUSTION is characterized by extreme weakness or fatigue, dizziness, nausea, and headache. In serious cases, a person may vomit or lose consciousness. The skin is clammy and moist, complexion pale or flushed, and body temperature normal or slightly higher than normal. Treatment is rest in a cool place and replacement of body water lost by perspiration. Mild cases may recover spontaneously with this treatment; severe cases may require care for several days. There are no permanent effects.

HEAT STROKE is a very serious condition caused by the breakdown of the body's heat regulating mechanisms. The skin is very dry and hot with red mottled or bluish appearance. Unconsciousness, mental confusion, or convulsions may occur. Without quick and adequate treatment, the result can be death or permanent brain damage. Seek medical assistance immediately. As first aid treatment, the person should be moved to a cool place. Soaking the person's clothes with water and fanning them should reduce body heat artificially, but not too rapidly.

Steps that can be taken to reduce heat stress are:

- Acclimatize the body. Allow a period of adjustment to make further heat exposure endurable.
- Drink more liquids to replace body water lost during sweating.
- Rest is necessary and should be conducted under monitoring by the SSO, in order to note the effect on personnel physiological state.

- Wearing personal cooling devices. There are two basic designs; units with pockets for holding frozen packets and units that circulate a cooling fluid from a reservoir through tubes to different parts of the body. Both designs can be in the form of a vest, jacket, or coverall. Some circulating units also have a component for cooling the head.

The severe effects due to cold temperatures are FROSTBITE and HYPOTHERMIA.

FROSTBITE is the most common injury resulting from exposure to cold. The extremities of the body are often affected. The signs of frostbite are:

- The skin turns white or grayish-yellow.
- Pain is sometimes felt early but subsides later. Often there is no pain.
- The affected part feels intensely cold and numb.

HYPOTHERMIA is characterized by shivering, numbness, drowsiness, muscular weakness and a low internal body temperature. This can lead to unconsciousness and death. With both frostbite and hypothermia, the affected areas need to be warmed quickly. Immersing in warm, rather than hot, water best does this. In such cases medical assistance will be sought.

To prevent these effects from occurring, persons working in the cold should wear adequate clothing and reduce the time spent in the cold area. The field SSO will monitor this to determine appropriate time personnel may spend in adverse weather conditions.

6.2.3 Lockout/Tagout

PURPOSE -- This program establishes procedures for de-energizing, isolating, and ensuring the energy isolation of equipment and machinery. The program will be used to ensure that equipment and machinery is de-energized and isolated from unexpected energization by physically locking (Lockout) energy isolation devices or, in the absence of locking capabilities, tagging out (Tagout) the device to warn against energization. These procedures will provide the means of achieving the purpose of this program, prevention of injury to Contractor employees from the unexpected energization or start-up of equipment and machinery, or from the release of stored energy.

APPLICATION -- This program applies to the control of energy during the servicing and/or maintenance of equipment and machinery. This program covers normal operations only if a guard or other safety device is removed or bypassed, or any part of the body is placed into an area of the equipment or machinery where work is performed on the material, or a danger zone exists during the operating cycle. Minor tool changes, adjustments, and other minor servicing activities which take place during normal production operations do not require isolation and lockout/tagout if they are routine and integral to the use of the equipment.

SCOPE -- This program will include all employees whose duties require them to service, install, repair, adjust, lubricate, inspect, or perform work on powered equipment or machinery that may also have the potential for stored energy.

PROGRAM RESPONSIBILITIES -- The SSO will have the overall responsibility of the program to ensure that: authorized and affected employees receive adequate training and information, the program is evaluated annually, and the lockout/tagout equipment is properly used and the procedures of this program are followed.

The program evaluation will be conducted to ensure that the procedures and requirements of the program are being followed and will be utilized to correct any deviations or inadequacies that may be discovered. The evaluation will consist of one or more inspections or audits of actual lockout/tagout procedures being used to isolate equipment. A review of the authorized and affected employee's responsibilities will be conducted at the time of the inspection

/audit. Any authorized employee, except the one(s) utilizing the energy isolation procedure being inspected, may perform the inspection/audit.

A record will be maintained of program evaluation inspections and will include:
1. The identity of the equipment or machine on which energy control procedures were being utilized.
2. The date(s) of the inspection(s).
3. The employee(s) included in the inspection(s).
4. The person performing the inspection.

Authorized employees (persons who implement lockout/tagout procedures) will be responsible for following the procedures established by this program.

Affected employees are responsible for understanding the significance of a lockout/tagout device and the prohibition relating to attempts to restart or re-energize equipment or machinery that is locked out or tagged out.

TRAINING – Where applicable, Contractor employees will be provided instruction in the purpose and functions of the energy control program to ensure that they understand the significance of locked or tagged out equipment and also have the knowledge and skill to correctly apply and remove energy controls. Training will include:

1. The recognition of applicable hazardous energy source(s), the type and magnitude of energy available, and the policies and procedures of the Contractor's energy control program.

2. Affected employees will be made aware of the purpose and use of energy control procedures and the prohibition relating to attempts to remove lockout or tagout devices.

3. Instruction in the limitations of tagout as a sole means of energy control.
   a. Tags are warning devices and do not provide the physical restraint that a lock would.
   b. Tags may provide a false sense of security.
   c. Tags may become detached during use.

Initial training will be provided during the energy control program implementation, when new employees are hired or when job responsibilities change to include utilization of energy control procedures.

Retraining will be conducted whenever there is a change in job assignments that require the employee to utilize energy control procedures, a change in equipment that presents a new hazard, a change in the energy control procedures or when the program evaluation identifies inadequacies in the energy control program procedures.

Records of employee training will be maintained and will include the employee's name and date(s) of training.

STANDARD OPERATING PROCEDURES –where necessary, the Contractor will provide the necessary devices to effectively lockout or tagout energy isolating devices. Lockout/tagout devices will be the only devices used for controlling energy and shall not be used for other purposes. Any device used for lockout/tagout will be capable of withstanding the environment to which they are exposed for the maximum period they are to be exposed. The devices will be substantial enough to prevent removal without excessive force. Excessive force for a locking device would be bolt cutters or other metal cuttings tools. Tagout devices will be attached by a non-reusable method, attachable by hand, and very difficult to remove by hand. A nylon cable tie or equivalent will be used. Lockout/tagout devices will indicate the identity of the employee who applied the device, and the tagout device will warn against the hazards if the equipment is energized.

Lockout is the preferred method of energy isolation. When physical lockout is not possible, the energy isolation will be tagged out of service with a warning tag attached at the power source. In the case of plug-in power source, the tag will be attached at the male plug. To ensure full employee protection using tagout instead of lockout,

additional steps should be taken to guard against accidental or inadvertent energization. These steps may include, where applicable: removal of fuses, blocking switches, removal of a valve handle.

STANDARD OPERATING PROCEDURES

I. APPLICATION OF CONTROLS

A. Preparing to Shut Down Equipment

1. Prior to equipment shutdown, the authorized employee(s) must have knowledge of:

    a. The type(s) and magnitude of power.
    b. The hazards of the energy to be controlled.
    c. The method(s) to control the energy.
    d. The location and identity of all isolating devices that control or feed the equipment to be locked/tagged out.

2. Notify all affected employees that the lockout/tagout system will be in effect.

3. Assemble applicable lockout/tagout devices, i.e., padlocks, tags, multiple lock HASPs, etc.

B. Equipment Shutdown and Isolation

1. If equipment is in operation, shut it down by the normal stopping procedure (stop button, switch).

2. Operate disconnects, switches, valves, or other energy isolating devices so that the equipment is de-energizing and isolated from its energy source(s).

3. Verify that equipment is shut down by operating equipment from the normal operating location and any remote locations.

C. Installation of Lockout/Tagout Device, Release of Stored Energy, and Verification

1. Attach individually assigned lock(s) or tag(s) to energy isolating device(s). Where it is not possible to lock a switch, valve, or other isolating device, electrical fuses must be removed, blank flanges installed in piping, lines disconnected, or other suitable methods used to ensure that equipment is isolated from energy sources. A tag must be installed at the point of power interruption to warn against energizing.

    a. Each lock or tag must positively identify the person who applied it and locks must be individually keyed.
    b. If more than one person is involved in the task, employees will place their own lock and tag. Multiple lock HASPs are available for this.

2. Release, restrain, or dissipate stored energy such spring tension, elevated machine members, rotating flywheels, hydraulic pressure, pistons and air, gas, steam, water pressure, etc. by repositioning, blocking bleeding, or other suitable means.

3. Prior to starting work on equipment and after ensuring that no personnel are exposed, the authorized employee will verify that isolation and de-energization have been accomplished by:

    a. Attempting, through normal effort, to operate energy isolating devices such as switches, valves, or circuit breaker with locks or tags installed.

b. Attempting to operate the equipment or machinery that is locked or tagged out. This includes all sources of energy, i.e. electrical, hydraulic, gravity, air, water, stream pressure, etc.
c. Verifying the presence and effectiveness of restraint (blocking) and energy dissipation or release (bleeding).

4. If there is a possibility of the re-accumulation of stored energy to a hazardous level, verification of isolation will be contained until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

D. Group Lockout/Tagout

1. When more than one individual is involved in locking or tagging equipment out of operation, each individual will attach their individual lock or tag, or the equivalent, to the energy isolating device(s).

2.
a. An equivalent lockout device may be in the form of a group lockout device such as a multiple lock HASP or lock box.
b. Primary responsibility for a group of authorized employees working under a group lockout device will be vested in a designated authorized employee.
c. Group lockout methods will provide a level of protection equal to that afforded by a personal lockout/tagout device.

II. RETURNING EQUIPMENT TO SERVICE

A. Restore Equipment to Normal Operating Status

1. Re-install all parts or subassemblies removed for servicing or maintenance.
2. Re-install all tools, rests, or other operating devices
3. Re-install all guards and protective devices (i.e. limit switches).
4. Remove all blocks, wedges, or other restraints from the operating area of the equipment (ways, slides, etc.).
5. Remove all tools, equipment and shop towels from the operating area of the equipment.

B. Verify Equipment Ready for Operation

1. Inspect area for non-essential items
2. Ensure that all employees are safely positioned clear of the operating areas of the equipment. Post a watch if energy isolation devices are not in line of sight of the equipment.

C. Notify Affected Employees of Impending Start-up

1. The sudden noise of start-up may startle nearby employees.
2. Equipment may need to be tested to determine operational safety by a qualified operator.

D. Remove Energy Isolation Devices - Only by authorized employee(s) who installed it/them.

1. Remove line blanks, reconnect piping (if applicable), and remove warning tag.
2. Close bleeder valves, remove warning tag.
3. Replace fuse(s), close circuit breaker(s), and remove warning tag.
4. Remove lock and tag from control panel, valve, etc.

Employee(s) who installed them may make an exception for removal of lockout/tagout devices. If it is necessary to operate a piece of equipment that is locked/tagged out, every effort must be made to locate the employee whose lock or tag is on the equipment. If he or she cannot be located and only after positive assurance is made that no one is working on the locked out equipment, the supervisor may personally remove the lock. The supervisor must assure that the equipment is once again locked out, or the employee notified that the equipment has been re-energized, before the employee resumes work. Employees will recheck locked out equipment if they have left the equipment (breaks, lunch, and end of shift) to make sure it is still de-energized and locked out.

III. TEMPORARY REMOVAL OF LOCKOUT/TAGOUT PROTECTION

A. In situations when the equipment must be temporarily energized to test or position the equipment or its components, the following steps will be followed:

1. Clear the equipment of tools and materials that are non-essential to the operation.
2. Ensure the equipment components are operationally intact.
3. Remove employees from the equipment area.
4. Remove the lockout/tagout devices by the employee who installed in/them.
5. Energize and proceed with testing or positioning.
6. De-energize all systems and re-install all energy control measures.
7. Verify re-installed energy control measures are effective.

IV. SHIFT OR PERSONNEL CHANGES

A. The following steps will be followed to ensure continuity of employee protection during personnel changes.

1. All personnel involved in the maintenance or servicing activity will be notified that a transfer of personal locks/tags is about to occur.
2. Clear all personnel from hazardous area(s) of equipment.
3. Under the supervision of the shift supervisor or group designee, the off-going employee will immediately install theirs.
    a. If an entire group or more than one employee will be transferring work responsibility, locks/tags will be removed and replaced one at a time in order of installation.
4. When the transfer of lockout/tagout devices is complete, the effectiveness of all energy isolation devices will be verified to the satisfaction of all personnel involved.
5. Once the effectiveness of energy isolation protection is confirmed, the service/maintenance operation may continue.

V. CONTRACTOR NOTIFICATION

A. Whenever outside personnel may be engaged in activities covered by this program, they will inform the contractor of applicable lockout/tagout procedures used to protect Contractor employees from the hazards of working near energized equipment.

1. The Contractor will be expected to ensure that his/her employees understand and comply with the restrictions and prohibitions of this program.
2. The Contractor must inform their employees and any other personnel onsite of their lockout/tagout procedures so that all persons onsite can comply with the restrictions and prohibitions of the contractor's program.
3. Airtek also requires the contractor to notify the program administrator, the area supervisor, and affected Airtek employees prior to de-energizing, isolating, and locking out Airtek equipment. Conversely, notification is also required when this equipment will be returned to service.

DEFINITIONS

Affected employee - An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

"Authorized employee(s)" - A person or persons who locks or implements a tagout system procedure to perform servicing or maintenance on a machine or equipment. An authorized employee and an affected employee may be the same person when the affected employee's duties also include performing maintenance or service on a machine or equipment that must be locked or tagged out.

"Capable Of Being Locked Out" - An energy isolating device will be considered to be capable of being locked out either if it is designed with a HASP or other attachment or integral part to which, or through which, a lock can be affixed, or if it has a locking mechanism built into it. Other energy isolating devices will also be considered to be capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy-isolating device or permanently alter its energy control capability.

"Energized" - Connected to an energy source or containing residual or stored energy.

"Energy Isolating Device" - A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: a manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors and, in addition, no pole can be operated independently; a slide gate; a slip blind; a line valve; a block; and any similar device used to block or isolate energy. The term does not include a push button, selector switch, and other control circuit type devices.

"Energy Source" - any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other type of energy.

"Lockout" - The placement of lockout device on an energy-isolating device, in accordance with an established procedure, is ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

"Lockout Device" - A device that utilizes positive means such as a lock, either key or combination type, to hold an energy isolating device in the safety position and prevent the energizing of a machine or equipment.

"Normal Production Operations" - The utilization of a machine or equipment to perform its intended production function.

"Servicing and/or Maintenance" - Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

"Setting Up" - Any work performed to prepare a machine or equipment to perform its normal production operation.

Stored energy - Energy that is available and may cause movement even after energy sources have been isolated. Stored energy may be in the form of compressed springs, elevated equipment components, hydraulic oil pressure, pressurized water, air, steam, or gas, or rotating flywheels, shafts or cams.

Tagout - The placement of a tagout device on an energy-isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Tagout device - A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

7.0 TRAINING

7.1 General Health and Safety Training

In accordance with 29 CFR 1910.120, hazardous waste site workers shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations. As a minimum, the training shall have consisted of instruction in the topics outlined in the above reference. Personnel who have not met the requirements for initial training will not be allowed to work in any site activities in which they may be exposed to hazards (chemical or physical).

In addition to the required initial training, each employee shall have received 3 days of directly supervised on-the-job training. This training will address the duties the employees are expected to perform.

The Contractor SSO has the responsibility of ensuring that personnel assigned to this project comply with these requirements. Written certification of completion of the required training will be provided to the SSO.

7.2 Manager/Supervisor Training

In accordance with 29 CFR 1910.120, on-site management and supervisors who will be directly responsible for, or who supervise employees engaged in hazardous waste operation shall receive training as required in this HASP and at least eight (8) additional hours of specialized training on managing such operations at the time of job assignment.

7.3 Annual 8-Hour Refresher Training

Annual 8-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualification for fieldwork. The following topics will be reviewed: toxicology, respiratory protection, including air purifying devices and self-contained breathing apparatus (SCBA), medical surveillance, decontamination procedures, and personnel protective clothing. In addition, topics deemed necessary by the SSO may be added to the above list.

7.4 Site-Specific Training

Prior to commencement of field activities, all personnel assigned to the project will be provided training that will specifically address the activities, procedures, monitoring, and equipment for the site operations. It will include site and facility layout, hazards, and emergency services at the site, and will highlight all provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

7.5 On-Site Safety Briefings

Project personnel and visitors will be given periodic on-site health and safety briefings by the SSO, or their designee, to assist site personnel in safely conducting their work activities. The briefings will include information on new operations to be conducted, changes in work practices, or changes in the site's environmental conditions. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety audits.

7.6 Additional Training

Additional training may be required by the SSO for participation in certain field tasks during the course of the project. Such additional training could be in the safe operation of heavy or power tool equipment or hazard communication training.

7.7 Subcontractor Training

Subcontractor personnel working on site only occasionally, for a specific limited task and who are unlikely to be exposed over permissible exposure limits may be exempted from the initial 40-hour training requirement. The SSO will determine if this exemption is allowed. In any case, the subcontractor personnel who are exposed to hazards are not exempted from the 40-hours training requirement nor medical surveillance requirements found in Section 8.1.

8.0 MEDICAL SURVEILLANCE

8.1 General

All contractor and subcontractor personnel performing field work at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). A physician's medical release for work will be confirmed by the SSO before an employee can begin site activities. Such examinations shall include a statement as to the worker's present health status, the ability to work in a hazardous environment (including any required PPE which may be used during temperature extremes), and the worker's ability to wear respiratory protection.

A medical data sheet will be completed by all on-site personnel and kept at the site. Where possible, this medical data sheet will accompany the personnel needing medical assistance or transport to hospital facilities.

8.1.1 Medical Surveillance Protocol

The medical surveillance protocol to be implemented is the occupational physicians' responsibility, but shall meet the requirements of CFR 1910.120 and ANSI Z88.2 (1980). The medical surveillance protocol shall, as a minimum, cover the following:

a. Medical and Occupational History
b. General physical examination (including evaluation of major organ system)
c. Serum lead and ZPP
d. Chest X-ray (performed no more frequently that every four years, except when otherwise indicated).
e. Pulmonary Function Testing (FVC and FEV1.0).
f. Ability to wear respirator
g. Audiometric testing.

Additional clinical tests may be included at the discretion of the occupational physician.

9.0 SITE CONTROL, PPE AND COMMUNICATIONS

9.1 Site Control

A Support Zone (SZ) is an uncontaminated area that will be the field support area for most operations. The SZ provides for field team communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel or materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples. A contamination reduction corridor will be established. This is the route of entry and egress to the site, and it provides an area for decontamination of personnel and portable equipment as well.

The area where contamination exists is considered to be the Exclusion Zone (EZ). All areas where excavation and handling of contaminated materials take place are considered the EZ. This zone will be clearly delineated by cones, tape, or other means. The SSO may establish more than one EZ where different levels of protection may be employed or where different hazards exist. Personnel are not allowed in the EZ without:

- A buddy
- Appropriate personal protective equipment
- Medical authorization
- Training certification

9.2 Personal Protective Equipment

9.2.1 General

The level of protection worn by field personnel will be enforced by the SSO. Levels of protection for general operations are provided below and are defined in this section. Levels of protection may be upgraded or downgraded at the discretion of the SSO. The decision shall be based on real-time air monitoring, site history data, and prior site experience. Any changes in the level of protection shall be recorded in the health and safety field logbook.

9.2.2 Personal Protective Equipment Specifications

For tasks requiring Level B PPE, the following equipment shall be used:

- Cotton or disposable coveralls
- Chemical protective suit (e.g. Saran-coated Tyvek®)
- Gloves, inner (latex)
- Gloves, outer (Nitrile®)
- Boots (PVC), steel toe/shank
- Boot Covers (as needed)
- Hard Hat
- Hearing protection (as needed)

For tasks requiring Level C PPE, the following equipment shall be used:

- Cotton or disposable coveralls
- Disposable outer coveralls (Poly-coated Tyvek)
- Gloves, inner (latex)
- Gloves, outer (Nitrile®)
- Boots (PVC), steel toe/shank

- Boot covers (as needed)
- Hard Hat
- Hearing protection (as needed)
- Splash suit and face shield for decontamination operations (as needed)

For tasks requiring Level D PPE, the following equipment shall be used:

- Cotton or disposable coveralls
- Gloves, inner (latex)
- Gloves, outer (Nitrile®)
- Boots (PVC) steel toe/shank
- Boot covers (as needed)
- Hard hat
- Hearing protection (as needed)
- Safety glasses

For tasks requiring respiratory protection, the following equipment shall be used:

Level D - No respiratory protective equipment necessary except for a dust mask.
Level C - A full-face air-purifying respirator equipped with organic vapor/pesticide-HEPA cartridges.
Level B - An air line respirator or a self-contained breathing apparatus (SCBA)

9.2.3 Initial Levels of Protection

Levels of protection for the activities may be upgraded or downgraded depending on direct-reading instruments or personnel monitoring. The following are the initial levels of protection that shall be used for each planned field activity.

LEVEL OF PERSONAL PROTECTIVE EQUIPMENT REQUIRED

Activity	**Level of Protection Respiratory/PPE**
Partial excavation of soil for the sampling of subsurface soil and vapor	D/D

9.3 Communications

Communications is the ability to talk with others. While working in Level C/B Protection, personnel may find that communication become a more difficult task and process to accomplish. This is further complicated by distance and space. In order to address this problem, electronic instruments, mechanical devices or hand signals will be used as follows:

- Walkie-Talkies - Hand held radios would be utilized as much as possible by field teams for communication between downrange operations and the Command Post base station.

- Telephones - A mobile telephone will be located in the Command Post vehicle in the Support Zone for communication with emergency support services/facilities. If a telephone is demobilized, the nearest public phones will be identified.

- Air Horns - A member of the downrange field team will carry an air horn and another will be evident in the Support Zone to alert field personnel to an emergency situation.

- Hand Signals - Members of the field team long with use of the buddy system will employ this communication method. Signals become especially important when in the vicinity of heavy moving equipment and when using Level B respiratory equipment. The signals shall become familiar to the entire field team before site operations commence and they will be reinforced and reviewed during site-specific training.

HAND SIGNALS FOR ON-SITE COMMUNICATION

Signal	**Meaning**
Hand gripping throat	Out of air, cannot breathe
Grip partners' wrist	Leave area immediately; no debate
Hands on top of head	Need assistance
Thumbs up	OK, I am all right; I understand
Thumbs down	No; negative, unable to understand you. I'm not all right

10.0 AIR MONITORING PLAN

10.1 General

Continuous air monitoring in the EZ during invasive tasks will accompany site operations, as indicated in this HASP or as required by the SSO. Monitoring will be performed to verify the adequacy of respiratory protection, to aid in site layout and to document work exposure. All monitoring instruments shall be operated by qualified personnel only and will be calibrated daily prior to use, or more often as necessary. For additional references and information, see the Contractor's Site-Specific Air Monitoring Program.

10.2 Real-Time Monitoring

10.2.1 Instrumentation

At least one (1) of the following monitoring instruments will be available for use during field operations as necessary:

- Photoionization Detector (PID), Rae Instruments with 10.2 EV probe or equivalent
- Flame Ionization Detector (FID), Foxboro Model 128 or equivalent
- Combustible Gas Indicator (CGI)/Oxygen (O_2) Meter, MSA or equivalent.

A FID or PID shall be used to monitor the organic vapor concentrations in active work areas. Organic vapor concentrations shall be measured upwind of the work areas to determine background concentrations. The SSO will interpret monitoring results using professional judgment. The PPE utilized shall always be the most protective, thus the action level criteria are flexible guidelines.

A CGI/O_2 meter shall be used to monitor for combustible gases and oxygen content in the boreholes during drilling activities.

Calibration records shall be documented, and included in the health and safety logbook or instrument calibration logbook. All instruments shall be calibrated before and after each daily use in accordance with the manufacturers' procedures.

10.2.2 Action Levels

Action levels for upgrading of PPE in this HASP will apply to all site work during the duration of field activities at the site. Action levels are for unknown contaminants using direct reading in the Breathing Zone (BZ) for organic vapors and dusts, and at the source for combustible gases.

10.2.3 Monitoring During Field Activities

The Contractor shall perform real time air monitoring prior to the commencement of work to establish baseline conditions. Baseline conditions will be established at the approximate center of the site and at the perimeter of the site both upwind and downwind.

During all work activities real time monitoring will occur. As necessary, the Contractor shall have at each applicable workstation a PID, explosimeter, and oxygen deficiency meter. The real time monitoring for remedial activities will be conducted approximating the Breathing Zone of the workers. The monitoring will be continuous during working operations.

The air-monitoring instrument may indicate that personnel working in the exclusion zone increase their level of protection. All personnel will be trained in the action levels. When conditions warrant an increase in protection, all personnel will stop working and immediately leave the exclusion zone. They will then don the appropriate safety equipment necessary and return to their current workstation. All of this activity will be monitored by the SSO. The SSO will keep the Contractor Project Manager aware of any extraordinary situations and conditions that may occur. Working conditions and monitoring levels will be noted in the Field Notebook along with the time, date, and page number. Verbal reports will be given to the Project Manager when there is a change in the PPE level.

The previous day's results shall be reviewed each morning to determine what actions are necessary and the general conditions resulting from and around the site.

The record keeping will include:

- Date & Time of Monitoring
- Air Monitoring Location
- Instrument, Model #, Serial #
- Calibration/Background Levels
- Results of Monitoring
- SSO Signature
- Comments

Excavation Operations - Monitoring will be performed continuously during all excavation operations. A PID and/or FID shall be utilized to monitor the breathing zone, the excavated area and any material taken from the excavation. A CGI/O_2 meter shall be used to monitor the excavation for the presence of combustible gases.

ACTION LEVELS OF AIRBORNE CONTAMINANTS

Instrument	Action Level	Action to be Taken
FID/PID	< 100 ppm, for a 15-minute average	Stop work & initiate vapor control
	> 100 ppm, for a 15-minute average	Stop work & initiate evacuation procedure
CGI	10% LEL	Stop work, initiate ventilating
	50% LEL	Stop work, initiate evacuation procedure and contact fire dept.

10.3 Personnel Monitoring Procedure

The site SSO, concurrent with activities that may generate the contaminants in excess of OSHA PEL's, may perform assessment and evaluation of field personnel exposures to airborne contaminants.

Procedures to be followed include:

- The SSO may select high-risk individuals who may be subject to contaminant exposure based on job assignment.

- The Personal Sampling is being conducted to determine the proper levels of respiratory protection required, to document potential exposures to compounds, and to assure compliance with OSHA standards. Therefore it is important that the data collected be from "worst case" locations and personnel.

  For example: when work is being conducted to excavate at an underground tank location, those persons closest to the excavation and most intimately involved with the work should be sampled. If a backhoe operator solely conducted the excavation, then that employee should be monitored. However, if there are additional workers who must enter the excavation and work with the freshly excavated soil, these persons would be closer to the potential contaminants and they should be sampled.

- To meet the intent of the sampling will require sampling at periods of the most disturbances. To be accurate in determining potential exposures, as many tasks/trades shall be sampled as possible during the course of this project. At completion of the project, a goal of 20% of all workers who must perform their duties in or around the contaminated soil, tanks, and excavations is sought.

  All sampling data must be provided in writing to the employees within three (3) days of receipt of results by the Contractor.

- Air sampling pumps used to collect employee exposure samples shall be calibrated before and after use each day. Calibration shall be accomplished using a primary standard calibration system, e.g. the bubble tube method. Results of the calibrations shall be included in the health and safety field logbook and with the exposure report.

- Chemical analysis of samples collected for assessment of employee exposures shall be performed in accordance with NIOSH or OSHA analytical methods only by laboratories accredited by the American Industrial Hygiene Association.

- Results of the personal exposure assessment shall be provided to the individual, in writing within fifteen (15) working days after receipt of laboratory reports. Reports to field personnel shall provide calculated time-weighted average exposures and shall provide comparative information relative to established permissible exposure limits. The air sampling data sheet and laboratory report is considered a part of the employee exposure report. A copy of the employee personal exposure assessment report shall also be included in the project file and the employees' medical record for Contractor employees. Reports for subcontractor employees will be sent directly to the subcontractors' employer.

10.4 Air Monitoring Reports

Air Monitoring Reports will be completed by the SSO and/or authorized personnel and submitted to the Project Manager in the daily safety logs and will include the following:

- Date of monitoring
- Equipment utilized for air monitoring
- Real-time air monitoring results from each work location
- Calibration method of equipment and results

11.0 SAFETY CONSIDERATIONS

11.1 General

In addition to the specific requirements of this HASP, common sense should be used at all times. The general safety rules and practices below will be in effect at the site at the discretion of the Project Manager, SSO or other authorized personnel.

- The site will be suitably marked or barricaded as necessary to prevent unauthorized visitors but not hinder emergency services if needed.

- As needed, all open holes, trenches, and obstacles will be properly barricaded in accordance with local site requirements. These requirements will be determined by proximity to traffic ways, both pedestrian and vehicular, and site of the hole, trench, or obstacle. If holes are required to be left open during non-working hours, they will be adequately decked over or barricaded and sufficiently lighted.

- Before any digging or boring operations are conducted, underground utility locations will be identified. All boring, excavation, and other site work will be planned and performed with consideration for underground lines. Any excavation work will be performed in accordance with the Contractor's Standard Operating Procedures for Excavations.

- Dust mitigating procedures will be enacted when the potential for the inhalation of dust particles by either workers or other people exists.

- The act of smoking and ignition sources in the vicinity of potentially flammable or contaminated material is strictly prohibited.

- Drilling, boring, and use of cranes and drilling rigs, erection of towers, movement of vehicles and equipment and other activities will be planned and performed with consideration for the location, height, and relative position of aboveground utilities and fixtures, including signs; canopies; building and other structures and construction; and natural features such as trees, boulders, bodies of water, and terrain.

- When working in areas where flammable vapors may be present, particular care shall be exercised with tools and equipment that may be sources of ignition. All tools and equipment provided must be properly bonded and/or grounded. Metal buttons and zippers are prohibited on safety clothing for areas that may contain a flammable or explosive atmosphere.

- Approved and appropriate safety equipment (as specified in this HASP), such as eye protection, hard hats, foot protection, and respirators, must be worn in areas where required. In addition, eye protection must be worn when sampling soil or water that may be contaminated.
- Beards interfere with respirator fit and are not allowed within the site boundaries because all site personnel may be called upon to use respirator protection is some situations.

- No smoking, eating, chewing tobacco, gum chewing, or drinking will be allowed in the contaminated areas.

- Contaminated tools and hands must be kept away from the face.

- Personnel must use personal hygiene safe guards (washing up) at the end of the shift or as soon as possible after leaving the site.

- Each sample must be treated and handled as though it were contaminated.

- Persons with long hair and/or loose fitting clothing that could become entangled in power equipment must take adequate precautions.

- Horseplay is prohibited in the work area.

- Work while under the influence of intoxicants, narcotics, or controlled substances is prohibited.

11.2 Posted Signs

Posted danger signs will be used where an immediate hazard exists. Caution signs will be posted to warn against potential hazards and to caution against unsafe practices. Traffic control methods and barricades will be used as needed. Wooden stakes and flagging tape, or equally effective material will be used to demarcate all restricted areas.

Other postings may include the OSHA poster, emergency hospital route, and telephone numbers of contact personnel.

11.3 Invasive Operations

The SSO will be present on-site during all invasive work (e.g. demolition, excavations). The SSO will ensure that appropriate monitoring; levels of protection and safety procedures are followed. No personnel will enter any excavations for any reasons. All personnel will stay at least 10 feet back from the edge of the excavation and out of the swing radius of the backhoe. No drums or other potential sources will be sampled or removed during this phase without further additions to the HASP.

The proximity of water, sewer, and electrical lines will be identified prior to invasive operations. The possibility of the presence of underground conduits or vessels containing materials under pressure will also be investigated prior to invasive operations. Properly-sized containment systems will be utilized and consideration of the potential volume of liquid or waste released during operations will be discussed with members of the field team to minimize the potential for spills and provide a method for collection of waste materials. Emergency evacuation procedures and the location of safety equipment will be established prior to start up operations. The use of protective clothing, especially hard hats, boots, and gloves will be required during drilling and other heavy equipment work.

11.4 Sample Handling

Personnel responsible for the handling of samples will wear the prescribed level of protection. Samples are to be identified as to their hazard and packaged as to prevent spillage or breakage. Any unusual sample conditions shall be noted. Laboratory personnel and all field personnel shall be advised of sample hazard levels and the potential contaminants present. This can be accomplished by a phone call to the lab coordinator and/or including a written statement with the samples reviewing lab safety procedures in handling in order to assure that the practices are appropriate for the suspected contaminants in the sample.

11.5 Heavy Equipment Decontamination

Personnel steam cleaning heavy equipment shall use the prescribed level of protection and adhere to the buddy system. This task typically employs level C protective equipment. The heavy equipment decontamination shall be restricted to authorized personnel only. Special consideration will be given to wind speed and direction. Downwind areas are to be kept free of personnel to avoid unnecessary exposure to potential airborne contamination.

11.6 Additional Safety Considerations

No other additional safety considerations at this time. As needed, safety considerations will be added.

12.0 DECONTAMINATION AND DISPOSAL PROCEDURES

12.1 Contamination Prevention

One of the most important aspects of decontamination is the prevention of contamination. Good contamination prevention should minimize worker exposure and help ensure valid sample results by precluding cross-contamination. Procedures for contamination avoidance include:

Personnel:

Do not walk through areas of obvious or known contamination
Do not directly handle or touch contaminated materials
Make sure that there are no cuts or tears on PPE.
Fasten all closures in suits; cover with tape if necessary
Particular care should be taken to prevent any skin injuries
Stay upwind of airborne contaminants
Do not carry cigarettes, cosmetics, gum, etc. into contaminated areas.

Sampling and Monitoring:

When required by the SSO, cover instruments with clear plastic, leaving openings for sampling ports. Bag sample containers prior to emplacement of sample material.

Heavy Equipment:

Care should be taken to limit the amount of contamination that comes in contact with heavy equipment (tires, contaminated augers). Dust control measures may be needed on roads inside the site boundaries.

12.2 Personnel Decontamination

All personnel shall pass through an outlined decontamination procedure when exiting the hot zone at each location. A field wash for equipment and PPE shall be set up at each drilling location. The system will include a gross wash and rinse for all disposable clothing and boots worn in the EZ. Upon exiting the EZ, all personnel will wash their hands, arms, neck, and face before entering the Support Zone.

12.3 Equipment Decontamination

Equipment used at the remediation system site that is potentially contaminated shall be decontaminated to prevent hazardous materials from leaving the site. All heavy equipment will be decontaminated at the decontamination pad and inspected by the SSO and Project Manager before it leaves the site. The decontamination area will provide for the containment of all wastewater from the decontamination process. Respirators, airline and any other personnel equipment that comes in contact with contaminated soils shall pass through a field wash.

12.4 Decontamination During Medical Emergencies

If emergency life-saving first aid and/or medical treatment is required, normal decontamination procedures may need to be abbreviated or omitted. The site SSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination, when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed, a plastic barrier between the individual and clean surfaces should be used to help prevent contaminating the inside of ambulances and/or medical personnel. Outer garments are then removed at the medical facility.

No attempt will be made to wash or rinse the victim, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material that could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed. Note that heat stroke requires prompt treatment to prevent irreversible damage or death. Protective clothing must be promptly removed. Less serious forms of heat stress also require prompt attention and removal of protective clothing immediately. Unless the victim is obviously contaminated, decontamination should be omitted or minimized and treatment begun immediately.

12.5 Disposal Procedures

A segregating system of non-hazardous waste and hazardous waste will be developed by the SSO and PM. All discarded material, waste materials, or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating sanitary hazards, or causing litter to be left on site. All potentially contaminated materials, e.g. clothing, gloves, etc., will be bagged or drummed as necessary, labeled and segregated for disposal. All non-contaminated materials shall be collected and bagged for appropriate disposal as normal domestic waste.

13.0 EMERGENCY PLAN

The potential for the development of an emergency situation is typically low, when the concentrations of hazardous substances at typical work sites are considered. Nevertheless, an emergency situation could occur. All Contractor and subcontractor field team members prior to the start of work will know the emergency plan outlined in this section. The emergency plan will be available for use at all times during site work.

Various individual site characteristics will determine preliminary actions taken to assure that this emergency plan is successfully implemented in the event of a site emergency. Careful consideration must be given to the proximity of neighborhood housing or places of employment, and to the relative possibility of site fire, explosion or release of vapors or gases that could affect the surrounding community.

The Project Manager shall make contact with local fire, police, and other emergency units prior to beginning work on site. In these contacts, the Project Manager will inform the emergency units about the nature and duration of work expected to the site and the type of contaminants and the possible health or safety effects of emergencies involving these contaminants. At this time, the Project Manager and the emergency response units shall make the necessary arrangements to be prepared for any emergencies that could occur.

The Project Manager shall implement the contingency plan whenever conditions at the site warrant such action. The Project Manager will be responsible for coordination of the evacuation emergency treatment, and transportation of site personnel as necessary, and notification of emergency response units and the appropriate management staff.

The cases where the PM is not available, the SSO shall serve as the alternate emergency coordinator.

13.1 Evacuation

In the event of an emergency situation, such as fire, explosion, or significant release of toxic gases, an air horn or other appropriate device will be sounded for approximately 10 second intervals indicating the initiation of evacuation procedures. All personnel will evacuate and assemble near the entrance to the site. The location shall be upwind of the site where possible.

For efficient and safe site evacuation and assessment of the emergency situation, the Project Manager will have authority to initiate action if outside services are required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The SSO or designated SSO must ensure that access for emergency equipment is provided and that all combustion apparatuses have been shut down once the alarm has been sounded. Once the safety of all personnel is established, the Fire Department and other emergency response groups as necessary will be notified by telephone of the emergency.

13.2 Potential or Actual Fire or Explosion

Immediately evacuate the site (air horn will sound for 10-second intervals), notify the local fire and police departments, and other appropriate emergency response groups if an actual fire or explosion has taken place.

13.3 Personnel Injury

Emergency first aid shall be applied on site as deemed necessary. If necessary, the individual shall be decontaminated and transported to the nearest medical facility.

The ambulance/rescue squad shall be contacted for transport as necessary in an emergency. However, since some situations may require transport of an injured party by other means, the hospital route is identified in Section 2.3.3. A map to this facility is provided with this HASP in Section 2.3.3.

13.4 Accident/Incident Reporting

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone:

1. Ms. Christine Chen, (Site Safety Officer) 718-937-3720
2. Ms. Christine Chen (Project Manager) 718-937-3720
3. The employer of any injured worker (if not a Contractor employee)

Written confirmation of verbal reports are to be submitted within 24 hours. The report form entitled "Accident Data Report" is to be used for this purpose. All Contractor representatives contacted by telephone are to receive a copy of this report. If the employee involved is not a Contractor employee, his employer shall receive a copy of this report.

For reporting purposes, the term accident refers to fatalities, lost time injuries, spill, or exposure to hazardous materials (toxic materials, explosive or flammable materials).

Any information released from the health care provider, which is not deemed confidential patient information, is to be attached to the appropriate form. Any medical information that is released by patient consent is to be filed in the individuals' medical records and treated as confidential.

13.5 Overt Personnel Exposure

SKIN CONTACT:	Use copious amounts of soap and water. Wash/rinse affected area thoroughly, and then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination.
INHALATION:	Move personnel to fresh air and if necessary, decontaminate and transport to hospital.
INGESTION:	Decontamination and transport to emergency medical facility.
PUNCTURE WOUND OR LACERATION:	Decontaminate and transport to emergency medical facility.

13.6 Adverse Weather Conditions

In the event of adverse weather conditions, the SSO or designee will determine if work can continue without sacrificing the health and safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries
- Potential for cold stress and cold-related injuries
- Treacherous weather-related conditions
- Limited visibility
- Potential for electrical storms

Site activities will be limited to daylight hours and acceptable weather conditions. Inclement working conditions include heavy rain, fog, high winds, and lighting. Observe daily weather reports and evacuate if necessary in case of inclement weather conditions.

13.7 Emergency Response Equipment List

Some or all of the following will either be available on-site or be able to be brought to the site within a 2-hour period:

- 55-Gallon Drums
- 85-Gallon Drums
- Absorbent Pads
- Absorbent Booms
- Speedy-Dry
- Plastic Sheeting
- Hay Bales
- Pneumatic Nibbler
- Back Hoe
- Pressure Washer
- Air Compressor
- Wilden Pumps
- Equipment Storage Trailer
- Submersible Pumps
- Miscellaneous Hand Tools
- Portable Lighting

13.8 Large Equipment

If necessary, Contractor shall have the following large equipment brought to the site within 2-hours:

- Large Vacuum Truck
- Super Sucker
- Dump Trucks
- Drill Rig
- Utility Vehicle

14.0 LOGS, REPORTS AND RECORDKEEPING

14.1 Medical and Training Records

The employer keeps medical and training records. All subcontractors must provide verification of training and medical qualifications to the SSO. The SSO will keep a log of personnel meeting appropriate training and medical qualifications for site work. The log will be kept in the project file. Medical records will be maintained in accordance with 29 CFR 1910.20.

14.2 On-Site Log

A log of personnel on-site each day will be kept by the SSO or designee. A copy of these logs will be sent to the Contractor records coordinator for data entry. Originals will be kept in the project file.

14.3 Exposure Records

Any personal monitoring results, laboratory reports, calculations and air sampling data sheets are part of an employee exposure record. These records will be kept in accordance with 29 CFR 1910.20. For Contractor employees, the originals will be sent to the Contractor records coordinator. For subcontractor employees, the original will be sent to the subcontractor employer and a copy kept in the project file.

14.4 Accident/Incident Reports

An accident/incident report must be completed for all accidents and incidents. The originals will be sent to the appropriate Contractor records coordinator for maintenance by the Contractor. Copies will be distributed as stated. A copy of the forms will be kept in the project file.

14.5 OSHA Form 200

An OSHA Form 200 (Log of Occupational Injuries and Illnesses) will be kept at the project site. All recordable injuries or illnesses will be recorded on this form. At the end of the project, the original will be sent to the Contractor's corporate records administrator for maintenance. Subcontractor employers must also meet the requirements of maintaining an OSHA 200 form. The Contractor accident/incident report meets the requirements of the OSHA Form 101 (Supplemental Record) and must be maintained with the OSHA Form 200 for all recordable injuries or illnesses.

14.6 Health and Safety Field Log Book

The SSO or designee will maintain the logbook in accordance with standard Contractor procedures. Daily site conditions, activities, personnel, calibration records, monitoring results and significant events will be recorded. The original logbooks will become part of the exposure records file.

15.0 SANITATION AT TEMPORARY WORK STATIONS

If sanitary sewers are not provided at the site, provisions shall be made for access to sanitary systems by using nearby public facilities or on-site facilities consistent with provisions of governing local ordinance codes. In the latter case, provisions are required for the removal of accumulated waste products within those units.

If a commercial/industrial laundry is used to clean or launder clothing that is potentially contaminated, they shall be informed of the potential harmful effects of exposure to hazardous substances related to the affected clothing.

Personnel and subcontractors sites shall follow decontamination procedures described in the HASP, or as directed by the SSO. This will generally include at a minimum site-specific training in shower usage and cleanup, personal hygiene requirements and the donning of protective equipment/clothing.

ATTACHMENT A - Analyte Material Safety Data Sheets

MSDS Number: **N4170** * * * * * *Effective Date:* ***11/02/01*** * * * * * *Supercedes:* ***11/17/99***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker ®

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

p-Nitroaniline

1. Product Identification

Synonyms: p-Aminonitrobenzene;PNA;4-Nitroaniline
CAS No.: 100-01-6
Molecular Weight: 138.13
Chemical Formula: NO2C6H4NH2
Product Codes: R871

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
p-Nitroaniline	100-01-6	95 - 100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! HAZARDOUS SOLID AND DUST. HIGHLY TOXIC. RAPIDLY ABSORBED THROUGH SKIN. CAUSES METHEMOGLOBINEMIA, DECREASING OXYGEN IN BLOOD. COMBUSTIBLE DUST - EXPLOSION POTENTIAL. MAY BE FATAL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN. HANDLE IN A FUME HOOD. TARGET ORGAN(S): Lungs, heart, blood, liver.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Life)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

EFFECTS OF EXPOSURE Inhalation and skin contact are expected to be the primary routes of occupational exposure to para-Nitroaniline. para-Nitroaniline is readily absorbed through human skin. Although para-Nitroaniline is considered to be only slightly toxic on the basis of single exposure animal tests, human experience has shown that man is much more sensitive to methemoglobinemia caused by aromatic amino compounds than the rat or the rabbit.Methemoglobinemia is a condition caused by changes in the blood cells which decrease the oxygen-carrying capacity of the blood. Cyanosis may occur and, as oxygen deficiency increases,there may be associated headache, weakness, irritability, drowsiness, shortness of breath, and unconsciousness. The appearance of methemoglobinemia may be delayed 0 to 12 hours after exposure. Because of the high potential for this material to cause methemoglobin formation, para-nitroaniline should be considered HAZARDOUS by all routes of exposure and exposures should be tightly controlled.

Inhalation:
Headache, coughing, dizziness, difficult breathing, nausea, vomiting, increased heart rate, cyanosis, unconsciousness.
Ingestion:
Nausea, vomiting, increased heart rate, methemoglobinemia cyanosis, (bluish discoloration of skin)
Skin Contact:
Not a skin irritant May be absorbed through the skin with possible systemic effects.
Eye Contact:
Slight irritation, with discomfort, tearing, blurring of vision.
Chronic Exposure:
Liver damage, kidney damage, bone marrow, blood damage.
Aggravation of Pre-existing Conditions:
Liver disorders.

---

4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Prompt action is essential.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately remove contaminated clothing and wash affected area thoroughly with soap and water.
Eye Contact:
In case of eye contact, immediately flush with plenty of water for at least 15 minutes.

Note to Physician:
Absorption of this product into the body may lead to the formation of methemoglobin that, in sufficient concentration, causes cyanosis. Since reversion of methemoglobin to hemoglobin occurs spontaneously after termination of exposure, moderate degrees of cyanosis need be treated only by supportive measures such as bed rest and oxygen inhalation. Thorough cleansing of the entire contaminated area of the body, including scalp and nails, is of utmost importance. If cyanosis is severe, intravenous injection of methylene blue, one milligram per kilogram of body weight, may be of value. Cyanocobalamin (Vitamin B12), one milligram intramuscularly, may speed recovery. Intravenous fluids and bloodtransfusions may be indicated in very severe exposure.

5. Fire Fighting Measures

Fire:
Flash point: 199C (390F) CC
Explosion:
Combustible dust. This material, like most organic materials in powder form, is capable of creating a dust explosion. Refer to NFPA pamphlet No. 654. "Standard for the Prevention of Fire and Dust Explosions in the Chemical, Dye, Pharmaceutical and Plastics Industries" if the material is to be reduced to or collected as a powder. Sensitive to static discharge.
Fire Extinguishing Media:
Water, dry chemical, foam or carbon dioxide.
Special Information:
Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode. Fire fighting equipment should be thoroughly decontaminated after use. This material, as normally packaged and handled, can contain sufficient fines to present a potential dust explosion hazard if a sufficient quantity of this material is dispersed in air.

---

6. Accidental Release Measures

Wear self-contained breathing apparatus and full protective clothing. With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water. Ventilate area.

---

7. Handling and Storage

Store in a cool place away from heated areas, sparks, and flame. Store in a well ventilated area. Store away from incompatible materials. Keep containers tightly closed and dry. Avoid contact with skin and eyes. Avoid dust formation Protect from freezing. Use only in a chemical fume hood. Do not breathe dust. Do not get in eyes, on skin, or on clothing. Avoid prolonged or repeated exposure. Wash thoroughly after handling. Keep it dry. Moisture causes nitration of organic materials and may result in spontaneous ignition. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
1 ppm (TWA) The PEL listed denotes PEL (skin).

-ACGIH Threshold Limit Value (TLV):
3 mg/m3 (TWA) The TLV listed denotes TLV (skin).
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the substance is apparent and engineering controls are not feasble, consult an industrial hygienist. For emergencies, or instances where the exposure levels are not known, use a full-facepiece

positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Yellow Powder.
Odor:
Faint amine odor.
Solubility:
Negligible (< 0.1%)
Specific Gravity:
1.44
pH:
No information found.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
332C (630F)
Melting Point:
149C (300F)
Vapor Density (Air=1):
4.77
Vapor Pressure (mm Hg):
Not applicable.
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon monoxide, carbon dioxide, oxides of nitrogen.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizing agents, strong acids, strong reducing agents, strong bases, alcohols, ketones, aldehydes.
Conditions to Avoid:
Heat, flame, other sources of ignition, moisture.

---

11. Toxicological Information

Reproductive Toxicity:

The compound does produce genetic damage in bacterial cell cultures but does not produce genetic damage in animals. It does not produce heritable genetic damage.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
p-Nitroaniline (100-01-6)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
Daphnia Magna: 48 Hr-LC50 = 20-30 ppm, slightly toxic. Rainbow Trout: 96 Hr-LC50 = 45 ppm, slightly toxic. Bluegill Sunfish: 96 Hr-LC50 = 80 ppm, slightly toxic.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: NITROANILINES
Hazard Class: 6.1
UN/NA: UN1661
Packing Group: II
Information reported for product/size: 100G

International (Water, I.M.O.)

Proper Shipping Name: NITROANILINES
Hazard Class: 6.1
UN/NA: UN1661
Packing Group: II
Information reported for product/size: 100G

International (Air, I.C.A.O.)

Proper Shipping Name: NITROANILINES
Hazard Class: 6.1
UN/NA: UN1661
Packing Group: II
Information reported for product/size: 100G

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
-------------------------------------------  ----  ---  -----  ---------
p-Nitroaniline (100-01-6)                     Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                      --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
-------------------------------------------  -----  ---   ----  -----
p-Nitroaniline (100-01-6)                     Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                          -SARA 302-    ------SARA 313------
Ingredient                                RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
p-Nitroaniline (100-01-6)                 No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                      -RCRA-    -TSCA-
Ingredient                                CERCLA      261.33     8(d)
----------------------------------------  ------      ------    ------
p-Nitroaniline (100-01-6)                 5000        P077       Yes


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: Yes         (Pure / Solid)
```

Australian Hazchem Code: 2X
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **3** Flammability: **1** Reactivity: **3**
Label Hazard Warning:
POISON! DANGER! HAZARDOUS SOLID AND DUST. HIGHLY TOXIC. RAPIDLY ABSORBED THROUGH SKIN. CAUSES METHEMOGLOBINEMIA, DECREASING OXYGEN IN BLOOD. COMBUSTIBLE DUST - EXPLOSION POTENTIAL. MAY BE FATAL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN. HANDLE IN A FUME HOOD. TARGET ORGAN(S): Lungs, heart, blood, liver.
Label Precautions:
Do not get in eyes, on skin, on clothing.
Do not breathe dust. Keep in tightly closed container. Use with adequate ventilation. Wash thoroughly after handling. In case of fire, soak with water. In case of spill, sweep up and remove. Flush spill area with water.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Prompt action is essential. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Product Use:
Laboratory Reagent.
Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet
4-Nitrophenol

ACC# 96371

Section 1 - Chemical Product and Company Identification

MSDS Name: 4-Nitrophenol
Catalog Numbers: AC157050000, AC157050050, AC157052500, AC220950000, AC220950500, 15705-0010, 15705-1000, BP612-1
Synonyms: 4-Hydroxynitrobenzene; p-Nitrophenol.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
100-02-7	4-Nitrophenol	98+	202-811-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: yellow crystals.
Warning! Harmful if swallowed, inhaled, or absorbed through the skin. May cause allergic respiratory reaction. May cause eye, skin, and respiratory tract irritation. Danger of cumulative effects.
Target Organs: Kidneys, central nervous system, liver, respiratory system, skin.

Potential Health Effects

Eye: May cause eye irritation.
Skin: May cause skin irritation. Harmful if absorbed through the skin. Substance is readily absorbed through the skin.
Ingestion: Harmful if swallowed. May cause irritation of the digestive tract. May cause methemoglobinemia, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), convulsions, and death. Effects may be delayed 2 to 4 hours. Methemoglobinemia is characterized by dizziness, drowsiness, headache, shortness of breath, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), rapid heart rate and chocolate-brown colored blood.
Inhalation: Harmful if inhaled. May cause cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood). May cause respiratory tract irritation. May cause asthmatic attacks due to allergic sensitization of the respiratory tract. May cause nausea and possible vomiting. May cause methemoglobinemia.
Chronic: Prolonged or repeated skin contact may cause dermatitis. May cause liver and kidney

damage. Adverse reproductive effects have been reported in animals. Laboratory experiments have resulted in mutagenic effects. There is a danger of cumulative effects. Exposure to high concentrations may cause central nervous system depression.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion: Do not induce vomiting. Get medical aid immediately. Call a poison control center.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Containers may explode in the heat of a fire. Vapors or dust may form explosive mixture with air.
Extinguishing Media: Use water spray to cool fire-exposed containers. Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: 169 deg C (336.20 deg F)
Autoignition Temperature: 283 deg C (541.40 deg F)
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 1; Instability: 1

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Avoid generating dusty conditions. Provide ventilation. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Minimize dust generation and accumulation. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Use only in a chemical fume hood.
Storage: Store in a cool, dry place. Store in a tightly closed container. Store protected from light.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
4-Nitrophenol	none listed	none listed	none listed

OSHA Vacated PELs: 4-Nitrophenol: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Crystals
Appearance: brown - yellow
Odor: phenol-like
pH: 4.4 (5 g/L aq.sol.)
Vapor Pressure: Not available.
Vapor Density: 4.8 (air=1)
Evaporation Rate: Not available.
Viscosity: 2.56 mPa @ 121 deg C
Boiling Point: 279 deg C @ 760 mmHg
Freezing / Melting Point:> 112 deg C
Decomposition Temperature:279 deg C
Solubility: Soluble.
Specific Gravity / Density: Not available.
Molecular Formula:C6H5NO3
Molecular Weight:139.11

Section 10 - Stability and Reactivity

Chemical Stability: Light sensitive. Heat sensitive
Conditions to Avoid: Incompatible materials, light, dust generation, temperatures above 75°C (167°F), heat.
Incompatibilities with Other Materials: Strong oxidizing agents, strong bases, caustic alkalis, combustible materials.
Hazardous Decomposition Products: Nitrogen oxides, carbon monoxide, carbon dioxide, phenol.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:

CAS# 100-02-7: SM2275000
LD50/LC50:
CAS# 100-02-7:
Dermal, guinea pig: LD50 = >1 gm/kg;
Oral, mouse: LD50 = 282 mg/kg;
Oral, rat: LD50 = 202 mg/kg;
Skin, rat: LD50 = 1024 mg/kg;
.
Inhalation, rat: LC50 = > 4.7 mg/l/4H.; Skin sensitization, guinea pig: None sensitized. (Eastman Kodak).
Carcinogenicity:
CAS# 100-02-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: Adverse reproductive effects have occurred in experimental animals.
Mutagenicity: Mutagenic effects have occurred in experimental animals.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: No information available.
Physical: No information available.
Other: Do not empty into drains.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 100-02-7: waste number U170.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	NITROPHENOLS	NITROPHENOLS
Hazard Class:	6.1	6.1
UN Number:	UN1663	UN1663
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 100-02-7 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 100-02-7: Effective 4/13/89, Sunset 6/30/98
Chemical Test Rules
CAS# 100-02-7: 40 CFR 799.5055
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 100-02-7: 100 lb final RQ; 45.4 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 100-02-7: immediate, delayed, reactive.
Section 313
This material contains 4-Nitrophenol (CAS# 100-02-7, 98+%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR
Clean Air Act:
CAS# 100-02-7 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 100-02-7 is listed as a Hazardous Substance under the CWA. CAS# 100-02-7 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 100-02-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
XN
Risk Phrases:
R 20/21/22 Harmful by inhalation, in contact with skin and if swallowed.
R 33 Danger of cumulative effects.

Safety Phrases:
S 28A After contact with skin, wash immediately with plenty of water
.

WGK (Water Danger/Protection)
CAS# 100-02-7: 2
Canada - DSL/NDSL
CAS# 100-02-7 is listed on Canada's DSL List.
Canada - WHMIS
This product has a WHMIS classification of D1B, D2B

This product has a WHMIS classification of D1B, D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 100-02-7 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/09/1998
Revision #8 Date: 4/04/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 100-41-4
Date: 12/28/2006

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: ETHYLBENZENE SYNONYMS: Ethylbenzol, Phenylethane

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	OSHA PEL	MAC	Other STEL
ETHYLBENZENE	C8H10	100-41-4	99+%	100	100	50	125

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.
Can form explosive mixtures with air.
Can cause skin and respiratory tract irritation.
May cause irritation to the eyes and mucous membranes.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation, Skin, Ingestion

ACUTE EFFECTS: Inhalation of vapors may cause pulmonary edema, circulatory collapse, damage to upper respiratory tract, coughing, difficulty breathing and choking.Symptoms include burning sensation, coughing, wheezing, shortness of breath, headache, nausea, and vomiting.Excessive exposure can be fatal.Skin contact can cause defatting and dermatitis.Can be absorbed through the skin.Eye contact may result in destruction of eye tissue.Ingestion irritates the digestive tract and results in systemic effects from absorption.

CHRONIC EFFECTS: Skin and respiratory related disease.Suspected human carcinogen.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Skin conditions, respiratory problems.

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - Yes
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes.Do not allow victim to rub or keep eyes tightly shut.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Never give anything by mouth to an unconscious person.If ingested, have that conscious and alert person drink 1 to 2 glasses of water. Do not induce vomiting.If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration to the victim.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: 21 deg.C

AUTOIGNITION TEMPERATURE: 432 deg. C

FLAMMABLE LIMITS: Vol. %

LOWER: 0.8
UPPER: 6.7

EXTINGUISHING MEDIA: Dry chemical, carbon dioxide, or alcohol foam.Water is ineffective in putting out a fire, but should be used for cooling fire exposed cylinders.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing.Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide may be given off during combustion.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Dangerous fire hazard and severe explosion hazard when exposed to heat or flame.Vapors may travel a considerable distance to the source of ignition and flash back.Vapors can collect in low lying areas.Cylinder rupture may occur under fire conditions.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area.Remove leaking cylinder to exhaust hood or safe outdoor area.Shut off source if possible and remove source of heat.

SPECIALIZED EQUIPMENT: Absorb small spills using a solid adsorbent such as vermiculite.Use non-sparking tools.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling.Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas.Keep valve protection cap on cylinders when not in use.Store away from heat, flame, and sparks.Ventilation equipment should be explosion proof.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Safety glasses, Goggles.

SKIN PROTECTION: Impervious gloves, coveralls, boots, and/or other resistant protective clothing.

RESPIRATORY PROTECTION: In case of leakage, use self-contained breathing apparatus.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Distinctive aromatic

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @20 deg. C: 7.1 mm Hg

VAPOR DENSITY (AIR=1): 3.66

BOILING POINT (C): 136

SOLUBILITY IN WATER: @20 deg.C: .015 wt.%

SPECIFIC GRAVITY (H2O=1): @ 20 deg.C: 0.867

EVAPORATION RATE: (BuAC=1): <1

ODOR THRESHOLD: 2.3 ppm

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas.Storage near a heat source.

MATERIALS TO AVOID: Oxidizing agents, acids and bases.Ammonia.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): None established

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state, and local regulations.Waste can be burned in an approved incinerator equipped with an afterburner and scrubber.Return cylinders to supplier with any valve outlet plugs or caps secured and valve protection cap in place.Follow federal, state and local regulations.

14. TRANSPORT INFORMATION

CONCENTRATION: 99%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Ethylbenzene
HAZARD CLASS: 3 (flammable liquid), Packing Group II
INDENTIFICATION NUMBER: UN1175
REPORTABLE QUANTITIES: 1000 lb.

LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): Class 3,3(b)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 202-849-4

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: 11-20

S: 16-24/25-29

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

Material Safety Data Sheet
Styrene Monomer, Inhibited

ACC# 22100

Section 1 - Chemical Product and Company Identification

MSDS Name: Styrene Monomer, Inhibited
Catalog Numbers: O4507-1
Synonyms: Ethenylbenzene; Cinnamene; Cinnamenol; Ethenylbenzene; Phenethylene; Styrol; Vinylbenzene; Vinylbenzol
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
100-42-5	Styrene	>99.0	202-851-5

Hazard Symbols: XN
Risk Phrases: 10 36/38 20

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless. Flash Point: 88 deg F. **Warning! Flammable liquid and vapor.** Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause eye and skin irritation. May cause respiratory and digestive tract irritation. May cause central nervous system depression. May cause reproductive and fetal effects. May cause cancer based on animal studies. Uninhibited material may form explosive peroxides.
Target Organs: Central nervous system.

Potential Health Effects

Eye: Causes eye irritation.
Skin: May be absorbed through the skin in harmful amounts. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis.
Ingestion: May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation: Aspiration may cause respiratory swelling and pneumonitis. Causes narcotic effects including headache, dizziness, weakness, unconsciousness, and possible death.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.
Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. If conscious drink water, then induce vomiting. If unconscious, immediately take victim to a physician and do NOT attempt to induce vomiting.
Inhalation: Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Treat symptomatically
Antidote: None reported.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Flammable Liquid. Can release vapors that form explosive mixtures at temperatures above the flashpoint. Containers may explode in the heat of a fire.
Extinguishing Media: This material is lighter than water and insoluble in water. The fire could easily be spread by the use of water in an area where the water cannot be contained. Use water fog, dry chemical, carbon dioxide, or regular foam.

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Use a spark-proof tool. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with skin and eyes. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Take precautionary measures against static discharges. Avoid ingestion and inhalation. Wash clothing before reuse. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from sources of ignition. Store in a cool place in the original container and protect from sunlight. Keep refrigerated. (Store below 4°C/39°F.) Keep containers tightly closed.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne

concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Styrene	20 ppm TWA; 40 ppm STEL	50 ppm TWA; 215 mg/m3 TWA 700 ppm IDLH	100 ppm TWA; C 200 ppm

OSHA Vacated PELs: Styrene: 50 ppm TWA; 215 mg/m3 TWA; 100 ppm STEL; 425 mg/m3 STEL

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to minimize contact with skin.

Respirators: Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: pungent odor
pH: Not available.
Vapor Pressure: 568 mm Hg
Vapor Density: 1.22 Kg/m3
Evaporation Rate:0.5 (Butyl Acetate=1)
Viscosity: 0.751 mPa
Boiling Point: 293 deg F
Freezing/Melting Point:-23 deg F
Autoignition Temperature: 914 deg F (490.00 deg C)
Flash Point: 88 deg F (31.11 deg C)
Decomposition Temperature: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 3; Reactivity: 2
Explosion Limits, Lower:1.1% v/v
Upper: 7.0% v/v
Solubility: Practically insoluble in water
Specific Gravity/Density:0.9060
Molecular Formula:C8 H8
Molecular Weight:104.1

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. May form peroxides in the absence of inhibitors.

Conditions to Avoid: Incompatible materials, ignition sources.

Incompatibilities with Other Materials: Vapor is explosive when exposed to heat or flame and reacts with oxygen at temperatures above 104 F, unhibited material may form explosive peroxides. Uninhibited material may polymerize which becomes self-sustaining at temperatures above 65 C. Exposure to butyllithium, dibenzoyl peroxide, azoisobutyronitrile or di-tert-butylperoxide may cause violent polymerization. Violent reaction with chlorosulfonic acid, oleum, sulfuric acid and oxidizers. Oxygen + heat is explosive.

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.

Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 100-42-5: WL3675000
LD50/LC50:
CAS# 100-42-5:
Draize test, rabbit, eye: 100 mg Severe;
Draize test, rabbit, eye: 100 mg/24H Moderate;
Draize test, rabbit, skin: 100% Moderate;
Inhalation, mouse: LC50 = 9500 mg/m3/4H;
Inhalation, rat: LC50 = 12 gm/m3/4H;
Oral, mouse: LD50 = 316 mg/kg;
Oral, rat: LD50 = 2650 mg/kg;
Carcinogenicity:
CAS# 100-42-5:
ACGIH: A4 - Not Classifiable as a Human Carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2B carcinogen
Epidemiology: TCLo (Inhalation, rat) = 293 ppm/6H; Reproductive - Effects on Newborn - behavioral.
Teratogenicity: TCLo - Lowest published toxic concentration(Inhalation,rat)= 300 ppm/6H; Lungs, Thorax, or Respiration - structural or functional change in trachea or bronchi; Lungs, Thorax, or Respiration - other changes; Liver - other changes.
Reproductive Effects: RTECs reports reproductive effects in animals such as effects on weaning/lactation index, naternal effects, fetoxitity, stillbirth and post-implantation mortality. TCLo (Inhalation, rat) = 293 ppm/6H; Reproductive - Effects on Newborn - behavioral.
Neurotoxicity: No information available.
Mutagenicity: An increased incidence of mutations such as chromosome aberrations and micronuclei in peripheral lymphocytes has been reported in workers exposed occupationally. Some studies have found a slight increase in the incidence of sister chromatid exchanges while no increase has been found in several other studies.Mutation in microorganisms(Salmonella typhimurium) =1 umol/plate(Yeast - Saccharomyces cerevisiae) =1 mmol/L.
Other Studies: IARC has determined that there is inadequate evidence for carcinogenicity in humans. Three studies have sugg ested an association between leukaemia and lymph omas with exposure to styrene. Other studies have sh own no excess in mortality from cancer in humans. IARC has determined there is sufficient evidence of carcinogen icity in animals.Standard Draize test(skin,rabbit) = 100%; Moderate.Standard Draize test(eye,rabbit) = 100 mg; Severe.

Section 12 - Ecological Information

Ecotoxicity: No data available. Cas# 100-42-5:LC50(96Hr.)Fathead Minnow = 46.4` mg/L; Static Bioassay Softwater.LC50(96Hr.)Fathead Minnow = 59.30 mg/L; Static Bioassay, Hardwater.LC50(96Hr.)Bluegill = 25.05 mg/L; Static Bioassay, Softwater.LC50(96Hr.)Goldfish = 64.74 mg/L; Static Bioassay, water.LC50(48Hr.) Water flea = 23.0 mg/L, Unspecified Bioassay.EC50(48Hr.) Water flea = 23.0 mg/L; Unspecified Bioassay.
Environmental: Styrene does not absorb solar radiation at wavelengths above the solar cutoff (approximately 300 nm); therefore, it will not be directly photolyzed in the lower atmosphere (troposphere) or surface water. However, styrene is expected to be involved in indirect photochemical reactions. Styrenes have been found to be very active generators of photochemical smog.
Physical: Styrene released to soil is subject to biodegradation. Volatilization and biodegradation are important transport and degradation processes respectively for styrene in water.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	No information available.				STYRENE MONOMER
Hazard Class:					3(9.2)
UN Number:					UN2055
Packing Group:					III
Additional Info:					FLASHPOINT 31C

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 100-42-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

Section 302 (RQ)
CAS# 100-42-5: final RQ = 1000 pounds (454 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 100-42-5: acute, chronic, flammable, reactive.
Section 313
This material contains Styrene (CAS# 100-42-5, 99 0%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 100-42-5 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 100-42-5 is listed as a Hazardous Substance under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are

product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 100-42-5 can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN

Risk Phrases:

R 10 Flammable.
R 36/38 Irritating to eyes and skin.
R 20 Harmful by inhalation.

Safety Phrases:

S 23 Do not inhale gas/fumes/vapour/spray.

WGK (Water Danger/Protection)

CAS# 100-42-5: 2

Canada

CAS# 100-42-5 is listed on Canada's DSL List. CAS# 100-42-5 is listed on Canada's DSL List.
This product has a WHMIS classification of B2, D2A, F.
CAS# 100-42-5 is listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 100-42-5: OEL-AUSTRALIA:TWA 50 ppm (215 mg/m3);STEL 100 ppm (42 5 mg/m3) OEL-BELGIUM:TWA 50 ppm (213 mg/m3);STEL 100 ppm (426 mg/m3); Skin OEL-CZECHOSLOVAKIA:TWA 200 mg/m3;STEL 1000 mg/m3 OEL-DENMARK:TW A 25 ppm (105 mg/m3) OEL-FINLAND:TWA 20 ppm (85 mg/m3);STEL 100 ppm (420 mg/m3) OEL-FRANCE:TWA 50 ppm (215 mg/m3) OEL-GERMANY:TWA 20 ppm (85 mg/m3) OEL-HUNGARY:STEL 50 mg/m3;Carcinogen OEL-JAPAN:TWA 50 ppm (210 mg/m3) OEL-THE NETHERLANDS:TWA 100 ppm (420 mg/m3) OEL-THE PHI LIPPINES:TWA 100 ppm (420 mg/m3) OEL-POLAND:TWA 100 mg/m3 OEL-SWEDEN :TWA 25 ppm (110 mg/m3);STEL 75 ppm (30 mg/m3);Skin OEL-SWITZERLAND:T WA 50 ppm (215 mg/m3);STEL 100 ppm (430 mg/m3) OEL-THAILAND:TWA 100 p pm;STEL 200 ppm OEL-TURKEY:TWA 100 ppm (420 mg/m3) OEL-UNITED KINGDO M:TWA 100 ppm (420 mg/m3);STEL 260 ppm OEL IN BULGARIA, COLOMBIA, JOR DAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM che ck ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 4/28/1999

Revision #2 Date: 8/02/2000

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

MSDS Number: **B1957** * * * * * *Effective Date:* ***08/20/08*** * * * * * *Supercedes:* ***11/10/05***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

BENZYL CHLORIDE

1. Product Identification

Synonyms: alpha-chlorotoluene; chlorophenylmethane; chloromethylbenzene
CAS No.: 100-44-7
Molecular Weight: 126.59
Chemical Formula: C6H5CH2Cl
Product Codes: 1076

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Benzyl Chloride	100-44-7	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE. CAUSES BURNS TO ANY AREA OF CONTACT. HARMFUL IF SWALLOWED OR INHALED. CAUSES SEVERE IRRITATION TO EYES, SKIN AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. COMBUSTIBLE LIQUID AND VAPOR.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 2 - Moderate
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Toxic. May be corrosive to the respiratory tract, symptoms may include sore throat, coughing, and labored breathing. May also cause central nervous system depression, pulmonary edema, kidney and liver damage, and death.
Ingestion:
Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. Can cause sore throat, vomiting, diarrhea. May also cause systemic poisoning with symptoms paralleling inhalation.
Skin Contact:
Corrosive. Symptoms of redness, pain, and severe burn can occur.
Eye Contact:
For Vapor of Liquid: Corrosive. Contact can cause blurred vision, redness, pain and severe tissue burns. Permanent eye damage is possible if exposure is severe.
Chronic Exposure:
Mild leukopenia(abnormally low number of circulating white blood cells), liver function disturbances and kidney problems.
Aggravation of Pre-existing Conditions:
Persons with pre-existing neurological disorders, liver or kidney problems may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Wipe off excess material from skin then immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Flash point: 67C (153F) CC
Autoignition temperature: 627C (1161F)
Flammable limits in air % by volume:
lel: 1.3; uel: 7.1
Combustible Liquid and Vapor!
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Use water spray to blanket fire, cool fire exposed containers, and to flush non-ignited spills or vapors away from fire. Do not allow water runoff to enter sewers or waterways.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

---

7. Handling and Storage

Keep in a tightly closed container. Store in a cool, dry, ventilated area away from sources of heat or ignition. Protect against physical damage. Store separately from reactive or combustible materials, and out of direct sunlight. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
1 ppm (TWA).
-ACGIH Threshold Limit Value (TLV):
1 ppm (TWA), A3: Animal carcinogen.
- NIOSH Immediately Dangerous to Life or Health (IDLH): 10 ppm
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face respirator with an organic vapor/acid gas cartridge may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an organic vapor/acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Pungent odor.
Solubility:
Insoluble in water.
Specific Gravity:
1.10
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
179C (354F)
Melting Point:
-48 - -43C (-54 - -45F)
Vapor Density (Air=1):
4.36
Vapor Pressure (mm Hg):
1.6 @ 20C (68F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Unstable. Inhibitors such as propylene oxide, sodium carbonate solution, lime, or trimethylamine must be used to prevent polymerization.
Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.
Hazardous Polymerization:
Hazardous polymerization can occur in presence of catalytic impurities such as aluminum, iron, rust, or sodium acetate + pyridine + iron at 115C.
Incompatibilities:
Water, dimethyl sulfoxide, oxidizing material, steam. Corrodes all common metals except lead and nickel (explosive when heated).
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 1231 mg/kg. Inhalation rat LD50: 150 ppm/2H. Investigated as a tumorigen, mutagen, reproductive effector.
Carcinogenicity:
EPA / IRIS classification: Group B2 - Probable human carcinogen, sufficient animal evidence.
Based on experiments done on rats, NIOSH has concluded that the carcinogenic risk from low exposure is probably negligible. There is limited evidence that workers exposed to benzyl chloride have a carcinogenic risk. In the NCI Carcinogenesis Studies (feed) clear evidence for carcinogenicity was found in the mouse and inadequate evidence was found in the rat. IARC Category: human - inadequate evidence; animal - limited evidence.

--------\Cancer Lists\----------

	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
Benzyl Chloride (100-44-7)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or

contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: BENZYL CHLORIDE
Hazard Class: 6.1, 8
UN/NA: UN1738
Packing Group: II
Information reported for product/size: 500ML

International (Water, I.M.O.)

Proper Shipping Name: BENZYL CHLORIDE
Hazard Class: 6.1, 8
UN/NA: UN1738
Packing Group: II
Information reported for product/size: 500ML

International (Air, I.C.A.O.)

Proper Shipping Name: BENZYL CHLORIDE
Hazard Class: 6.1, 8
UN/NA: UN1738
Packing Group: II
Information reported for product/size: 500ML

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
Benzyl Chloride (100-44-7)                     Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                      --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
Benzyl Chloride (100-44-7)                     Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
--------------------------------------  ---   -----   ----  --------------
Benzyl Chloride (100-44-7)              100   500     Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                -RCRA-    -TSCA-
Ingredient                              CERCLA     261.33     8(d)
--------------------------------------  ------     ------    ------
Benzyl Chloride (100-44-7)              100        P028       Yes


Chemical Weapons Convention:  No     TSCA 12(b):  Yes    CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: Yes         (Pure / Liquid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2W
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **2** Reactivity: **1**
Label Hazard Warning:
DANGER! CORROSIVE. CAUSES BURNS TO ANY AREA OF CONTACT. HARMFUL IF SWALLOWED OR INHALED. CAUSES SEVERE IRRITATION TO EYES, SKIN AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. COMBUSTIBLE LIQUID AND VAPOR.
Label Precautions:

Do not get in eyes, on skin, or on clothing.
Do not breathe mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.

Label First Aid:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, wipe off excess material from skin then immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **B1885** * * * * * *Effective Date:* ***05/26/09*** * * * * * *Supercedes:* ***08/17/06***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

BENZYL ALCOHOL

1. Product Identification

Synonyms: Benzenecarbinol; benzenemethanol; alpha-hydroxytoluene; Phenylmethyl alcohol; Phenyl carbinol
CAS No.: 100-51-6
Molecular Weight: 108.14
Chemical Formula: C6H5CH2OH
Product Codes:
J.T. Baker: 5190, 9039, 9040, 9041, 9050, 9051, 9421
Mallinckrodt: 1403, 1816, 71083

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Benzyl Alcohol	100-51-6	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. COMBUSTIBLE LIQUID AND VAPOR.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 2 - Moderate
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. May be absorbed into the bloodstream with symptoms similar to ingestion.
Ingestion:
Large doses may cause sore throat, coughing, labored respiration, dizziness, dullness, abdominal pain, vomiting, central nervous system depression, convulsions, and death due to respiratory failure.
Skin Contact:
May cause irritation, redness, pain, and tissue injury. May be absorbed through the skin with symptoms paralleling ingestion.
Eye Contact:
Causes irritation, redness, and pain. Can cause eye damage.
Chronic Exposure:
Chronic exposure may cause skin effects.
Aggravation of Pre-existing Conditions:

No information found.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: 93C (199F)
Autoignition temperature: 436C (817F)
Combustible. High heat or direct flame is necessary to cause ignition.
Explosion:
Above the flash point, explosive vapor-air mixtures may be formed.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Do not use a solid stream of water, since the stream will scatter and spread the fire. Water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer!

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials. Storage and use areas should be No Smoking areas. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
AIHA Workplace Environmental Exposure Level (WEEL):10 ppm, 8-hour, TWA
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the substance is apparent and engineering controls are not feasble, consult an industrial hygienist. For emergencies, or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Faint aromatic odor.
Solubility:
1g/25ml water @ 17C
Specific Gravity:
1.05 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
205C (401F)
Melting Point:
-15C (5F)
Vapor Density (Air=1):
3.72
Vapor Pressure (mm Hg):
0.15 @ 25C (77F)
Evaporation Rate (BuAc=1):
1.8 (Ether = 1)

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Undergoes slow oxidation in the presence of air or oxygen to form benzaldehyde and benzoic acid.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
When heated past 100C, Benzyl Alcohol containing hydrogen bromide and dissolved iron may polymerize with a rapid increase in temperature.
Incompatibilities:
Acids, oxidizing agents, and aluminum. Will attack some plastics.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 1230 mg/kg; skin rabbit LD50: 2000 mg/kg; irritation, skin rabbit, standard Draize, 100 mg/24-hour, open, moderate; investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------			
	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
----------	-----	-----------	------------
Benzyl Alcohol (100-51-6)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material is not expected to evaporate significantly. When released into water, this material may biodegrade to a moderate extent. This material has an estimated bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.
Environmental Toxicity:
The LC50/96-hour values for fish are from 10 to over 100 mg/l. This material may be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\--------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
Benzyl Alcohol (100-51-6)                      Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\--------------------------------
                                                       --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
Benzyl Alcohol (100-51-6)                      Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                          -SARA 302-    ------SARA 313------
Ingredient                                RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Benzyl Alcohol (100-51-6)                 No    No      No         No

--------\Federal, State & International Regulations - Part 2\----------------
                                                -RCRA-    -TSCA-
Ingredient                                CERCLA     261.33     8(d)
----------------------------------------  ------     ------    ------
Benzyl Alcohol (100-51-6)                 No         No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **2** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. COMBUSTIBLE LIQUID AND VAPOR.
Label Precautions:
Avoid breathing vapor or mist.
Avoid contact with eyes, skin and clothing.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.
Label First Aid:
If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
No Information Found.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 10061-01-5
Date: 12/28/2006

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: 1,3-DICHLOROPROPENE (CIS) SYNONYMS: None

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	OSHA PEL	MAC	Other STEL
1,3-DICHLOROPROPENE (CIS)	C3H4CL2	10061-01-5	99+%	1.0	1.0	1.0	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.
Can form explosive mixtures in air.
May cause severe irritation or burns to the eyes and skin.
May cause irritation to the respiratory tract.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation, Eye, Skin, Ingestion

ACUTE EFFECTS: This material will severely irritate and damage the skin, eyes, mucous membranes and upper respiratory tract.Inhalation may cause dizziness, vomiting, diarrhea, abdominal pain, convulsions, and visual disturbances.May damage liver and kidney.Blood and lung effects.Skin contact can cause defatting and dermatitis.Eye contact may result in destruction of eye tissue.Ingestion irritates the digestive tract and results in systemic effects from absorption.

CHRONIC EFFECTS: May damage liver and kidney.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Skin conditions, respiratory problems.

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - Yes
IARC MONOGRAPHS - Yes
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air.If breathing has stopped, give artificial respiration.If breathing is difficult, give oxygen.

EYE CONTACT: Do not allow victim to rub or keep eyes tightly shut.Flush with large amounts of water lifting upper and lower lids.

SKIN CONTACT: Rinse the affected area with flooding amounts of water and then wash it with soap and water.

INGESTION: Never give anything by mouth to an unconscious person.Have conscious and alert person drink 1 to 2 glasses of water.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: 35 deg.C

AUTOIGNITION TEMPERATURE: N/Av

FLAMMABLE LIMITS: Vol. %

LOWER: 5.30
UPPER: 14.50

EXTINGUISHING MEDIA: Extinguish with water spray, water fog, dry chemical, or carbon dioxide.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing.Keep fire exposed cylinders cool with water spray.If possible, stop the product flow.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide, hydrogen chloride and phosgene.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Cylinder rupture may occur under fire conditions.Severe when exposed to heat or flame.Vapors may travel a considerable distance to the source of ignition and flash back.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area.Remove all sources of ignition.Prevent release of material to surface water or sewers.Absorb with sand or vermiculite and place in closed containers for disposal.Place waste into a clean, dry container for disposal.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling.Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas.Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Safety glasses

SKIN PROTECTION: Impervious gloves, coveralls, boots, and/or other resistant protective clothing.

RESPIRATORY PROTECTION: In case of leakage, use self-contained breathing apparatus.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Sweet chloroform odor.

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @20 deg.C: 40-52 mm Hg

VAPOR DENSITY (AIR=1): 3.83

BOILING POINT (C): 104

SOLUBILITY IN WATER: 0.15%

SPECIFIC GRAVITY (H2O=1): @25 deg.C: 1.22

EVAPORATION RATE: N/Av

ODOR THRESHOLD: 1-3 ppm

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas.Storage near a heat source.

MATERIALS TO AVOID: Oxidizing agents.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide, hydrogen chloride and phosgene.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): 500 ppm, rat one hour.

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Dichloropropene
HAZARD CLASS: 3 (flammable), Packing Group II
INDENTIFICATION NUMBER: UN2047
REPORTABLE QUANTITIES: 100 lbs.
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): Class 3, 31(c)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 208-826-5

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: 10-20/21-25-36/37/38

S: 36/37-44

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 10061-02-6
Date: 12/28/2006

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: 1,3-DICHLOROPROPENE (TRANS) SYNONYMS: None

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	OSHA PEL	MAC	Other STEL
1,3 DICHLOROPROPENE (TRANS)	C3H4CL2	10061-02-6	99+%	1	1	1	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.
Can form explosive mixtures in air.
May cause severe irritation or burns to the eyes and skin.
May cause irritation to the respiratory tract.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation, Eye, Skin, Ingestion

ACUTE EFFECTS: This material will severely irritate and damage the skin, eyes, mucous membranes and upper respiratory tract.Inhalation may cause dizziness, vomiting, diarrhea, abdominal pain, convulsions, and visual disturbances.May damage liver and kidney.Blood and lung effects.Skin contact can cause defatting and dermatitis.Eye contact may result in destruction of eye tissue.Ingestion irritates the digestive tract and results in systemic effects from absorption.

CHRONIC EFFECTS: May damage liver and kidney.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Skin conditions, respiratory problems.

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - Yes
IARC MONOGRAPHS - Yes
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air.If breathing has stopped, give artificial respiration.If breathing is difficult, give oxygen.

EYE CONTACT: Do not allow victim to rub or keep eyes tightly shut.Flush with large amounts of water lifting upper and lower lids.

SKIN CONTACT: Rinse the affected area with flooding amounts of water and then wash it with soap and water.

INGESTION: Never give anything by mouth to an unconscious person.Have conscious and alert person drink 1 to 2 glasses of water.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: 35 deg. C

AUTOIGNITION TEMPERATURE: N/Av

FLAMMABLE LIMITS: Vol. %

LOWER: 5.30
UPPER: 14.50

EXTINGUISHING MEDIA: Extinguish with water spray, water fog, dry chemical, or carbon dioxide.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing.Keep fire exposed cylinders cool with water spray.If possible, stop the product flow.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide, hydrogen chloride and phosgene.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Cylinder rupture may occur under fire conditions.Severe when exposed to heat or flame.Vapors may travel a considerable distance to the source of ignition and flash back.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area.Remove all sources of ignition.Prevent release of material to surface water or sewers.Absorb with sand or vermiculite and place in closed containers for disposal.Place waste into a clean, dry container for disposal.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling.Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas.Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Safety glasses

SKIN PROTECTION: Impervious gloves, coveralls, boots, and/or other resistant protective clothing.

RESPIRATORY PROTECTION: In case of leakage, use self-contained breathing apparatus.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Sweet chloroform odor.

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @20 deg.C: 40-52 mm Hg

VAPOR DENSITY (AIR=1): 3.83

BOILING POINT (C): 112

SOLUBILITY IN WATER: 0.15%

SPECIFIC GRAVITY (H2O=1): @25 deg.C: 1.22

EVAPORATION RATE: N/Av

ODOR THRESHOLD: 1-3 ppm

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas.Storage near a heat source.

MATERIALS TO AVOID: Oxidizing agents.

HAZARDOUS POLYMERIZATION: May occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide, hydrogen chloride and phosgene.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): 500 ppm, rat one hour.

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state, and local regulations.Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood.If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection cap in place.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Dichloropropene
HAZARD CLASS: 3 (flammable), Packing Group II
INDENTIFICATION NUMBER: UN2047
REPORTABLE QUANTITIES: 100 lbs.
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): Class 3, 31(c)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 208-826-5

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: 10-20/21-25-36/37/38

S: 36/37-44

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

Material Safety Data Sheet

acc. to OSHA and ANSI

Printing date 06/01/2009 Reviewed on 05/29/2009

1 Identification of substance:

Product details:

Product name: 4-Bromodiphenyl ether

Stock number: L01473

Manufacturer/Supplier:
Alfa Aesar, A Johnson Matthey Company
Johnson Matthey Catalog Company, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Emergency Phone: (978) 521-6300
CHEMTREC: (800) 424-9300
Web Site: www.alfa.com

Information Department: Health, Safety and Environmental Department
Emergency information:
During normal hours the Health, Safety and Environmental Department. After normal hours call Chemtrec at (800) 424-9300.

2 Composition/Data on components:

Chemical characterization:
Description: (CAS#)
4-Bromodiphenyl ether (CAS# 101-55-3): 100%
Identification number(s):
EINECS Number: 202-952-4

3 Hazards identification

Hazard description:

N Dangerous for the environment

Information pertaining to particular dangers for man and environment
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
Classification system
HMIS ratings (scale 0-4)
(Hazardous Materials Identification System)

HEALTH	1
FIRE	1
REACTIVITY	1

Health (acute effects) = 1
Flammability = 1
Reactivity = 1

GHS label elements

4.1/2 - Toxic to aquatic life with long lasting effects.
Prevention:
Avoid release to the environment.
Response:
Collect spillage.
Disposal:
Dispose of contents/container in accordance with local/regional/national/international regulations.

4 First aid measures

After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
After skin contact
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.
After eye contact
Rinse opened eye for several minutes under running water. Then consult a doctor.
After swallowing Seek immediate medical advice.

(Contd. on page 2)

Material Safety Data Sheet

acc. to OSHA and ANSI

Printing date 06/01/2009 Reviewed on 05/29/2009

Product name: 4-Bromodiphenyl ether

(Contd. of page 1)

5 Fire fighting measures

Suitable extinguishing agents
Carbon dioxide, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
Special hazards caused by the material, its products of combustion or resulting gases:
In case of fire, the following can be released:
Carbon monoxide and carbon dioxide
Hydrogen bromide (HBr)
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

6 Accidental release measures

Person-related safety precautions:
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Measures for environmental protection:
Do not allow material to be released to the environment without proper governmental permits.
Measures for cleaning/collecting:
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Additional information:
See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

Handling
Information for safe handling:
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Information about protection against explosions and fires: Keep ignition sources away.

Storage
Requirements to be met by storerooms and receptacles: No special requirements.
Information about storage in one common storage facility: Store away from oxidizing agents.
Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.

8 Exposure controls and personal protection

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Components with limit values that require monitoring at the workplace: Not required.
Additional information: No data

Personal protective equipment
General protective and hygienic measures
The usual precautionary measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Breathing equipment: Use suitable respirator when high concentrations are present.
Protection of hands:
Impervious gloves
Check protective gloves prior to each use for their proper condition.
Material of gloves
The selection of suitable gloves not only depends on the material, but also on quality.
Quality will vary from manufacturer to manufacturer.
Eye protection: Safety glasses
Body protection: Protective work clothing.

(Contd. on page 3)

Material Safety Data Sheet
acc. to OSHA and ANSI

Printing date 06/01/2009 Reviewed on 05/29/2009

Product name: 4-Bromodiphenyl ether

(Contd. of page 2)

9 Physical and chemical properties:

General Information	
Form:	Liquid
Color:	Colorless
Odor:	Not determined
Change in condition	
Melting point/Melting range:	17-18°C (63-64°F)
Boiling point/Boiling range:	304-305°C (579-581°F)
Sublimation temperature / start:	Not determined
Flash point:	> 110°C (> 230°F)
Ignition temperature:	Not determined
Decomposition temperature:	Not determined
Danger of explosion:	Product does not present an explosion hazard.
Explosion limits:	
Lower:	Not determined
Upper:	Not determined
Vapor pressure:	Not determined
Density at 20°C (68°F):	1.42 g/cm³
Solubility in / Miscibility with	
Water:	Not miscible or difficult to mix

10 Stability and reactivity

Thermal decomposition / conditions to be avoided:
Decomposition will not occur if used and stored according to specifications.
Materials to be avoided: Oxidizing agents
Dangerous reactions No dangerous reactions known
Dangerous products of decomposition:
Carbon monoxide and carbon dioxide
Hydrogen bromide

11 Toxicological information

Acute toxicity:
Primary irritant effect:
on the skin: May cause irritation
on the eye: May cause irritation
Sensitization: No sensitizing effects known.
Subacute to chronic toxicity:
Other than potential irritation (see above), no information on illness or injury to humans from acute or chronic exposure to this product is available.
Additional toxicological information:
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
No classification data on carcinogenic properties of this material is available from the EPA, IARC, NTP, OSHA or ACGIH.

12 Ecological information:

Ecotoxical effects:
Remark: Toxic for fish
General notes:
Do not allow product to reach ground water, water course or sewage system.
Danger to drinking water if even small quantities leak into the ground.
Also poisonous for fish and plankton in water bodies.
Do not allow material to be released to the environment without proper governmental permits.
Toxic for aquatic organisms

13 Disposal considerations

Product:
Recommendation Consult state, local or national regulations to ensure proper disposal.

(Contd. on page 4)

Material Safety Data Sheet
acc. to OSHA and ANSI

Printing date 06/01/2009 Reviewed on 05/29/2009

Product name: 4-Bromodiphenyl ether

(Contd. of page 3)

Uncleaned packagings:
Recommendation: Disposal must be made according to official regulations.

14 Transport information

DOT regulations:

Hazard class:	9
Identification number:	UN3082
Packing group:	III
Proper shipping name (technical name):	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (4-Bromodiphenyl ether)
Label	9

Land transport ADR/RID (cross-border)

ADR/RID class:	9 (M6) Miscellaneous dangerous substances and articles
Danger code (Kemler):	90
UN-Number:	3082
Packaging group:	III
Description of goods:	3082 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (4-Bromodiphenyl ether)

Maritime transport IMDG:

IMDG Class:	9
UN Number:	3082
Label	9
Packaging group:	III
EMS Number:	F-A,S-F
Proper shipping name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (4-Bromodiphenyl ether)

Air transport ICAO-TI and IATA-DGR:

ICAO/IATA Class:	9
UN/ID Number:	3082
Label	9
Packaging group:	III
Proper shipping name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (4-Bromodiphenyl ether)

UN "Model Regulation": UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., 9, III
Environmental hazards: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID

15 Regulations

Product related hazard informations:

Hazard symbols:
N Dangerous for the environment

(Contd. on page 5)

Material Safety Data Sheet

acc. to OSHA and ANSI

Printing date 06/01/2009 Reviewed on 05/29/2009

Product name: 4-Bromodiphenyl ether

(Contd. of page 4)

Risk phrases:
51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

Safety phrases:
57 Use appropriate container to avoid environmental contamination.

National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
All components of this product are listed on the Canadian Non-Domestic Substances List (NDSL).

Information about limitation of use:
For use only by technically qualified individuals.
This product is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.

16 Other information:

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing MSDS: Health, Safety and Environmental Department.
Contact: Zachariah Holt
Abbreviations and acronyms:
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
IATA-DGR: Dangerous Goods Regulations by the "International Air Transport Association" (IATA)
ICAO: International Civil Aviation Organization
ICAO-TI: Technical Instructions by the "International Civil Aviation Organization" (ICAO)
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
HMIS: Hazardous Materials Identification System (USA)

Composition/Information on Ingredient

Cas:
1024-57-3
Code:
M
RTECS:
PB9450000
Code:
M
Name:
HEPTACHLOR EPOXIDE (SARA III)
Other REC Limits:
N/K
OSHA PEL:
NOT ESTABLISHED
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
NOT ESTABLISHED
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
USE APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.
Ventilation:
HANDLE ONLY IN A HOOD
Protective Gloves:
AS REQUIRED
Eye Protection:
EYE SHIELDS
Other Protective Equipment:
Equipment N/K
Work Hygienic Practices:
REMOVE/WASH CONTAMINATED CLOTHING BEFORE REUSE. ONLY TRAINED PERSONNEL SHOULD HANDLE THIS
CHEMICAL OR ITS CONTAINER.
Supplemental Safety and Health:
N/K

Health Hazards Data

LD50LC50Mixture:
ORAL LD50 (RAT): 62 MG/KG
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO

Health Hazards Acute And Chronic:
SKIN: FATAL IF ABSORBED. INHALATION: FATAL. INGESTION: FATAL & TOXIC.
Explanation Of Carcinogenicity:
NONE
Signs And Symptions Of Overexposure:
SKIN: FATAL IF ABSORBED. INHALATION: FATAL. INGESTION: FATAL & TOXIC.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES/SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NO BURNS HAVE OCCURED-USE SOAP & WATER TO CLEANSE SKIN. INHALATION:
REMOVE TO FRESH AIR. ADMINISTER OXYGEN IF BREATHING DIFFICULTY. ADMINISTER CPR IF CARDIA C ARREST OCCURS. INGESTION:
INDUCE VOMITING. DON'T ADMINISTER LIQUIDS/INDUCE VOMITING TO AN UNCONSIOUS/CONVULSING PERSON. MAKE SURE AIRWAY
DOESN'T BECOME OBSTRUCTED BY VOMIT. OBTAIN MEDICAL ATTENTION.
Spill Release Procedures:
EVACUATE AREA. WEAR APPROPRIATE EQUIPMENT. VENTILATE AREA. SWEEP UP & PLACE IN AN APPROPRIATE CONTAINER. WASH
CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
Neutralizing Agent:
N/K
Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER. DISPOSE OF IN ACCORDANCE W/FEDERAL, STATE, &
LOCAL REGULATIONS.
Handling And Storage Precautions:
KEEP CLOSED IN A COOL DRY PLACE. STORE ONLY W/COMPATIBLE CHEMICALS. FOR LABORATORY USE ONLY. DON'T WEAR CONTACT
LENSES.
Other Precautions:
DON'T USE AS DRUGS, COSMETICS, AGRICULTURAL OR PESTICIDAL PRODUCTS, FOOD ADDITIVES OR AS HOUSEHOLD CHEMICALS.
AVOID DIRECT PHYSICAL CONTACT. AVOID CONTACT W/SKIN, EYES & CLOTHING. COMPOUND IS VOLATILE . 2

Fire and Explosion Hazard Information

Flash Point Method:
N/P
Flash Point:
Flash Point Text:
N/K
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
CO2, DRY CHEMICAL POWDER OR SPRAY.
Fire Fighting Procedures:
N/K
Unusual Fire/Explosion Hazard:
N/K

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:

N/K 3
Melt/Freeze Pt:
M.P/F.P Text:
327.2F
Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
N/K
Appearance and Odor:
CRYSTALLINE SOLID.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
LOW REACTIVITY
Hazardous Decomposition Products:
N/K
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is

applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Lookchem shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Composition/Information on Ingredient

Cas:
1031-07-8
Code:
M
RTECS:
RB9150000
Code:
M
Name:
ENDOSULFAN SULFATE
Other REC Limits:
N/K
OSHA PEL:
N/K
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
N/K
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
N/K
Ventilation:
N/K
Protective Gloves:
RECOMMENDED
Eye Protection:
RECOMMENDED
Other Protective Equipment:
Equipment USE APPROPRIATE OSHA/MSHA SAFETY EQUIPMENT.
Work Hygienic Practices:
N/K
Supplemental Safety and Health:
N/K

Health Hazards Data

LD50LC50Mixture:
ORAL (RAT) LD50: 5000 MG/KG (TOLUENE)
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
EYES/SKIN/INHALATION/INGESTION: IRRITATION.

Explanation Of Carcinogenicity:
LINDANE, DDT ISOMERS, & DIELDRIN ARE SUSPECTED HUMAN CARCINOGENS. HEPTACHLOR IS AN A2 CARCINOGEN.
Signs And Symptions Of Overexposure:
EYES/SKIN/INGESTION/INHALATION: TOXIC & IRRITATION.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN IF NECESSARY. OBTAIN
MEDICAL ATTENTION IN ALL CASES.
Spill Release Procedures:
DUE TO THE SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. A LEAKING BOTTLE MAY BE
PLACED IN A PLASTIC BAG & NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE OR
SAND.
Neutralizing Agent:
N/K
Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCUBBER. OBSERVE ALL FEDERAL, STATE, & LOCAL LAWS
CONCERNING DISPOSAL.
Handling And Storage Precautions:
AVOID CONTACT W/EYES, SKIN, & CLOTHING. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE.
Other Precautions:
THIS MATERIAL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN THE SAFE HANDLING OF HAZARDOUS CHEMICALS.

Fire and Explosion Hazard Information

Flash Point Method:
N/P 6
Flash Point:
Flash Point Text:
COMBUSTIBLE
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
CO2, DRY CHEMICAL POWDER, OR WATER SPRAY
Fire Fighting Procedures:
N/K
Unusual Fire/Explosion Hazard:
COMBUSTIBLE.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/K
Melt/Freeze Pt:
M.P/F.P Text:
N/K
Decomp Temp:
Decomp Text:

N/K
Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K 7
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
N/K
Appearance and Odor:
LIQUID W/BENZENE-LIKE ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
STRONG OXIDIZERS
Hazardous Decomposition Products:
N/R
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 103-65-1
Date: 03/09/2001

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: PROPYL BENZENE SYNONYMS: 1-Phenylpropane, Isocumene.

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	**Formula**	**CAS #**	**Concentration**	**ACGIH TLV**	**OSHA PEL**	**MAC**	**Other STEL**
PROPYL BENZENE	C9H12	103-65-1	99+%	NE	NE	NE	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.
Can form explosive mixtures with air.
May cause irritation to eyes and skin.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Ingestion

ACUTE EFFECTS: Skin and eye irritation may occur. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

CHRONIC EFFECTS: None known

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - No
OSHA REGULATED - No

4. FIRST AID MEASURES

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Contact physician immediately.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: 30 deg. C

AUTOIGNITION TEMPERATURE: 450 deg. C

FLAMMABLE LIMITS: Vol.%

LOWER: .80
UPPER: 6.00

EXTINGUISHING MEDIA: Water spray. Carbon dioxide, foam, or dry chemical.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide may be given off during combustion.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Cylinder rupture may occur under fire conditions. May form explosive mixture in air. Vapors may travel a considerable distance to the source of ignition and flash back. Dangerous when exposed to heat, flame or powerful oxidizers.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Remove leaking cylinder to exhaust hood or safe outdoor area. Remove all sources of ignition. Absorb with sand or vermiculite and place in closed containers for disposal.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below flammable limits.

EYE / FACE PROTECTION: Goggles. A safety shower and eyewash station should be readily available.

SKIN PROTECTION: Wear suitable protective clothing.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless to pale yellow

ODOR: Odorless

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @20 deg. C: 2.0 mm Hg

VAPOR DENSITY (AIR=1): 4.14

BOILING POINT (C): 159.2

SOLUBILITY IN WATER: Practically insoluble

SPECIFIC GRAVITY (H2O=1): 0.862

EVAPORATION RATE: N/Av

ODOR THRESHOLD: N/Ap

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Sparks, flame, heat and other sources of ignition.

MATERIALS TO AVOID: Strong oxidizing agents.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): 91,910 ppm, Rat 1 hr.

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Waste material may be burned in a controlled manner in an approved incinerator. Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: n-Propyl benzene
HAZARD CLASS: 3 (flammable), Packing group III.
INDENTIFICATION NUMBER: UN2364
REPORTABLE QUANTITIES: None
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): Class 3, 31(c)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 203-132-9

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: 10-37

S: 2

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 104-51-8
Date: 03/09/2001

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: BUTYL BENZENE SYNONYMS: 1-Phenyl butane.

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	OSHA PEL	MAC	Other STEL
BUTYL BENZENE	C10H14	104-51-8	99+%	NE	NE	NE	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Skin , Ingestion

ACUTE EFFECTS: To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

CHRONIC EFFECTS: None known

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - No
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Never give anything by mouth to an unconscious person. Contact a poison control center.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: 71.1 deg. C

AUTOIGNITION TEMPERATURE: 412.22 deg. C

FLAMMABLE LIMITS: Vol.%

LOWER: .80
UPPER: 5.80

EXTINGUISHING MEDIA: Carbon dioxide, foam, or dry chemical. Water spray.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide may be given off during combustion.

UNUSUAL FIRE AND EXPLOSION HAZARDS: N/Av

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Absorb with sand or vermiculite and place in closed containers for disposal.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below flammable limits.

EYE / FACE PROTECTION: Goggles. A safety shower and eyewash station should be readily available.

SKIN PROTECTION: Wear suitable protective clothing.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Odorless

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @22.7 deg. C: 1 mm Hg

VAPOR DENSITY (AIR=1): 4.6

BOILING POINT (C): 182.1

SOLUBILITY IN WATER: @20 deg. C: Insoluble

SPECIFIC GRAVITY (H2O=1): @20 deg. C: 0.860

EVAPORATION RATE: N/Av

ODOR THRESHOLD: N/Ap

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Avoid contact with incompatible chemicals.

MATERIALS TO AVOID: Strong oxidizing agents.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): NONE ESTABLISHED

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Waste can be burned in an approved incinerator equipped with an afterburner and scrubber. Return cylinders to supplier with any valve outlet plugs or caps secured and valve protection cap in place. Follow federal, state and local regulations. Non-returnable cylinders must not be refilled. Dispose of non-refillable cylinders in accordance with federal, state, and local regulations.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Butyl benzenes
HAZARD CLASS: 3 (flammable), Packing group III
INDENTIFICATION NUMBER: UN2709
REPORTABLE QUANTITIES: None
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): 3, 31(c)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous

chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: N/Av

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: N/Av

S: N/Av

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

FOREWORD INTRODUCTION

1,4-DIETHYLBENZENE

CAS N°: 105-05-5

SIDS Initial Assessment Report

(SIAM 2, Paris, 4-6 July 1994)

Chemical Name: 1,4-Diethylbenzene

CAS No: 105-05-5

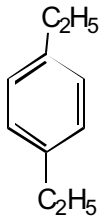
Sponsor Country: Japan

National SIDS Contact Point in Sponsor Country:

Mr. Yasuhisa Kawamura, Ministry of Foreign Affairs, Japan

History: As a high priority chemical for initial assessment, 1,4-Diethylbenzene was selected in the framework of the HPV Programme.
At SIAM-2, conclusion was approved with comments.
Comments at SIAM-2: Rearrangement of the documents.

SIDS INITIAL ASSESSMENT PROFILE

CAS No.	105-05-5
Chemical Name	Benezene, 1,4-diethyl-
Structural Formula	

CONCLUSIONS AND RECOMMENDATIONS

It is currently considered of low potential risk and low priority for further work.

SHORT SUMMARY WHICH SUPPORTS THE REASONS FOR THE CONCLUSIONS AND RECOMMENDATIONS

Exposure

1,4-Diethylbenzene is a volatile liquid. Its production volume is ca. 1,300 tonnes/year in 1990 - 1992 in Japan and 1,200 tonnes/year were exported to the USA. This chemical is used as a solvent in closed systems. This chemical is stable in neutral, acidic or alkaline solution, and is considered to be "not readily biodegradable" (OECD TG 301C; 0 % by BOD; 02 % by GC after 28 days). Experimental BCF values (OECD TG 305) of the chemical are 320 – 629 in carp after 6 weeks.

PECs have been calculated based on a fugacity level III model considering its physico-chemical properties (e.g. molecular weight, water solubility, vapour pressure and partition coefficient). The estimated environmental concentrations were 1.5×10^{-8} mg/l (air), 4.9×10^{-6} mg/l (water), 5.4×10^{-4} mg/kg (soil), 4.6×10^{-3} mg/kg (sediment).

No monitoring data at the work place or the environment have been reported. The chemical is used in closed systems, and no data for consumer use are available. Based on the physico-chemical properties, the total exposed dose indirectly through the environment was estimated to be 8.8×10^{-4} mg/man/day. Also, the daily intake through drinking water is estimated to be 9.7×10^{-6} mg/man/day and through fish is calculated to be 5.7×10^{-4} mg/man/day.

Environment

For the environment, various NOEC and LC_{50} values were gained from test results; 96 h LC_{50} = 1.8 mg/l (acute fish); 24 h EC_{50} = 32 mg/l (acute daphnia); 72 h EC_{50} = 29 mg/l (algae); 21 d NOEC = 0.93 mg/l (long-term daphnia reproduction). As the lowest chronic toxicity result, the 21 d-NOEC (reproduction) for *Daphnia magna* (0.93 mg/l) were adopted. As assessment factor of 100 is applied. Thus the PNEC of 1,4-diethylbenzene is 0.0093 mg/l. Since the PEC is lower than the PNEC, the environmental risk is presumed to be low.

Human Health

The chemical showed no genotoxic effects in bacteria and chromosomal aberration test *in vitro*.

In a combined repeat dose and reproductive/developmental toxicity screening test (OECD TG 422), increases of liver and kidney weights were observed at the dose level of 750 mg/kg/day and 150 mg/kg/day. In relation to the increase of liver weights, increases of incidence of brown colored livers and enlargement of the livers were observed at the highest dose (750 mg/kg/day) with histopathological findings of swelling of liver cells. For reproductive/developmental toxicity end-points, there were no effects observed concerning mating, fertility and oestrus cycle and also for dams during the pregnancy and lactation period. Therefore, the NOEL was 30 mg/kg/day

for repeated dose toxicity and 750 mg/kg/day for reproductive toxicity.

The total exposure dose indirectly through the environment was estimated to be 8.8×10^{-4} mg/man/day. Also, the daily intake through drinking water is estimated as 9.7×10^{-6} mg/man/day and through fish is calculated as 5.7×10^{-4} mg/man/day. For human health, the margins of safety by indirect exposure from fish or drinking water are very large. Therefore, health risk is presumed to be low.

In conclusion, no further testing is needed at present considering its toxicity and exposure levels.

NATURE OF FURTHER WORK RECOMMENDED

This chemical is not a candidate for further work because all SIDS endpoints are sufficient.

FULL SIDS SUMMARY

CAS NO: 105-05-5		SPECIES	PROTOCOL	RESULTS
PHYSICAL-CHEMICAL				
2.1	Melting Point			- 42 °C
2.2	Boiling Point			183 °C (at 1013 hPa)
2.3	Density			4.62 (relative density)
2.4	Vapour Pressure		OECD TG 104	1.054 torr at 25 °C
2.5	Partition Coefficient (Log Pow)		OECD TG 107	4.06 at 25 °C
2.6 A.	Water Solubility		OECD TG 105	17 mg/L at 25 °C
B.	pH			No data available.
	pKa			No data available
2.12	Oxidation: Reduction Potential			No data available.
ENVIRONMENTAL FATE AND PATHWAY				
3.1.1	Photodegradation		Estimated	Direct photodegradation in water $T_{1/2}$ = 9 y
3.1.2	Stability in Water		OECD TG 111	Stable (pH 4.0, 7.0, 9.0)
3.2	Monitoring Data			No data available.
3.3	Transport and Distribution		Fugacity, level 3 Calculated (MNSEM-147S)	In Air 1.5E-8 mg/L In Water 4.9E-6 mg/L In Soil 5.4E-4 mg/kg In Sediment 4.6E-3 mg/kg
3.5	Biodegradation		OECD TG 301C	not readily biodegradable: 0 % (BOD) in 28 days, 0 - 2% (GC) in 28 days
3.6	Bioaccumulation	Carp	OECD TG 305C	BCF: 320 - 629
ECOTOXICOLOGY				
4.1	Acute/Prolonged Toxicity to Fish	*Oryzias latipes*	OECD TG 203	LC_{50} (72hr): 2.5 mg/L LC_{50} (96hr): 1.8 mg/L
4.2	Acute Toxicity to Aquatic Invertebrates (*Daphnia*)	*Daphnia magna*	OECD TG 202	EC_{50} (24hr): 32 mg/l
4.3	Toxicity to Aquatic Plants e.g. Algae	*Selenastrum Capricornutum*	OECD TG 201	EC_{50} (72hr): 29 mg/l
4.5.2	Chronic Toxicity to Aquatic Invertebrates (*Daphnia*)	*Daphnia magna*	OECD TG 202	EC_{50} (21d, Mortality): 2.4 mg/l NOEC(21d, Repro): 0.93 mg/l
4.6.1	Toxicity to Soil Dwelling Organisms			No data available.
4.6.2	Toxicity to Terrestrial Plants			No data available.
(4.6.3)	Toxicity to Other Non-Mammalian Terrestrial Species (Including Birds)			No data available
TOXICOLOGY				
5.1.1	Acute Oral Toxicity	Rat	OECD TG 401	LD_{50} > 2,000 mg/kg
5.1.2	Acute Inhalation Toxicity			No data available.

CAS NO: 105-05-5		SPECIES	PROTOCOL	RESULTS
5.1.3	Acute Dermal Toxicity			No data available.
5.4	Repeated Dose Toxicity	Rat	OECD Combined Test	NOAEL = 30 mg/kg/day
5.5	Genetic Toxicity In Vitro			
A.	Bacterial Test (Gene mutation)	*S. .typhimurium* *E. coli*	OECD Guidelines No.471 and 472 and Guidelines for Screening Mutagenicity Testing of Chemicals (Japan)	Negative (With metabolic activation) Negative (Without metabolic activation)
B.	Non-Bacterial In Vitro Test (Chromosomal aberrations)	CHL cells	OECD Guideline No.473 and Guidelines for Screening Mutagenicity Testing of Chemicals (Japan)	Negative(With metabolic activation) Negative(Without metabolic activation)
5.6	Genetic Toxicity In Vivo			No data available.
5.8	Toxicity to Reproduction	Rat	OECD Combined Test	NOAEL Parental = 750 mg/kg/day NOAEL F1 offspring = 750 mg/kg/day
5.9	Developmental Toxicity/ Teratogenicity	Rat	OECD Combined Test	NOAEL Maternal toxicity = 750 mg/kg/day NOAEL Teratogenicity = 750 mg/kg/day
5.11	Experience with Human Exposure			

SIDS Initial Assessment Report

1. Identity

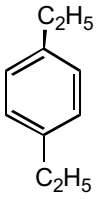
OECD Name: 1,4-Diethylbenzene

Synonym: None

CAS Number: 105-05-5

Empirical Formula: $C_{10}H_{14}$

Structural Formula:



Degree of Purity: 97 %

Major Impurities: 1,3-Diethylbenzene

Essential Additives: None

Physical-chemical Properties:

Melting Point:	-42.85 °C
Boiling Point:	183.75 °C
Density:	4.62
Vapor pressure:	1.054 Torr at 25 °C
Water solubility:	17 mg/L at 25 °C
Log Pow:	4.06 at 25 °C

2. Exposure

2.1 General discussion

1,4-Diethylbenzene is a volatile stable liquid. The production volume was ca. 1,300 tonnes/year in 1990 - 1992 in Japan, and 1,200 tonnes/year were exported to the U.S.A.

This chemical is used as a solvent. Releases to the environment may occur at the production site and specific industrial sites. All disposal wastes are treated by incineration. 1,4-Dethylbenzene seems to be released into water and air from its production sites after biological treatment. No specific monitoring data of the chemical is available. This chemical is stable in neutral, acidic or alkaline solutions, and is classified as "not readily biodegradable".

2.2 Environmental exposure

a) Biodegradability:

If released into water, this substance is not readily biodegraded. In a MITI (I) test, corresponding to the OECD 301C, 0 % degradation during 28 days based on BOD and 0 - 2 % based on GC analysis were measured.

b) Hydrolysis as a function to pH:

The chemical is stable in water at pH 4, 7 and 9 (OECD TG 111).

c) Photodegradability (estimation)

A half-life time of 9 years is estimated for the degradation of 1,4-diethylbenzene in water by direct photodegradation through absorption of UV light (MITI, Japan).

d) Bioaccumulation:

A measured BCF of 320 – 629 in carp (6 weeks at 25 °C) suggests that the potential for bioconcentration in aquatic organisms is low.

e) Estimates of environmental fate, pathway and concentration:

The potential environmental distribution of 1,4-diethylbenzene obtained from a generic fugacity model, Mackay level III, under emission scenarios is shown in Table 1. The results show that when 1,4-diethylbenzene is released into water, the majority of the chemical is likely distributed into soil and sediment

PECs have been calculated based on several models (MNSEM, CHEMCAN, CHEMFRN) considering its physico-chemical properties (e.g. molecular weight, water solubility, vapour pressure and partition coefficient). The estimated concentrations of MNSEM model were 1.5×10^{-8} mg/l (air), 4.9×10^{-6} mg/l (water), 5.4×10^{-4} mg/kg (soil), 4.6×10^{-3} mg/kg (sediment). No monitoring data at work place and environment have been reported. The chemical is used in closed system, and no data for consumer use are available. Based on the physico-chemical properties, the total exposed dose indirectly through the environment was estimated as 8.8×10^{-4}

mg/man/day. Also, the daily intake through drinking water is estimated as 9.7×10^{-6} mg/man/day and through fish is calculated as 5.7×10^{-4} mg/man/day.

Global situation:

Method: MNSEM 147S (Details are shown in Form-1 Annex)
Input data:
Molecular weight: 134.21
Water solubility: 17.00 [mg/l]
Vapor pressure: 1.05 [mmHg]
Log Pow: 4.06
Results: Steady state mass and concentration calculated using MNSEM 147S
Air: 1.5E-08 [mg/l]
Water: 4.9E-06 [mg/l]
Soil: 5.4E-04 [mg/kg dry solid]
Sediment: 4.6E-03 [mg/kg dry solid]
Environmental exposure dose (Concentration in foods)
Inhalation of air: 3.0E-04 [mg/day]
Drinking water: 9.7E-06 [mg/day]
Ingestion of fish: 5.7E-04 [mg/day]
meat: 2.9E-08 [mg/day]
milk: 2.9E-08 [mg/day]
vegetation: 3.5E-06 [mg/day]
Total exposure dose: 8.8E-04 [mg/day]

Table 1: Comparison of calculated environmental concentration using several models.

Model	Air[mg/l]	Water[mg/l]	Soil[mg/kg]	Sediment[mg/kg]
MNSEM	1.5E-08	4.9E-06	5.4E-04	4.6E-03
CHEMCAN2	5.3E-08	3.5E-06	1.0E-04	3.2E-03
CHEMFRAN	5.3E-08	3.6E-06	1.1E-04	3.3E-03

2.3 Consumer Exposure

No data on consumer exposure are available.

2.4 Occupational Exposure

No data on work place monitoring have been reported.

3. Toxicity

3.1 Human Toxicity

a) Acute toxicity

Only one acute toxicity data is available for rat using a limit test according to OECD Test Guideline 401. Rats were administered orally (gavage) at 0 or 2,000 mg/kg.
No deaths occurred for either males or females in the treated groups. As clinical signs, decrease of spontaneous motor activity was observed in both male and female rats and lacrimation was additionally observed in one female rat. No death were observed during the course of the study. All animals gained body weight on day 7 and 14 after administration. No remarkable macroscopical changes were observed in both males and females (MHW, Japan, 1993a). No acute toxicity data are available by inhalation and dermal routes of 1,4-diethylbenzene.

b) Repeated toxicity

There is only one key study on repeated dose toxicity of 1,4-diethylbenzene. This chemical was studied for oral toxicity in rats according to the OECD combined repeated dose and reproductive/developmental toxicity test [OECD TG 422]. As the study was well controlled and conducted according to GLP, this was appropriate to regard as a key study. Male and female SD rats were orally administered (gavage) at doses of 0, 30, 150 and 750 mg/kg/day. In male rats, the administration period was two weeks prior to mating, 2 weeks of mating and 2 weeks after the completion of mating period. In female, in addition to maximum four weeks pre-mating and mating period, they were given through pregnant period until day 3 of post delivery.
The results in clinical observations did not reveal any effects attributable to the administration of test substance and there were no mortality in all groups. Depression of body weight gain observed in both male and female rats receiving 750 mg/kg/day, and food consumption of male rats receiving 750 mg/kg/day was less than those of control until day 7 and thereafter, increases in food consumption were observed in them from Day 28. As a results of hematology, there were no essential effects of test substance.
As the results of blood clinical examination, increases in the BUN and GPT were observed in male rat receiving 150 and 750 mg/kg/day, and increases in total protein, albumin, creatinine and total bilirubin and decrease in glucose were observed in male rats receiving 750 mg/kg/day, suggesting that those changes were due to the effect on kidneys and liver. As the results of organ weight analysis, increases in liver weight were observed in both male and female rats receiving 750 mg/kg/day, moreover increases in kidneys weights were observed in male rats receiving 150 mg/kg/day or more groups. As the gross findings, in relation to increase of liver weights, increases in incidence of brown colored livers or enlargement of the livers were observed in male rats receiving 750 mg/kg/day, and swelling of the liver cells was observed in them, histopathologically. The results described above led to a conclusion that effects of repeated dose toxicity study were considered to appear at 150 mg/kg/day or more in male rats and at 750 mg/kg/day in female rats (MHW, Japan, 1993b). The NOAEL for repeated dose toxicity in rats is considered to be 30 mg/kg/day in males and 150 mg/kg/day in female rats.

c) Reproductive toxicity

1,4-Diethylbenzene was studied for oral toxicity in rats according to the OECD

combined repeated dose and reproductive/developmental toxicity test [OECD TG 422] at doses of 0, 100, 300 and 1,000 mg/kg/day. Although this combined study was designed to investigate reproductive capability in parental generation as well as development in F_1 offspring, parameters to evaluate developmental toxicity were limited to only body weights at day 0 and day 4 after birth, and autopsy findings at day 4.

The results observed in mating, fertility and estrous cycle did not reveal any effects attributable to the administration of test substance. Observation of delivery, all gestation animals delivered of pups, normally and there were not a treatment-related effect throughout the lactation period. The external examination of pups revealed no effects attributable to the administration of test substance. The body weights of fetuses showed the favorably froths until Day 4 of lactation. The necropsy of stillborn, dead pups until Day 4 of lactation and newborns at Day 4 of lactation did not reveal any effects attributable to the administration of test substance. The influences of the test substance on reproductive and developmental toxicity were not observed in both male and female rats receiving 750 mg/kg/day, therefore maximum NOELs were considered to be 750 mg/kg/day in both sexes (MHW, 1993). The NOAEL values for both parental and F_1 offspring in reproductive toxicity are considered to be 750 mg/kg/day. As for developmental toxicity, the NOAEL for F_1 offspring is estimated to be 750 mg/kg/day.

d) Genetic toxicity

Bacterial tests

Reverse gene mutation assays were conducted in line with Guidelines for Screening Mutagenicity Testing of Chemicals (Japan) and OECD Test Guidelines 471 and 472, using the pre-incubation method. This study was well controlled and regarded as a key study.

1,4-Diethylbenzene showed negative results in *Salmonella typhimurium* TA100, TA1535, TA98, TA1537 and *Escherichia coli* WP2 *uvr*A at concentrations up to 50 ug/plate with or without metabolic activation (MHW, 1993c).

Non-bacterial test *in vitro*

A chromosomal aberration test in line with the Guidelines for Screening Mutagenicity Testing of Chemicals (Japan) and OECD Test Guideline 473 was conducted using cultured Chinese Hamster lung (CHL/IU) cells. This study was well controlled and regarded as a key study. The maximum concentration of the chemical was used within no apparent cytotoxic effect in continuous treatment.

Either structural chromosomal aberrations or polyproidy were not recognized up to a maximum concentration of 0.11 and 1.3 mg/ml under conditions of both continuous treatment and short-term treatment, respectively with or without an exogeneous metabolic activation system (MHW, 1993c).

in vivo test

No data are available on *in vivo* genotoxic effects.

e) Other human health related information

None

3.2 Ecotoxicity

1,4-Diethylbenzene has been tested in a limited number of aquatic species (*Selenastrum capricornutum*, *Daphnia magna* and *Oryzias latipes*), according to OECD test guidelines [OECD TG 201, 202, 203, 204 and 211]. Acute and chronic toxicity data to test organisms for 1,4-diethylbenzene are summarized in Table 2. No other ecotoxicological data are available.

Various NOEC and LC_{50} values were gained from above tests; LC_{50} = 1.8 mg/l (acute fish); EC_{50} = 32 mg/l (acute daphnia); EC_{50} = 29 mg/l (algae); NOEC = 0.93 mg/l (long-term daphnia reproduction). The lowest chronic toxicity result (21 d-NOEC, reproduction, for Daphnia magna: 0.93 mg/l) was adopted for the calculation of the PNEC. An assessment factor of 100 is applied. Thus the PNEC of 1,4-diethylbenzene is 0.0093 mg/l. Since the PEC is lower than the PNEC the environmental risk is presumed to be low.

Table 2. Acute and chronic toxicity data of 1,4-diethylbenzene to aquatic organisms.

Species	Endpoint[*1]	Conc. (mg/L)	Reference
Selenastrum capricornutum (algae)	Biomass: EC_{50} (72h)	29 mg/L	MOE, Japan. (1992)
Daphnia magna (water flea)	Mor: LC_{50}(24h) Mor: LC_{50}(21d) Rep: EC_{50}(21d) NOEC(21d)	32 mg/L 2.4 mg/L 1.3 mg/L 0.93 mg/L	
Oryzias latipes (fish, Medaka)	Mor: LC_{50}(24h) Mor: LC_{50}(72h) Mor: LC_{50}(96h)	2.5 mg/L 2.5 mg/L 1.8 mg/L	

Notes: [*1] Mor; mortality, Rep; reproduction.

4. Initial assessment

For the environment, various NOEC and LC_{50} values were gained from test results; LC_{50} = 1.8 mg/l (acute fish); EC_{50} = 32 mg/l (acute daphnia); EC_{50} = 29 mg/l (acute algae); NOEC = 0.93 mg/l (long-term daphnia reproduction). The lowest chronic toxicity result (21 d-NOEC, reproduction, for Daphnia magna: 0.93 mg/l) was adopted for the calculation of the PNEC. An assessment factor of 100 is applied. Thus the PNEC of 1,4-diethylbenzene is 0.0093 mg/l. Since the PEC is lower than the PNEC the environmental risk is presumably low.

The chemical showed no genotoxic effects in bacteria or chromosomal aberrations *in vitro*. In a combined repeat dose and reproductive/developmental toxicity screening test, increases of liver and kidney weights were observed at the dose level of 750 mg/kg/day and 150 mg/kg/day. In relation to the increase of liver weights, increases of incidence of brown colored livers and enlargement of the livers were observed at the highest dose (750 mg/kg/day) with histopathological findings of swelling of liver cells. For reproductive/ developmental toxicity end-points, there were no effects observed concerning mating, fertility and oestrus cycle and also for dams during the pregnancy and lactation period. Therefore, the NOEL was 30 mg/kg/day for repeated dose toxicity and 750 mg/kg/day for reproductive toxicity. The total exposed dose indirectly through the environment was estimated as 8.8×10^{-4} mg/man/day. Also, the daily intake through drinking water is estimated as 9.7×10^{-6} mg/man/day and through fish is calculated as 5.7×10^{-4} mg/man/day. For human health, the margin of safety by indirect exposure from fish or drinking water are very large. Therefore, health risk is presumed to be low.

5. Overall recommendation and initial assessment

5.1 Conclusion

It is currently considered of low potential risk and low priority for further work.

5.2 Recommendation

None

6. REFERENCES

Driesbach, R.R. (1961) Physical Properties of Chemical Compounds. Vol. 3, Am. Chem.Soc., Washington D.C.

EA, Japan (1993) "Investigation of the Ecotoxicological Effects of OECD High Production Volume Chemicals", Office of Health Studies, Environmental Health Department, Environment Agency, Japan (HPV/SIDS Test conducted by EA, Japan)

EA and MITI, Japan (1993) Unpublished Report on Exposure Estimation (HPV/SIDS Test conducted by EA and MITI, Japan)

ECDIN Database (1993)

Lyman, W. J., W. F. Reehl and D. H. Rosenblatt (1981) "Handbook of Chemical Property Estimation Method", McGraw Hill Book Co.

MHW, Japan (1993a) Unpublished Report on Acute Oral Toxicity Test of 1,4-Diethylbenzene. (HPV/SIDS Test conducted by MHW, Japan)

MHW, Japan (1993b) Unpublished Report on Combined Repeat Dose and Reproductive/Developmental Toxicity Screening Test of 1,4-diethylbenzene. (HPV/SIDS Test conducted by MHW, Japan)

MHW, Japan (1993c) Unpublished Report on Mutagenicity Test of 1,4-Diethylbenzene. (HPV/SIDS Test conducted by MHW, Japan)

MITI, Japan: Unpublished data

MITI, Japan (1992) Biodegradation and Bioaccumulation Data of Existing Chemicals based on the CSCL Japan, Edit CITI, Japan (1992)

MITI, Japan (1993) Unpublished Report (1993) (HPV/SIDS Test conducted by MITI, Japan. Test was performed in Chemicals Inspection and Testing Institute, Japan)

REVISED SIDS DOSSIER ON THE HPV CHEMICAL

1,4-Diethylbenzene

CAS No. 105-05-5

Sponsor Country : Japan

DATE: March 2001

S I D S P R O F I L E

1.01 A.	**CAS No.**	105-05-5
1.01 C.	**CHEMICAL NAME (OECD Name)**	1,4-Diethylbenzene
1.01 D.	**CAS DESCRIPTOR**	Not applicable in this case
1.01 G.	**STRUCTURAL FORMULA**	$C_{10}H_{15}$
	OTHER CHEMICAL IDENTITY INFORMATION	
1.5	**QUANTITY**	In Japan, approx 1,300 tonnes in 1990 - 1992, and 1,200 tonnes were exported to the U. S. A.
1.7	**USE PATTERN**	Solvent (100 %)
1.9	**SOURCES AND LEVELS OF EXPOSURE**	1. Amount released from production site to water is negligible in Japan. All leaks and spills are contained and cleaned up in an appropriate manner, i.e., water treatment or incineration. 2. Amount released to air from production site is negligible. 3. Information on consumer exposure is not available.
ISSUES FOR DISCUSSION (IDENTIFY, IF ANY)		

S I D S S U M M A R Y

1, 4-Diethylbenzene

CAS NO: 105-05-5		Information	OECD Study	GLP	Other Study	Estimation Method	Acceptable	SIDS Testing Required
STUDY		**Y/N**	**Y/N**	**Y/N**	**Y/N**	**Y/N**	**Y/N**	**Y/N**
PHYSICAL-CHEMICAL DATA								
2.1	Melting Point	Y	N	N	Y	N	Y	N
2.2	Boiling Point	Y	N	N	Y	N	Y	N
2.3	Density	Y	N	N	Y	N	Y	N
2.4	Vapour Pressure	N						Y
2.5	Partition Coefficient	N						Y
2.6	Water Solubility	Y	N	N	Y	N	Y	N
	pH and pKa values	N						N
OTHER P/C STUDIES RECEIVED								
ENVIRONMENTAL FATE and PATHWAY								
3.1.1	Photodegradation	N						Y
3.1.2	Stability in water	N						Y
3.2	Monitoring data	N						N
3.3	Transport and Distribution	N						N
3.5	Biodegradation	N						Y
3.6	Bioaccumulation	Y	Y	Y	N	N	Y	N
OTHER ENV FATE STUDIES RECEIVED								
ECOTOXICITY								
4.1	Acute toxicity to Fish	N						Y
4.2	Acute toxicity to Daphnia	N						Y
4.3	Toxicity to Algae	N						Y
4.5.2	Chronic toxicity to Daphnia	N						Y
4.6.1	Toxicity to Soil dwelling organisms	N						N
4.6.2	Toxicity to Terrestrial plants	N						N
4.6.3	Toxicity to Birds	N						N
OTHER ECOTOXICITY STUDIES RECEIVED								
TOXICITY								
5.1.1	Acute Oral	N						Y
5.1.2	Acute Inhalation	N						N
5.1.3	Acute Dermal	N						N
5.4	Repeated Dose	N						Y
5.5	Genetic Toxicity *in vitro*							
	. Gene mutation	N						Y
	. Chromosomal aberration	N						Y
5.6	Genetic Toxicity *in vivo*	N						N
5.8	Reproduction Toxicity	N						Y
5.9	Development / Teratogenicity	N						Y
5.11	Human experience	N						N
OTHER TOXICITY STUDIES RECEIVED								

1. GENERAL INFORMATION

1.01 SUBSTANCE INFORMATION

A. CAS-Number 105-05-5

B. Name *(IUPAC name)* Benzene, 1,4-diethyl-

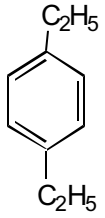
C. Name *(OECD name)* 1,4-Diethylbenzene

D. CAS Descriptor Not applicable

E. EINECS-Number 203-265-2

F. Molecular Formula $C_{10}H_{14}$

G. Structural Formula



H. Substance Group Not applicable

I. Substance Remark None

J. Molecular Weight 134.22

1.02 OECD INFORMATION

A. Sponsor Country: Japan

B. Lead Organisation:

Name of Lead Organisation:
Ministry of Health and Welfare (MHW)
Ministry of International Trade and Industry (MITI)
Environment Agency (EA)

Contact person:
Mr. Yasuhisa Kawamura
Director
Second International Organization Bureau
Ministry of Foreign Affairs

Address:
2-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100, Japan
TEL 81-3-3581-0018
FAX 81-3-3503-3136

C. Name of responder

Name: Same as above contact person

1.1 GENERAL SUBSTANCE INFORMATION

A. Type of Substance

element **[ ]**; inorganic **[ ]**; natural substance **[ ]**;
organic **[X]**; organometallic **[ ]**; petroleum product **[ ]**

B. Physical State

gaseous **[ ]**; liquid **[X]**; solid **[ ]**

C. Purity 97 % (weight/weight)

1.2 SYNONYMS

1.3 IMPURITIES Name: 1,3-Diethylbenzene
Value: unknown

1.4 ADDITIVES None

1.5 QUANTITY

Location	Production(tonnes)	Date
Japan	1,300/year	1990-1992
export to U.S.A	1,200/year	1990-1992

Reference: MITI, Japan

1.6 LABELLING AND CLASSIFICATION

Labelling None

Classification None

1.7 USE PATTERN

A. General

Type of Use:	**Category:**
(a) main industry use	Solvent (Closed system) 100 %

Remarks: None

Reference: MITI, Japan

B. Uses in Consumer Products None

Function	Amount present	Physical state

1.8 OCCUPATIONAL EXPOSURE LIMIT VALUE

None

1.9 SOURCES OF EXPOSURE

Source:	Media of release: Air from a production site Quantities per media: Negligible small
Remarks:	
Reference:	MITI, Japan

1.10 ADDITIONAL REMARKS

A.	**Options for disposal**	Incineration
	Reference:	MITI, Japan
B.	**Other remarks**	None

2. PHYSICAL-CHEMICAL DATA

2.1 MELTING POINT

Value:	- 42.85 °C
Decomposition:	Yes **[ ]** No **[X]** Ambiguous **[ ]**
Sublimation:	Yes **[ ]** No **[X]** Ambiguous **[ ]**
Method:	Unknown
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Remarks:	None
Reference:	API

2.2 BOILING POINT

Value:	183.75 °C
Pressure:	at 1013 hPa
Decomposition:	Yes **[ ]** No **[X]** Ambiguous **[ ]**
Method:	Unknown
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Remarks:	None
Reference:	API

2.3 DENSITY (Relative density)

Type:	Bulk density **[ ]**; Density **[ ]**; Relative Density **[X]**
Value:	4.62
Temperature:	Unknown
Method:	Unknown
GLP:	Yes [ ] No **[ ]** ? **[X]**
Remarks:	None
Reference:	ECDIN database

2.4 VAPOUR PRESSURE

Value:	1.054 Torr
Temperature:	25 °C
Method:	calculated **[ ]**; measured **[X]** OECD Test Guideline 104 Static Method
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Remarks:	
Reference:	Driesbach, R.R. (1961)

2.5 PARTITION COEFFICIENT $\log_{10}P_{ow}$

Log Pow:	4.06
Temperature:	25 °C
Method:	calculated **[ ]**; measured **[X]** OECD Test Guideline 107
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Remarks:	None
Reference:	MITI, Japan (1993)

2.6 WATER SOLUBILITY

A. Solubility

(a) **Preferred result**

Value:	17 mg/l
Temperature:	25°C
Description:	Miscible**[ ]**; Of very high solubility **[ ]**; Of high solubility **[ ]**; Soluble **[ ]**; Slightly soluble **[ ]**; Of low solubility **[X]**; Of very low solubility **[ ]**; Not soluble **[ ]**
Method:	Unknown
GLP:	Yes **[ ]** No **[ ]** ? **[X]**
Remarks:	
Reference:	Company data

B. pH Value, pKa Value

Not applicable

2.7 FLASH POINT

Value:	57 °C
Type of test:	Closed cup **[X]**; Open cup **[ ]**; Other **[ ]**
Method:	Unknown
GLP:	Yes **[ ]** No **[X]** ? **[ ]**
Remarks:	
Reference:	Company data

2.8 AUTO FLAMMABILITY

Not applicable

2.9 FLAMMABILITY

No studies located

2.10 EXPLOSIVE PROPERTIES

No studies located

2.11 OXIDIZING PROPERTIES

No studies located

2.12 OXIDATION: REDUCTION POTENTIAL

No studies located

2.13 ADDITIONAL DATA

A. Partition co-efficient between soil/sediment and water (Kd)

No studies located

B. Other data

None

3. ENVIRONMENTAL FATE AND PATHWAYS

3.1 STABILITY

3.1.1 PHOTODEGRADATION

Type:	Air **[ ]**; Water **[X]**; Soil **[ ]**; Other **[ ]**	
Light source:	Sun light **[X]**; Xenon lamp **[ ]**; Other **[ ]**	
Light spectrum:		
Relative intensity:		
Spectrum of substance:	epsilon = 4.70 at 300 nm	
Concentration of Substance:		
Estimated parameter for calculation:		
	Quantum yield	0.01
	Concentration	5×10^{-5} M
	Depth of water body	500 cm
	Conversion rate	6.023×10^{20}
Results:	Degradation rate	1.22×10^{-13} mol/l/s
	Half life	9.00 years
Reference	Lyman, W. J. et al. (1981)	

3.1.2 STABILITY IN WATER

Type:	Abiotic (hydrolysis) **[X]**; biotic (sediment)**[ ]**
Half life:	Not hydrolysed at pH 4, 7 and 9
Method:	OECD TG 111
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	1,4-Diethylbenzene
Reference:	MITI, Japan (1993)

3.1.3 STABILITY IN SOIL

No studies located

3.2 MONITORING DATA (ENVIRONMENT)

No studies located

3.3 TRANSPORT AND DISTRIBUTION BETWEEN ENVIRONMENTAL COMPARTMENT INCLUDING ESTIMATED ENVIRONMENTAL CONCENTRATIONS AND DISTRIBUTION PATHWAY

3.3.1 TRANSPORT

No studies located

3.3.2 THEORETICAL DISTRIBUTION (FUGACITY CALCULATION)

Media:	Air-biota **[ ]**; Air-biota-sediment-soil-water [ ]; Soil-biota **[ ]**; Water-air **[ ]**; Water-biota **[ ]**; Water-soil Other **[X]** (Air-soil-water-sediment)
Method:	Fugacity level I **[ ]**; Fugacity level II **[ ]**; Fugacity level **III [ ]**; Fugacity level IV **[ ]**; Other(calculation) **[X]**;

Other(measurement) **[ ]**

Results: Steady state mass and concentration calculated using MNSEM 147S

Air:	1.5E-08 [mg/l]
Water:	4.9E-06 [mg/l]
Soil:	5.4E-04 [mg/kg dry solid]
Sediment:	4.6E-03 [mg/kg dry solid]

Exposure dose

Inhalation of air:	3.0E-04 [mg/day]
Drinking water:	9.7E-06 [mg/day]
Ingestion of fish:	5.7E-04 [mg/day]
Meat:	2.9E-08 [mg/day]
milk:	2.9E-08 [mg/day]
vegetation:	3.5E-06 [mg/day]
Total exposure dose:	8.8E-04 [mg/day]

Remarks: Input data:

Molecular weight:	134.21
Water solubility:	17.00 [mg/l]
Vapor pressure:	1.05 [mmHg]
Log Pow:	4.06

MNSEM 147S is a slightly revised version of MNSEM 145I.
1. addition of air particle compartment to air phase
2. execution of calculation on a spreadsheet program

Comparison of calculated environmental concentration using several methods (Japanese environmental conditions are applied to the calculations.)

Model	Air[mg/l]	Water[mg/l]	Soil[mg/kg]	Sediment[mg/kg]
MNSEM	1.5E-08	4.9E-06	5.4E-04	4.6E-03
CHEMCAN2	5.3E-08	3.5E-06	1.0E-04	3.2E-03
CHEMFRAN	5.3E-08	3.6E-06	1.1E-04	3.3E-03

Reference: EA and MITI, Japan (1993)

3.4 IDENTIFICATION OF MAIN MODE OF DEGRADABILITY IN ACTUAL USE

No studies located

3.5 BIODEGRADATION

Type: aerobic **[X]**; anaerobic **[ ]**

Inoculum: adapted **[ ]**; non-adapted **[X]**;
activated sludge, 30 mg/l as suspended solid

Concentration of the chemical: 100 mg/l related to COD **[ ]**; DOC **[ ]**; Test substance **[X]**;

Medium: water **[ ];** water-sediment **[ ];** soil **[ ];** sewage treatment others [X] (Japanese standard activated sludge)

Degradation: Degree of degradation after 28 days
0, 0 and 0 % from BOD
2, 0 and 0 % from GC analysis

Results: Readily biodeg. **[ ];** Inherently biodeg. **[ ]**; under test condition no biodegradation observed **[X]**, Other **[ ]**

Method:	OECD Test Guideline 301C
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	1,4-Diethylbenzene, purity: > 95 %
Remarks:	None
Reference:	MITI, Japan (1993)

3.6 BOD_5,COD OR RATIO BOD_5/COD

Not applicable

3.7 BIOACCUMULATION

Species:	Carp
Exposure period:	6 weeks
Temperature:	25 °C
Concentration:	(1) 20 µg/l (2) 2 µg/l
BCF:	(1) 362 - 598 (2) 320 - 629
Elimination:	Yes **[ ]** No **[ ]** ? **[ ]**
Method:	OECD TG 305C
Type of test:	**[ ]** calculated; **[X]** measured static **[ ]**; semi-static **[ ]**; flow-through **[X]**; other **[ ]**
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	1,4-Diethylbenzene, Purity: > 95 %
Remarks:	None
Reference:	MITI, Japan (1992)

3.8 ADDITIONAL REMARKS

A. Sewage treatment None

B. Other information None

4. ECOTOXICOLOGICAL DATA

4.1 ACUTE/PROLONGED TOXICITY TO FISH

Type of test:	static **[ ]**; semi-static **[X]**; flow-through **[ ]**; other **[ ]** open-system **[X]**; closed-system **[ ]**
Species:	*Oryzias latipes*
Exposure period:	96 hr
Results:	$LC_{50\ (24h)}$ = 2.5 mg/l (95% confidence level: 1.8-3.4 mg/l) $LC_{50\ (48h)}$ = 2.5 mg/l (95% confidence level: 1.8-3.4 mg/l) $LC_{50\ (72h)}$ = 2.5 mg/l (95% confidence level: 1.9-3.2 mg/l) $LC_{50\ (96h)}$ = 1.8 mg/l (95% confidence level: 1.0-3.2 mg/l) NOEC = LOEC =
Analytical monitoring:	Yes **[ ]** No **[X]** ? **[ ]**
Method:	OECD Test Guideline 203 (1981)
GLP:	Yes **[ ]** No **[X]** ? **[ ]**
Test substance:	1,4-Diethylbenzene, Purity = 99.9 %
Remarks:	A group of 10 fishes were exposed to 5 nominal concentrations (0.56-5.6 mg/l), control of Tween 80 (5.6 mg/l) and laboratory water control.
Reference:	EA, Japan (1992)

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

A. Daphnia

Type of test:	static **[X]**; semi-static **[ ]**; flow-through **[ ]**; other **[ ]**; open-system **[X]**; closed-system **[ ]**
Species:	Daphnia magna
Exposure period:	24 hrs
Results:	$EC_{50\ (24h)}$ = 32 mg/l (95% confidence level: 28-37 mg/l) $EC_{50\ (48h)}$ = NOEC = LOEC =
Analytical monitoring:	Yes **[ ]** No **[X]** ? **[ ]**
Method:	OECD Test Guideline 202 (1984)
GLP:	Yes **[ ]** No **[X]** ? **[ ]**
Test substance:	1,4-Diethylbenzene, purity: = 99.9 %
Remarks:	20 daphnids (4 replicates; 5 organisms per replicate) were exposed to 5 nominal concentrations (10-100 mg/l), control of DMSO:HCO-40 = 9:1 (100 mg/l) and laboratory water control.
Reference:	EA, Japan (1992)

B. Other aquatic organisms

C.

No studies located

4.3 TOXICITY TO AQUATIC PLANTS e.g. Algae

Species:	Selenastrum capricornutum ATCC 22662
End-point:	Biomass **[X]**; Growth rate **[ ]**; Other **[ ]**
Exposure period:	72 hours
Results:	Biomass: $EC_{50\ (72h)}$ = 29 mg/l

NOEC =
LOEC =

Analytical monitoring: Yes **[ ]** No **[X]** ? **[ ]**
Method: OECD Test Guideline 201 (1984)
open-system **[**X**]**; closed-system **[ ]**
GLP: Yes **[ ]** No **[X]** ? **[ ]**
Test substance: 1,4-Diethylbenzene, purity = 99.9 %
Remarks: The EC_{50} values were calculated based on 4 nominal concentrations (17-100 mg/l), ethanol control (100 mg/l) and laboratory water control.
Reference: EA, Japan (1992)

4.4 TOXICITY TO BACTERIA

No studies located

4.5 CHRONIC TOXICITY TO AQUATIC ORGANISMS

4.5.1. CHRONIC TOXICITY TO FISH

No studies located

4.5.2. CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

Type of test: static **[ ]**; semi-static **[X]**; flow-through **[ ]**; other **[ ]**;
End-point: Mortality **[X]**; Reproduction rate **[X]**; Other **[ ]**
Exposure period: 21 days
Results:
Mortality: LC_{50} (24 h) = 7.2 mg/l (95% confidence level: 5.4-9.8 mg/l)
LC_{50} (48 h) = 6.0 mg/l (95% confidence level: 4.5-8.0 mg/l)
LC_{50} (96 h) = 4.2 mg/l (95% confidence level: 3.2-5.4 mg/l)
LC_{50} (7 d) = 3.2 mg/l (95% confidence level: 2.4-4.1 mg/l)
LC_{50} (14 d) = 2.6 mg/l (95% confidence level: 1.9-3.5 mg/l)
LC_{50} (21 d) = 2.4 mg/l (95% confidence level: 1.8-3.2 mg/l)
Reproduction: EC_{50} (14 d) = 1.1 mg/l (95% confidence level: 0.66-1.7 mg/l)
EC_{50} (21 d) = 1.3 mg/l (95% confidence level: 0.97-1.8 mg/l)
NOEC = 0.93 mg/l ($p < 0.05$)
LOEC = 3.0 mg/l ($p < 0.05$)
Analytical monitoring: Yes **[ ]** No **[X]** ? **[ ]**
Method: OECD Test Guideline 202 (1984)
GLP: Yes **[ ]** No **[X]** ? **[ ]**
Test substance: 1,4-Diethylbenzene, purity = 99.9 %
Remarks: 40 daphnids (4 replicates; 10 organisms per replicate) were exposed to 5 nominal concentrations (0.3-30 mg/l), control of DMSO:HCO-40 = (:1 (100 mg/l) and laboratory water control.
Reference: EA, Japan (1992)

4.6 TOXICITY TO TERRESTRIAL ORGANISMS

4.6.1 TOXICITY TO SOIL DWELLING ORGANISMS

No studies located

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

No studies located

4.6.3 TOXICITY TO OTHER NON MAMMALIAN TERRESTRIAL SPECIES (INCLUDING AVIAN)

No studies located

4.7 BIOLOGICAL EFFECTS MONITORING (INCLUDING BIOMAGNIFICATION)

No studies located

4.8 BIOTRANSFORMATION AND KINETICS IN ENVIRONMENTAL SPECIES

No studies located

4.9 ADDITIONAL REMARKS

None

5. TOXICITY

5.1 ACUTE TOXICITY

5.1.1 ACUTE ORAL TOXICITY

Type : LD_0 **[ ]**; LD_{100} **[ ]**; LD_{50} **[X]**; LDL_0 **[ ]**; Other **[ ]**
Species/strain: Rat (Crj:CD(SD))
Value : > 2,000 (mg/kg) for male or female
Method: OECD Test Guideline 401
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: 1,4-Diethylbenzene, purity: 97.2 %
Remarks: As clinical signs, decrease of spontaneous motor activity was observed in both male and female rats and lacrimation was additionally observed in one female rat. No death were observed during the course of the study. All animals gained body weight on day 7 and 14 after administration. No remarkable macroscopical changes were observed in both males and females.
Reference: MHW, Japan (1993a)

5.1.2 ACUTE INHALATION TOXICITY

No studies located

5.1.3 ACUTE DERMAL TOXICITY

No studies located

5.1.4 ACUTE TOXICITY, OTHER ROUTES OF ADMINISTRATION

No studies located

5.2 CORROSIVENESS/IRRITATION

5.2.1 SKIN IRRITATION/CORROSION

No studies located

5.2.2 EYE IRRITATION/CORROSION

No studies located

5.3 SKIN SENSITISATION

No studies located

5.4 REPEATED DOSE TOXICITY

Species/strain: Rat (Crj:CD(SD))
Sex: Female **[ ]**; Male **[ ]**; Male/Female **[X]**; No data **[ ]**
Route of Administration: oral (gavage)
Exposure period: Male: 44 days including 14 days before mating
Female: from 14 days before mating to day 3 of lactation
Frequency of treatment: 7 days/week

Post exposure observation period:
Dose: 0, 30, 150 or 750 mg/kg (12 animals /group)
Control group: Yes **[X]**; No **[ ]**; No data **[ ]**;
Concurrent no treatment **[ ]**; Concurrent vehicle **[X]**;
Historical **[ ]**
NOEL: 30 mg/kg/day
LOEL: 150 mg/kg/day
Results: The results in clinical observations did not reveal any effects attributable to the administration of test substance and there were no mortality in all groups. Depression of body weight gain observed in both male and female rats receiving 750 mg/kg/day, and food consumption of male rats receiving 750 mg/kg/day was less than those of control until day 7 and thereafter, increases in food consumption were observed in them from Day 28. As a results of hematology, there were no essential effects of test substance. As the results of blood clinical examination, increases in the BUN and GPT were observed in male rat receiving 150 and 750 mg/kg/day, a and increases in total protein, albumin, creatinine and total bilirubin and decrease in glucose were observed in male rats receiving 750 mg/kg/day, suggesting that those changes were due to the effect on kidneys and liver.
As the results of organ weight analysis, increases in liver weight were observed in both male and female rats receiving 750 mg/kg/day, moreover increases in kidneys weights were observed in male rats receiving 150 mg/kg/day or more groups. As the gross findings, in relation to increase of liver weights, increases in incidence of brown colored livers or enlargement of the livers were observed in male rats receiving 750 mg/kg/day, and swelling of the liver cells was observed in them, histopathologically.
The results described above led to a conclusion that effects of repeated dose toxicity study were considered to appear at 150 mg/kg/day or more in male rats and at 750 mg/kg/day in female rats, and maximum NOELs were considered to be 30 mg/kg/day in males and to be 150 mg/kg/day in females.
Method: OECD Combined Repeat dose and Reproductive/Developmental Toxicity Test (1992)
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: Commercial, purity: 97.2 %
Reference: MHW, Japan (1993b)

5.5 GENETIC TOXICITY IN VITRO

A. BACTERIAL TEST

(a)
Type : Bacterial reverse mutation assay
System of testing:
Species/strain: *S. typhimurium* TA 98, TA 100, TA 1535, TA 1537, TA 1539
E. coli WP2 uvrA
Concentration: 0, 2.4 - 78.12 µg/plate
Metabolic activation: With **[ ]**; Without **[ ]**; With and Without **[X]**;
No data **[ ]**
Results:
Cytotoxicity conc: With metabolic activation: 50 µg/plate
Without metabolic activation: 50 µg/plate
Precipitation conc:
Genotoxic effects:

	+	?	-
With metabolic activation:	**[ ]**	**[ ]**	**[X]**
Without metabolic activation:	**[ ]**	**[ ]**	**[X]**

Method: Japanese Guideline for Screening Mutagenicity testing of chemicals

GLP: Yes **[X]** No **[ ]** ? **[ ]**
Teat substance: Commercial, purity: 97.2 %
Remarks: Procedure: Pre-incubation.
Plates/test: 3
Activation system: Liver S-9 fraction from Phenobarbital and 5,6-Benzoflavone pretreated male SD rats with NADPH-generating system
Media:Histidine selective
No. replicates: 2
Reference: MHW, Japan (1993c)

B. NON-BACTERIAL IN VITRO TEST

Type : Cytogenetics Assay
System of testing: Species/strain: Chinese hamster CHL cells
Concentration: Incubated with 0, 0.03 - 0.11 mg/ml (-S9)
0, 0.33 - 1.30 mg/ml (+S9)
Metabolic activation: With **[ ]**; Without **[ ]**; With and Without **[X]**; No data **[ ]**
Results:
Cytotoxicity conc: With metabolic activation: 1.30 mg/ml
Without metabolic activation: 0.11 mg/ml
Precipitation conc:
Genotoxic effects: + ? -
With metabolic activation: **[ ] [ ] [X]**
Without metabolic activation: **[ ] [ ] [X]**
Method: Japanese Guideline for Screening Mutagenicity testing of chemicals
GLP: Yes **[X]** No **[ ]** ? **[ ]**
Test substance: Commercial, purity 97.2 %
Remarks: Plates/test:2
Activation system: S-9 fraction from the liver of Phenobarbital and 5,6-Benzoflavone induced male SD derived rats with NADPH-generating system
No. replicates: 1
Reference: MHW, Japan (1993c)

5.6 GENETIC TOXICITY IN VIVO

No studies located

5.7 CARCINOGENICITY

No studies located

5.8 TOXICITY TO REPRODUCTION

Type: Fertility **[ ]**; One generation study **[ ]**; Two generation study **[ ]**; Other **[X]**
Species/strain: Rat slc:SD
Sex: Female **[ ]**; Male **[ ]**; Male/Female **[X]**; No data **[ ]**
Route of Administration: Oral (gavage)
Exposure period: Male: 44 days including 14 days before mating
Female: from 14 days before mating to day 3 of lactation
Frequency of treatment: 7 days/week
Postexposure observation period:
Premating exposure period: male: 14 days, female: 14 days
Duration of the test;
Doses: 0, 30, 150, or 750 mg/kg (12 /animals /sex/ group)

Control group:	Yes **[X]**; No **[ ]**; No data **[ ]**; Concurrent no treatment **[ ]**; Concurrent vehicle **[X]**; Historical **[ ]**
NOEL Parental :	= 750 mg/kg/day
NOEL F1 Offspring:	= 750 mg/kg/day
NOEL F2 Offspring:	N/A
Results:	The results observed in mating, fertility and estrous cycle did not reveal any effects attributable to the administration of test substance. Observation of delivery, all gestation animals delivered of pups, normally and there were not a treatment-related effect throughout the lactation period. The external examination of pups revealed no effects attributable to the administration of test substance. The body weights of fetuses showed the favorably froths until Day 4 of lactation. The necropsy of stillborn, dead pups until Day 4 of lactation and newborns at Day 4 of lactation did not reveal any effects attributable to the administration of test substance. The influences of test substance on reproductive and developmental toxicity were not observed in both male and female rats receiving 750 mg/kg/day, therefore maximum NOELs were considered to be 750 mg/kg/day in both sexes.
Method:	OECD Combined Repeated Dose and Reproductive/Developmental toxicity Test
GLP:	Yes **[X]** No **[ ]** ? **[ ]**
Test substance:	Commercial, purity 97.2 %
Remarks:	None
Reference:	MHW, Japan (1993b)

5.9 DEVELOPMENTAL TOXICITY/ TERATOGENICITY

No studies located

5.10 OTHER RELEVANT INFORMATION

A. Specific toxicities

No studies located

B. Toxicodynamics, toxicokinetics

No studies located

5.11 EXPERIENCE WITH HUMAN EXPOSURE

No studies located

6. REFERENCES

Driesbach, R.R. (1961) Physical Properties of Chemical Compounds. Vol. 3, Am. Chem.Soc., Washington D.C.

EA, Japan (1993) "Investigation of the Ecotoxicological Effects of OECD High Production Volume Chemicals", Office of Health Studies, Environmental Health Department, Environment Agency, Japan (HPV/SIDS Test conducted by EA, Japan)

EA and MITI, Japan (1993) Unpublished Report on Exposure Estimation (HPV/SIDS Test conducted by EA and MITI, Japan)

ECDIN Database (1993)

Lyman, W. J., W. F. Reehl and D. H. Rosenblatt (1981) "Handbook of Chemical Property Estimation Method", McGraw Hill Book Co.

MHW, Japan (1993a) Unpublished Report on Acute Oral Toxicity Test of 1,4-Diethylbenzene. (HPV/SIDS Test conducted by MHW, Japan)

MHW, Japan (1993b) Unpublished Report on Combined Repeat Dose and Reproductive/ Developmental Toxicity Screening Test of 1,4-diethylbenzene. (HPV/SIDS Test conducted by MHW, Japan)

MHW, Japan (1993c) Unpublished Report on Mutagenicity Test of 1,4-Diethylbenzene. (HPV/SIDS Test conducted by MHW, Japan)

MITI, Japan: Unpublished data

MITI, Japan (1992) Biodegradation and Bioaccumulation Data of Existing Chemicals Based on the CSCL Japan, Edit CITI, Japan (1992)

MITI, Japan (1993) Unpublished Report (1993) (HPV/SIDS Test conducted by MITI, Japan. Test was performed in Chemicals Inspection and Testing Institute, Japan)

Section 1 - Chemical Product and Company Identification

MSDS Name: 2,4-Dimethylphenol, 99%
Catalog Numbers: AC408450050, AC408450250, AC408451000
Synonyms: 2,4-Xylenol; 4,6-DImethylphenol Benzene; 1-Hydroxy-2,4-Dimethyl Benzene; M-Xylenol.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
105-67-9	2,4-Dimethylphenol	99	203-321-6

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless or almost colorless crystals.
Danger! Causes eye and skin burns. Causesdigestive and respiratory tract burns. Harmful if swallowed orabsorbed through the skin. May cause kidney damage.
Target Organs: Kidneys, respiratory system,gastrointestinal system, eyes, skin.

Potential Health Effects

Eye: Causes eye burns.
Skin: Harmful if absorbed through the skin. Causes skin burns.
Ingestion: Harmful if swallowed. Causes gastrointestinal tract burns. A case of fatal xylenol ingestion by a long stay mental hospital patient is described. Clinical course was similar to that observed in other phenolic poisonings with active bowel sounds, nausea, vomiting, severe metabolic acidosis, hypotension, and cardiac and renal failure.
Inhalation: Causes chemical burns to the respiratory tract.
Chronic: May cause kidney damage. Chronic exposure may cause effects similar to those of acute exposure.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid immediately.
Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.
Ingestion: If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Dust from this material can form explosive organic dust cloud.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, or water spray. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray.
Flash Point: 96 deg C (204.80 deg F)
Autoignition Temperature: Not available.
Explosion Limits, Lower:1.40 vol %
Upper: Not available.
NFPA Rating:(estimated) Health: 3; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up or absorb material, then place into a suitable clean, dry, closed container for disposal. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Do not breathe dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Keep container tightly closed.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store in metal containers.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
2,4-Dimethylphenol	none listed	none listed	none listed

OSHA Vacated PELs: 2,4-Dimethylphenol: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Crystals

Appearance: colorless or almost colorless
Odor: Characteristic phenolic odor.
pH: Not available.
Vapor Pressure: 10 mm Hg @92.3
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 211 deg C
Freezing/Melting Point:21-26 deg C
Decomposition Temperature: Not available.
Solubility: 0.5% (25癈)
Specific Gravity/Density:.9700 g/cm3
Molecular Formula:C8H10O
Molecular Weight:122.17

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Dust generation, excess heat.
Incompatibilities with Other Materials: Bases - acid chlorides - acid anhydrides - oxidizing agents - corrodes steel - brass - copper - copper alloys.
Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Has not been reported

Section 11 - Toxicological Information

RTECS#:
CAS# 105-67-9:ZE5600000
LD50/LC50:
CAS# 105-67-9:
Oral, mouse: LD50 = 809 mg/kg;
Oral, rat: LD50 = 3200 mg/kg;
Skin, rat: LD50 = 1040 mg/kg;
.

Carcinogenicity:
CAS# 105-67-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: Terrestrial: Would adsorb moderately to soil. It is reported to have been biodegraded in soil in 4 days at 19 deg C. Aquatic: May adsorb moderately to sediment and will be readily biodegradable. Atmospheric: Should degrade by reaction with photochemically produced

hydroxyl radicals (half-life 8 hr). Expected to slightly bioconcentrate.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classifiedas a hazardous waste.US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3.Additionally, waste generators must consult state and local hazardous waste regulations toensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 105-67-9: wastenumber U101.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	TOXIC SOLIDS, CORROSIVE, ORGANIC, N.O.S.	Toxic Solid, Corrosive, Organic, N.O.S.
Hazard Class:	6.1	6.1
UN Number:	UN2928	UN2928
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 105-67-9 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 105-67-9: 100 lb final RQ; 45.4 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 105-67-9: immediate.
Section 313
This material contains2,4-Dimethylphenol (CAS# 105-67-9, 99%),which is subject to thereporting requirements of Section 313 of SARA Title III and 40 CFR
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this productare listed as Hazardous Substances under the CWA. CAS# 105-67-9 is listed as a Priority Pollutant under the Clean Water Act.CAS# 105-67-

9 is listed as a Toxic Pollutant under the Clean WaterAct.

OSHA:

None of the chemicals in this productare considered highly hazardous by OSHA.

STATE

CAS# 105-67-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T C N

Risk Phrases:

R 34 Causes burns.
R 24/25 Toxic in contact with skin and if swallowed.
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face pr otection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 105-67-9: No information available.

Canada - DSL/NDSL

CAS# 105-67-9 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of E, D1A.

This product has been classified in accordance with the hazardcriteria of the Controlled Products Regulations and the MSDScontains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 105-67-9 is not listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 4/16/1999
Revision #4 Date: 1/09/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 106-42-3
Date: 04/17/2007

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: P-XYLENE SYNONYMS: P-Xylol, 1,4-Dimethylbenzene

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	OSHA PEL	MAC	Other STEL
P-XYLENE	C8H10	106-42-3	99+%	100	100	100	150

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.
Can form explosive mixtures with air.
Can cause skin and respiratory track irritation.
May cause irritation to the eyes and mucous membranes.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation, Ingestion

ACUTE EFFECTS: Inhalation of vapors may cause pulmonary edema, circulatory collapse, damage to upper respiratory tract, coughing, difficulty breathing and choking.Symptoms include burning sensation, coughing, wheezing, shortness of breath, headache, nausea, and vomiting.May cause pulmonary edema, fainting, convulsions and coma.Skin contact can cause defatting and dermatitis.Eye contact may result in destruction of eye tissue.Ingestion irritates the digestive tract and results in systemic effects from absorption.

CHRONIC EFFECTS: Kidney and liver damage.Blood effects.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Liver, kidney, skin, and central nervous system diseases or disorders.

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - No
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air.If breathing has stopped, give artificial respiration.If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes.Do not allow victim to rub or keep eyes tightly shut.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Never give anything by mouth to an unconscious person.If ingested, have that conscious and alert person drink 1 to 2 glasses of water. Do not induce vomiting.If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration to the victim.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: 25 deg.C

AUTOIGNITION TEMPERATURE: 496 deg.C

FLAMMABLE LIMITS: Vol.%

LOWER: 1.1
UPPER: 6.6

EXTINGUISHING MEDIA: Carbon dioxide, foam, or dry chemical.Water is ineffective in putting out a fire, but should be used for cooling fire exposed cylinders.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing.Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide may be given off during combustion.

UNUSUAL FIRE AND EXPLOSION HAZARDS: May form explosive mixture in air.Dangerous fire hazard and moderate explosion hazard when heated.Vapors may travel a considerable distance to the source of ignition and flash back.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area.Remove leaking cylinder to exhaust hood or safe outdoor

area.Shut off source if possible and remove source of heat.

SPECIALIZED EQUIPMENT: Absorb small spills using a solid adsorbent such as vermiculite.Use non-sparking tools.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling.Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas.Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Safety glasses, Goggles.

SKIN PROTECTION: Protective gloves.

RESPIRATORY PROTECTION: In case of leakage, use self-contained breathing apparatus.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.Use explosion-proof ventilation equipment.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Mild aromatic odor.

PHYSICAL PRESSURE: Gas

VAPOR PRESSURE: 9.0 mm Hg

VAPOR DENSITY (AIR=1): 3.7

BOILING POINT (C): 138

SOLUBILITY IN WATER: @25 deg.C: 162 mg/L

SPECIFIC GRAVITY (H2O=1): @20 deg.C: 0.857

EVAPORATION RATE: N/Av

ODOR THRESHOLD: 2.1 ppm

10. STABILITY AND REACTIVITY

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas.Storage near a heat source.

MATERIALS TO AVOID: Oxidizing agents.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): 9100 ppm, rat 1 hour.

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.Waste material may be burned in a controlled manner in an approved incinerator.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Xylenes
HAZARD CLASS: 3 (flammable)
INDENTIFICATION NUMBER: UN1307
REPORTABLE QUANTITIES: 1000 lb.
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): Class 3, 31(c)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 203-396-5

NUMBER IN ANNEX 1 OF DIR 67/548: Material is listed in annex 1.

EU CLASSIFICATION: N/Av

R: 10-20/21-38

S: 25

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

Material Safety Data Sheet
4-Chlorotoluene, 98%

ACC# 55349

Section 1 - Chemical Product and Company Identification

MSDS Name: 4-Chlorotoluene, 98%
Catalog Numbers: AC150210000, AC150210010, AC150210050
Synonyms: p-Tolylchloride; 1-Chloro-4-methylbenzene; p-Chlorotoluene.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
106-43-4	4-Chlorotoluene	98.0	203-397-0

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colourless. Flash Point: 121 deg F.
Warning! Flammable liquid and vapor. Causes eye and skin irritation. Causes digestive and respiratory tract irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause central nervous system depression.
Target Organs: None.

Potential Health Effects

Eye: Causes eye irritation.
Skin: Causes skin irritation.
Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.
Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Flammable liquid and vapor.
Extinguishing Media: In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam.
Flash Point: 121e deg F (49.44 deg C)
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 1; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Avoid contact with skin and eyes. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep away from heat, sparks and flame. Avoid ingestion and inhalation. Use with adequate ventilation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from heat, sparks, and flame. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
4-Chlorotoluene	none listed	none listed	none listed

OSHA Vacated PELs: 4-Chlorotoluene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colourless
Odor: None reported.
pH: Not available.
Vapor Pressure: 10 mm Hg @ 45 C
Vapor Density: 4.38
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 162 deg C
Freezing/Melting Point:7 deg C
Decomposition Temperature: Not available.
Solubility: Slightly soluble in water.
Specific Gravity/Density:1.070
Molecular Formula:C7H7Cl
Molecular Weight:126.502

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: High temperatures, mechanical shock, incompatible materials, ignition sources, strong oxidants.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Hydrogen chloride, chlorine, carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 106-43-4: XS9010000
LD50/LC50:
CAS# 106-43-4:
Inhalation, mouse: LC50 = 34 gm/m3/2H;
Oral, mouse: LD50 = 1900 mg/kg;
Oral, rat: LD50 = 2100 mg/kg;
.

Carcinogenicity:

CAS# 106-43-4: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: No information found.
Physical: No information found.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	CHLOROTOLUENES	No information available.
Hazard Class:	3	
UN Number:	UN2238	
Packing Group:	III	

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 106-43-4 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 106-43-4: Effective 6/1/87, Sunset 12/19/95
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 106-43-4 can be found on the following state right to know lists: Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN N

Risk Phrases:

R 10 Flammable.
R 20 Harmful by inhalation.
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 24/25 Avoid contact with skin and eyes.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 106-43-4: 2

Canada - DSL/NDSL

CAS# 106-43-4 is listed on Canada's NDSL List.

Canada - WHMIS

not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 11/04/1998
Revision #3 Date: 10/03/2005

MSDS Number: **D2224** * * * * * *Effective Date:* ***07/05/07*** * * * * * *Supercedes:* ***05/07/07***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

p-DICHLOROBENZENE

1. Product Identification

Synonyms: 1,4-Dichlorobenzene; para-dichlorobenzene; Paracide; PDCB
CAS No.: 106-46-7
Molecular Weight: 147.01
Chemical Formula: C6H4Cl2
Product Codes: G970

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
p-Dichlorobenzene	106-46-7	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS THE RESPIRATORY SYSTEM, LIVER, KIDNEYS, EYES, SKIN AND BLOOD. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. COMBUSTIBLE. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 2 - Moderate
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of dust or vapors can irritate the nose and throat. May also cause headache, swelling around the eyes and runny nose. Can cause loss of appetite, nausea, vomiting, central nervous system effects, weight loss and liver and kidney damage.
Ingestion:
Toxic. Swallowing can produce adverse health effects paralleling inhalation.
Skin Contact:
Causes skin irritation, with a slight burning sensation. Red blotching of the skin due to allergic reactions may occur. May be absorbed through the skin; symptoms may parallel inhalation.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
Chronic exposure may damage blood, lungs, central nervous system, liver and kidneys. p-Dichlorobenzene is a possible carcinogen.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.
Skin Contact:
Wash skin with soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Flash point: 66C (151F) CC
Combustible!
Explosion:
Above the flash point, explosive vapor-air mixtures may be formed. Contact with strong oxidizers may cause fire.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Protect against physical damage. Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials. Storage and use areas should be No Smoking areas. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
75 ppm (TWA)
-ACGIH Threshold Limit Value (TLV):
10 ppm (TWA), listed as A3, animal carcinogen.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, and engineering controls are not feasible, a full-face piece respirator with an organic vapor cartridge and particulate filter (NIOSH type N100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P particulate filter. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
White crystals.

Odor:
Moth-ball odor
Solubility:
Practically insoluble in water.
Specific Gravity:
1.25 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
174C (345F)
Melting Point:
53C (127F)
Vapor Density (Air=1):
5.08
Vapor Pressure (mm Hg):
10 @ 54.8C (131F)
Evaporation Rate (BuAc=1):
Not applicable.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Oxidizing agents, aluminum and its alloys.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 500 mg/kg; skin rabbit LD50: > 2 gm/kg; investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------			
	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
----------	-----	----------	----------
p-Dichlorobenzene (106-46-7)	No	Yes	2B

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. This material has an experimentally-determined bioconcentration factor (BCF) of greater than 100. This material may bioaccumulate to some extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of greater than 30 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.
Environmental Toxicity:
The LC50/96-hour values for fish are between 1 and 10 mg/l. The LC50/96-hour values for fish are between 10 and 100 mg/l. This material may be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (PARA-DICHLOROBENZENE)
Hazard Class: 9

UN/NA: UN3077
Packing Group: III
Information reported for product/size: 5KG

International (Water, I.M.O.)

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (PARA-DICHLOROBENZENE)
Hazard Class: 9
UN/NA: UN3077
Packing Group: III
Information reported for product/size: 5KG

International (Air, I.C.A.O.)

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (PARA-DICHLOROBENZENE)
Hazard Class: 9
UN/NA: UN3077
Packing Group: **Information reported for product/size:** 5KG

---

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
p-Dichlorobenzene (106-46-7)                   Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                      --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
p-Dichlorobenzene (106-46-7)                   Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
p-Dichlorobenzene (106-46-7)            No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                    -RCRA-    -TSCA-
Ingredient                              CERCLA     261.33     8(d)
----------------------------------------  ------     ------    ------
p-Dichlorobenzene (106-46-7)            100        U072       No


Chemical Weapons Convention:  No     TSCA 12(b):  Yes    CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Solid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **2** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS THE RESPIRATORY SYSTEM, LIVER, KIDNEYS, EYES, SKIN AND BLOOD. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. COMBUSTIBLE. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA.
Label Precautions:
Avoid breathing dust or vapors.
Use only with adequate ventilation.
Avoid contact with eyes, skin and clothing.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes

while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 3.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet
4-Chloroaniline, 99% (Titr.)

ACC# 49468

Section 1 - Chemical Product and Company Identification

MSDS Name: 4-Chloroaniline, 99% (Titr.)
Catalog Numbers: AC404480000, AC404481000, AC404485000, ACE1064922
Synonyms: 1-Amino-4-chlorobenzene; p-Chloroaniline; 4-Chloraniline; 4-Chlorobenzenamine.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
106-47-8	4-Chloroaniline	99.0	203-401-0

Hazard Symbols: T N
Risk Phrases: 23/24/25 43 45 50/53

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless solid. **Warning!** Causes skin irritation. Causes severe eye irritation. May cause liver and kidney damage. May cause methemoglobinemia. Harmful if swallowed, inhaled, or absorbed through the skin. Causes respiratory tract irritation. Cancer suspect agent. May cause allergic skin reaction. Light sensitive. Air sensitive.
Target Organs: Blood, kidneys, liver, eyes, skin.

Potential Health Effects

Eye: Causes severe eye irritation.
Skin: Causes skin irritation. Harmful if absorbed through the skin. Prolonged and/or repeated contact may cause irritation and/or dermatitis. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material.
Ingestion: Harmful if swallowed. Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Methemoglobinemia is characterized by dizziness, drowsiness, headache, shortness of breath, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), rapid heart rate and chocolate-brown colored blood. Overexposure may cause methemoglobinemia.
Inhalation: May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Methemoglobinemia is characterized by dizziness, drowsiness, headache, shortness of breath, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), rapid heart rate and chocolate-brown blood. Inhalation of aniline causes anoxia due to the formation of methemoglobinemia.
Chronic: May cause liver and kidney damage. May cause methemoglobinemia, which is characterized

by chocolate-brown colored blood, headache, weakness, dizziness, breath shortness, cyanosis (bluish skin due to deficient oxygenation of blood), rapid heart rate, unconsciousness and possible death. May cause cancer according to animal studies. May cause reproductive and fetal effects.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation.
Notes to Physician: For methemoglobinemia, administer oxygen alone or with Methylene blue depending on the methemoglobinemia concentration in the blood.
Antidote: Methylene blue, alone or in combination with oxygen is indicated as a treatment in nitrite induced methemoglobinemia.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
Extinguishing Media: In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam.
Flash Point: > 120 deg C (> 248.00 deg F)
Autoignition Temperature: > 450 deg C (> 842.00 deg F)
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Reduce airborne dust and prevent scattering by moistening with water. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Wash hands before eating. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Wash clothing before reuse. Use only with adequate ventilation. Avoid breathing dust.
Storage: Keep container closed when not in use. Store in a cool, dry, well-ventilated area away

from incompatible substances. Store protected from light and air.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
4-Chloroaniline	none listed	none listed	none listed

OSHA Vacated PELs: 4-Chloroaniline: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: colorless
Odor: None reported.
pH: Not available.
Vapor Pressure: 1 mm Hg @ 58 C
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 232 deg C
Freezing/Melting Point:71 deg C
Decomposition Temperature: Not available.
Solubility: Soluble in hot water.
Specific Gravity/Density:1.169
Molecular Formula:C6H6ClN
Molecular Weight:127.57

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Light, dust generation, excess heat, prolonged exposure to air.

Incompatibilities with Other Materials: Acids, acid chlorides, acid anhydrides, chloroformates, and strong oxidizing agents.

Hazardous Decomposition Products: Hydrogen chloride, nitrogen oxides, carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 106-47-8: BX0700000
LD50/LC50:
CAS# 106-47-8:
Draize test, rabbit, eye: 250 ug/24H Severe;
Draize test, rabbit, skin: 500 mg/24H Mild;
Inhalation, rat: LC50 = 2340 mg/m3/4H;
Oral, mouse: LD50 = 100 mg/kg;
Oral, rat: LD50 = 300 mg/kg;
Skin, rabbit: LD50 = 360 mg/kg;
Skin, rat: LD50 = 3200 mg/kg;
Carcinogenicity:
CAS# 106-47-8:
ACGIH: A3 - Animal Carcinogen (listed as Aniline).
California: carcinogen; initial date 10/01/94
NIOSH: potential occupational carcinogen (listed as Aniline)
OSHA: Possible Select carcinogen
IARC: IARC Group 3 - not classifiable (listed as Aniline).
Epidemiology: Substance has been identified as a carcinogen by the NTP an d the under CA prop 65. IARC has determined that evidenc e for carcinogenicity of aniline is limited in animals and inadequate in humans. There is experimental neoplastic data. The high risk of bladder cancer obse rved originally in workers in the aniline dye industry h as been attributed to exposure to chemicals other than aniline.
Teratogenicity: No information found.
Reproductive Effects: No information found.
Neurotoxicity: No information found.
Mutagenicity: No information found.
Other Studies: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: Terrestrial: Will bind tightly to soil although in the first few hours after a spill, a small amount should volatilize. It will undergo both biological and chemical transformation. Aquatic: Will volatilize (half-life 35.7 days in a typical river), photooxidize in surface layers (half-life 0.4 hr), biodegrade (half-life several days in well acclimated water but otherwise of the order of several months), and chemically bind to clay and humus in sediment and particulate matter in the water column. Atmospheric: Should exist in the atmosphere as a vapor.
Physical: Will biodegrade but not bioconcentrate.
Other: For more information, see "HANDBOOK OF ENVIRONMENTAL FATE AND EXPOSURE DATA."

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: CAS# 106-47-8: waste number P024.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	CHLOROANILINES, SOLID				CHLOROANILINES SOLID
Hazard Class:	6.1				6.1
UN Number:	UN2018				UN2018
Packing Group:	II				II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 106-47-8 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

CERCLA Hazardous Substances and corresponding RQs
CAS# 106-47-8: 1000 lb final RQ; 454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 106-47-8: acute.
Section 313
This material contains 4-Chloroaniline (CAS# 106-47-8, 99 0%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 106-47-8 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act: WARNING: This product contains 4-Chloroaniline, a chemical known to the state of California to cause cancer. California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations
European Labeling in Accordance with EC Directives

European Labeling in Accordance with EC Directives

Hazard Symbols:
T N

Risk Phrases:
R 23/24/25 Toxic by inhalation, in contact with skin and if swallowed.
R 43 May cause sensitization by skin contact.
R 45 May cause cancer.
R 50/53 Very toxic to aquatic organisms; may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.
S 60 This material and/or its container must be disposed of as hazardous waste.
S 61 Avoid release to the environment. Refer to special instructions/Safety data sheets.

WGK (Water Danger/Protection)
CAS# 106-47-8: 3

Canada - DSL/NDSL
CAS# 106-47-8 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D1B, D2A, D2B.

Canadian Ingredient Disclosure List
CAS# 106-47-8 is listed on the Canadian Ingredient Disclosure List.

Exposure Limits
CAS# 106-47-8 (listed as aniline): OEL-ARAB Republic of Egypt:TWA 2 pp m (10 mg/m3);Skin OEL-AUSTRALIA:TWA 2 ppm (10 mg/m3);Skin OEL-AUSTRI A:TWA 2 ppm (8 mg/m3);Skin OEL-BELGIUM:TWA 2 ppm (7.6 mg/m3);Skin OE L-CZECHOSLOVAKIA:TWA 5 mg/m3;STEL 20 mg/m3 JAN9 OEL-DENMARK:TWA 1 ppm (4 mg/m3);Skin OEL-FINLAND:TWA 2 ppm (7.6 mg/m3);STEL 4 ppm (15 mg/m 3);Skin;CAR OEL-FRANCE:TWA 2 ppm (10 mg/m3);Skin OEL-GERMANY:TWA 2 p pm (8 mg/m3);Skin;Carcinogen OEL-HUNGARY:TWA 5 mg/m3;STEL 10 mg/m3;Sk in OEL-INDIA:TWA 0.2 mg/m3;Skin OEL-JAPAN:TWA 1 ppm (3.8 mg/m3);Skin OEL-THE NETHERLANDS:TWA 5 ppm (19 mg/m3);Skin OEL-THE PHILIPPINES:T WA 5 ppm (19 mg/m3);Skin OEL-POLAND:TWA 5 mg/m3;STEL 20 mg/m3;Skin O EL-RUSSIA:TWA 1 ppm;STEL 0.1 mg/m3;Skin OEL-SWEDEN:TWA 1 ppm (4 mg/m3);STEL 2 ppm (8 mg/m3);Skin OEL-SWITZERLAND:TWA 2 ppm (8 mg/m3);STEL 10 ppm (40 mg/m3);Skin OEL-TURKEY:TWA 5 ppm (19 mg/m3);Skin OEL-UNIT ED KINGDOM:TWA 2 ppm (10 mg/m3);STEL 5 ppm;Skin OEL IN BULGARIA, COLO MBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VI ETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 11/13/1997
Revision #6 Date: 9/25/2001

possibility of such damages.

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 106-93-4
Date: 12/28/2006

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: 1,2-DIBROMOETHANE SYNONYMS: Ethylene dibromide, ethylene bromide, EDB

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	**Formula**	**CAS #**	**Concentration**	**ACGIH TLV**	**OSHA PEL**	**MAC**	**Other STEL**
1,2-DIBROMOETHANE	C2H4Br2	106-93-4	99+%	NE	20	20	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Poisonous liquid and vapor.
May cause liver, kidney and heart damage.
May cause central nervous system depression.
Can cause irritation to eyes, skin and respiratory tract.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation, Skin, Ingestion

ACUTE EFFECTS: Vapor or mist is irritating to the eyes, skin, mucous membrane, and upper respiratory tract.Can be absorbed through the skin.Skin exposure may cause irritation, itching, erythema, swelling, burning and pain.Eye contact may cause irritation, redness, or blurred vision.Symptoms of exposure can include headache, dizziness, nausea, diarrhea, weakness, fatigue, thirst, cough, difficulty in breathing, and chest or abdominal pain.Possible central nervous system depression.

CHRONIC EFFECTS: Suspected human carcinogen.Respiratory irritation and pulmonary edema, dermatitis, central nervous system depression, and conjunctivitis.Kidney and liver damage.Lung damage.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - Yes
IARC MONOGRAPHS - Yes
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air.If breathing has stopped, give artificial respiration.If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Have conscious and alert person drink 1 to 2 glasses of water.Induce vomiting after victim drinks water.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: Nonflammable

AUTOIGNITION TEMPERATURE: N/Ap

FLAMMABLE LIMITS: Nonflammable

LOWER:
UPPER:

EXTINGUISHING MEDIA: Use what is appropriate for surrounding fire.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing.Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide and HBr may be given off during combustion.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Cylinder rupture may occur under fire conditions.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area.Remove leaking cylinder to exhaust hood or safe outdoor area.Absorb with sand or vermiculite and place in closed containers for disposal.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling.Use suitable hand truck to move cylinders.Use only in a well-ventilated area.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas.Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentration below exposure limits.

EYE / FACE PROTECTION: Goggles.A safety shower and eyewash station should be readily available.

SKIN PROTECTION: Impervious gloves, coveralls, boots, and/or other resistant protective clothing.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Clear, Colorless

ODOR: Mild, Sweet odor.(chloroform-like)

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @20 deg.C: 11 mm Hg

VAPOR DENSITY (AIR=1): 1.65

BOILING POINT (C): 131-132

SOLUBILITY IN WATER: Slight

SPECIFIC GRAVITY (H2O=1): @20 deg.C: 1.18

EVAPORATION RATE: N/Av

ODOR THRESHOLD: 26 ppm

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas.

MATERIALS TO AVOID: Oxidizing agents.Alkali or alkaline earth metals, powdered Al, Zn, and Be.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide and hydrogen bromide.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): None established

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.Waste material may be burned in a controlled manner in an approved incinerator.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Ethylene dibromide
HAZARD CLASS: 6.1 (poison), Packing Group I
INDENTIFICATION NUMBER: UN1605
REPORTABLE QUANTITIES: 1 lb.
LABELING: POISON

ADR / RID (EU Only): Class 6.1,15(a)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 203-44-5

NUMBER IN ANNEX 1 OF DIR 67/548: Material is listed in annex 1.

EU CLASSIFICATION: N/Av

R: 45-23/24/25-36/37/38

S: 53-44

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 106-99-0
Date: 09/29/2005

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: 1,3-BUTADIENE SYNONYMS: None

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	OSHA PEL	MAC	Other STEL
1,3-BUTADIENE	C4H6	106-99-0	99+%	2	1	50	5

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and gas under pressure.
Can cause cancer.
Can form explosive mixtures with air.
May cause irritation to eyes, skin and mucous membranes.
May cause frostbite.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation

ACUTE EFFECTS: May cause irritation to eyes, skin, mucous membranes and throat.Symptoms include rapid respiration, diminished mental alertness, fatique, muscular incoordination and loss of consciousness.Can act as an asphyxiant by displacing breathable air.Pressure drop through valves and piping may cause extreme cold and frostbite on contact.

CHRONIC EFFECTS: Material is a carcinogen.Exposure can cause lukemia, non-Hodgkins lymphoma, and anemia.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - Yes
IARC MONOGRAPHS - Yes
OSHA REGULATED - Yes

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air.If breathing has stopped, give artificial respiration.If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes.

SKIN CONTACT: If frostbite occurs, flush affected areas with lukewarm water.

INGESTION: None

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: -76 deg.C

AUTOIGNITION TEMPERATURE: 420 deg.C

FLAMMABLE LIMITS:

LOWER: 2%
UPPER: 11.5%

EXTINGUISHING MEDIA: Dry chemical or carbon dioxide.Do not extinguish burning gas if flow cannot be shut off.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing.Keep fire exposed cylinders cool with water spray.If possible, stop the product flow.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide may be given off during combustion.

UNUSUAL FIRE AND EXPLOSION HAZARDS: High explosion hazard exists if heated under pressure in air and mixed with phenol, CLO2, and crontonaldehyde.Vapors may travel a considerable distance to the source of ignition and flash back.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area.Shut off source if possible and remove source of heat.Remove leaking cylinder to exhaust hood or safe outdoor area.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling.Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas.Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentration below exposure limits.

EYE / FACE PROTECTION: Safety glasses

SKIN PROTECTION: Protective gloves to prevent contact with cold equipment.

RESPIRATORY PROTECTION: In case of leakage, use self-contained breathing apparatus.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Slightly aromatic

PHYSICAL PRESSURE: Gas

VAPOR PRESSURE: @ 20 deg.C: 36.0 psia

VAPOR DENSITY (AIR=1): 1.9

BOILING POINT (C): -4

SOLUBILITY IN WATER: Insoluble

SPECIFIC GRAVITY (H2O=1): Gas

EVAPORATION RATE: Gas

ODOR THRESHOLD: N/Av

10. STABILITY AND REACTIVITY

STABILITY: Unstable.Stable when inhibited.

CONDITIONS TO AVOID: Storage in poorly ventilated areas.Storage near a heat source.

MATERIALS TO AVOID: Avoid oxidizers, copper, and copper alloys, halogens.

HAZARDOUS POLYMERIZATION: May occur due to lowered levels of inhibitor, or elevated temperatures.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): 220,000 ppm, rat 1 hour

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Butadienes, inhibited
HAZARD CLASS: 2.1 (flammable)
INDENTIFICATION NUMBER: UN1010
REPORTABLE QUANTITIES: 10 lb.
LABELING: FLAMMABLE GAS

ADR / RID (EU Only): Class 2, 2F

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 203-450-8

NUMBER IN ANNEX 1 OF DIR 67/548: Material is listed in annex 1.

EU CLASSIFICATION: N/Av

R: 45-13

S: 53-9-16-33

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

Fisher Scientific CANADA
A Fisher Scientific International Company

MATERIAL SAFETY DATA SHEET

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MSDS Identification:

- **Key:** 74402
- **Name:** Acrolein, stabilized, 97%

Catalog Numbers:

AC149640000, AC149640010, AC149640250, AC149642500

Synonyms:

- Acrolein; Acryaldehyde; Acrylic aldehyde; Acraldehyde; 2-Propenal.

Company Identification (Europe):

Acros Organics BVBA
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium

Company Identification (USA):

Acros Organics
One Reagent Lane
Fairlawn, NJ 07410

For information in North America, call:

- 800-ACROS-01

For information in Europe, call:

- 0032(0) 14575211

For emergencies in the US, call CHEMTREC:

- 800-424-9300

For emergencies in Europe, call:

- 0032(0) 14575299

SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS

CAS #	Chemical Name	%	EINECS #
107-02-8	Acrolein	97	203-453-4
123-31-9	Hydroquinone	> 0.1	204-617-8

Text for R-phrases: see Section 16

Hazard Symbols: T+ F C N

Risk Phrases: 11 26 34 24/25 50

SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Appearance: clear colorless to slightly yellow liquid. Flash Point: -26 deg C. Danger! May be fatal if swallowed. May be fatal if absorbed through the skin. Lachrymator (substance which increases the flow of tears). Causes eye and skin burns. Causes digestive and respiratory tract burns. May be fatal if inhaled. May form unstable peroxides. Extremely flammable liquid and vapor. Vapor may cause flash fire. Keep refrigerated. (Store below 4列/39刎.) May polymerize explosively on loss of inhibitor.

Target Organs: Lungs, eyes, skin, mucous membranes.

POTENTIAL HEALTH EFFECTS

Eye: May result in corneal injury. Contact with eyes may cause severe irritation, and possible eye burns. Lachrymator (substance which increases the flow of tears).

Skin: May be fatal if absorbed through the skin. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. May cause severe irritation and possible burns.

Ingestion: May be fatal if swallowed. May cause severe gastrointestinal tract irritation with nausea, vomiting and possible burns.

Inhalation: May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema.

Chronic: No information found.

SECTION 4 - FIRST AID MEASURES

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.

Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

Ingestion: If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

Inhalation: POISON material. If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician: Treat symptomatically and

Antidote: None reported.

SECTION 5 - FIRE FIGHTING MEASURES

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Closed containers may rupture violently when heated. Extremely flammable liquid and vapor. Vapor may cause flash fire. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.

Extinguishing Media: Use water spray, dry chemical, "alcohol resistant" foam, or carbon dioxide.

Autoignition Temperature: 235 deg C (455.00 deg F)

Flash Point: -26 deg C (-14.80 deg F)

Explosion Limits, lower: 2.8%

Explosion Limits, upper: 31%

NFPA Rating: (estimated) Health: 4; Flammability: 3; Instability: 3

SECTION 6 - ACCIDENTAL RELEASE MEASURES

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Isolate area and deny entry. Provide ventilation. Evacuate unnecessary personnel. Use water spray to cool and disperse vapors, protect personnel, and dilute spills to form nonflammable mixtures.

SECTION 7 - HANDLING AND STORAGE

Handling: Wash thoroughly after handling. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Do not get in eyes, on skin, or on clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Use and store under nitrogen. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame. Do not breathe vapor or mist. Pure vapor will be uninhibited and may polymerize in vents or other confined spaces.

Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Keep under a nitrogen blanket. Store in a cool, dry, well-ventilated area away from incompatible substances. Refrigerator/flammables. Store protected from light and air. Separate from oxidizing materials. Inhibitor level should be checked periodically.

SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

EXPOSURE LIMITS

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Acrolein	skin - potentialfor cutaneousabsorption; 0.1ppm Ceiling	0.1 ppm TWA; 0.25mg/m3 TWA 2 ppmIDLH	0.1 ppm TWA;0.25 mg/m3 TWA
Hydroquinone	2 mg/m3	50 mg/m3 IDLH	2 mg/m3 TWA

OSHA Vacated PELs:

Acrolein: 0.1 ppm TWA; 0.25 mg/m3 TWA

Hydroquinone: 2 mg/m3 TWA

PERSONAL PROTECTIVE EQUIPMENT

Eyes: Wear chemical goggles and face shield.

Skin: Wear appropriate gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid

Color: clear colorless to slightly yellow

Odor: disagreeable odor - strong odor

pH: Not available.

Vapor Pressure: 210 mm Hg @ 20 deg C

Vapor Density: 1.94 (Air=1)

Evaporation Rate: Not available.

Viscosity: Not available.

Boiling Point: 53 deg C

Freezing/Melting Point: -87 deg C

Decomposition Temperature: Not available.

Solubility in water: Soluble.

Specific Gravity/Density: 0.83

Molecular Formula: C3H4O

Molecular Weight: 56.06

SECTION 10 - STABILITY AND REACTIVITY

Chemical Stability: Unstable. May form unstable peroxides. Acrolein polymerizes with release of heat on contact with minor amounts of acids (including sulfur dioxide), alkalis, volatile amines, salts, thiourea, oxidants (air) and on exposure to light and heat.

Conditions to Avoid: High temperatures, mechanical shock, light, ignition sources, exposure to air, excess heat.

Incompatibilities with Other Materials: Polymerizes violently upon exposure to strong acids or bases, oxidants (such as air), light or heat. Also incompatible with amines, sulfur dioxide and metal salts.

Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.

Hazardous Polymerization: Will occur.

SECTION 11 - TOXICOLOGICAL INFORMATION

RTECS#:

- CAS# 107-02-8: AS1050000
- CAS# 123-31-9: MX3500000

LD50/LC50:

- CAS# 107-02-8: Draize test, rabbit, eye: 1 mg Severe; Draize test, rabbit, eye: 50 ug/24H Severe; Draize test, rabbit, skin: 2 mg/24H Severe; Inhalation, mouse: LC50 = 66 ppm/6H; Inhalation, mouse: LC50 = 875 ppm/1M; Inhalation, mouse: LC50 = 175 ppm/10M; Inhalation, mouse: LC50 = 152 mg/m3/6H; Inhalation, rabbit: LC50 = 10.5 ppm/6H; Inhalation, rat: LC50 = 18 mg/m3/4H; Inhalation, rat: LC50 = 131 ppm/30M; Inhalation, rat: LC50 = 8 ppm/4H; Oral, mouse: LD50 = 13900 ug/kg; Oral, mouse: LD50 = 28 mg/kg; Oral, rabbit: LD50 = 7 mg/kg; Oral, rat: LD50 = 26 mg/kg; Skin, rabbit: LD50 = 200 mg/kg.
- CAS# 123-31-9: Oral, mouse: LD50 = 245 mg/kg; Oral, mouse: LD50 = 350 mg/kg; Oral, rabbit: LD50 = 200 mg/kg; Oral, rat: LD50 = 302 mg/kg; Oral, rat: LD50 = 320 mg/kg. Not available.

Carcinogenicity:

Acrolein -

- Not listed by ACGIH, IARC, or NTP.

Hydroquinone -

- ACGIH: A3 - Confirmed animal carcinogen with unknown relevance to humans

Epidemiology:

No information available.

Teratogenicity:

No information available.

Reproductive Effects:

No information available.

Neurotoxicity:

No information available.

Mutagenicity:

No information available.

Other Studies:

No data available.

SECTION 12 - ECOLOGICAL INFORMATION

Ecotoxicity:

Fish: Fathead Minnow: LC50 = 0.0195 mg/L; 96 Hr.; Flow-through; 24.9

- degrees; pH 7.9Fish: Rainbow trout: LC50 = 0.065 mg/L; 24 Hr.;

  Static ConditionsFish: Bluegill/Sunfish: LC50 = 0.09-0.10 mg/L; 96 Hr.; Static Conditions; 21.5-22.0 degrees CWater flea EC50 = 0.083 mg/L; 48 Hr.; UnspecifiedBacteria: Phytobacterium phosphoreum: EC50 = 0.12-0.674 mg/L; 5, 15 minutes; Microtox test; 15 degrees C

SECTION 13 - DISPOSAL CONSIDERATIONS

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: CAS# 107-02-8: waste number P003.

RCRA U-Series: None listed.

SECTION 14 - TRANSPORT INFORMATION

US DOT

- Shipping Name: ACROLEIN, STABILIZED
- Hazard Class: 6.1
- UN Number: UN1092
- Packing Group: I

Canadian TDG

- No information available.

USA RQ:CAS# 107-02-8: 1 lb final RQ; 0.454 kg final RQ

USA RQ:CAS# 123-31-9: 100 lb final RQ; 45.4 kg final RQ

SECTION 15 - REGULATORY INFORMATION

US FEDERAL

TSCA

- CAS# 107-02-8 is listed on the TSCA inventory.
- CAS# 123-31-9 is listed on the TSCA inventory.

Health & Safety Reporting List

- CAS# 123-31-9: Effective 10/4/84; Sunset 10/4/94

Chemical Test Rules

- None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

- None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

- None of the chemicals in this material have a SNUR under TSCA.

SARA

CERCLA Hazardous Substances and corresponding RQs

- CAS# 107-02-8: 1 lb final RQ; 0.454 kg final RQ
- CAS# 123-31-9: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

- CAS# 107-02-8: 500 lb TPQ
- CAS# 123-31-9: 500 lb TPQ (lower threshold); 10000 lb TPQ (upper threshold)

SARA Codes

- CAS # 123-31-9: acute, chronic.

Section 313

- This material contains Acrolein (CAS# 107-02-8, 97%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.
- This chemical is not at a high enough concentration to be reportable under Section 313.

Clean Air Act:

- CAS# 107-02-8 is listed as a hazardous air pollutant (HAP).
- CAS# 123-31-9 is listed as a hazardous air pollutant (HAP).
- This material does not contain any Class 1 Ozone depletors.
- This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

- CAS# 107-02-8 is listed as a Hazardous Substance under the CWA.
- CAS# 107-02-8 is listed as a Priority Pollutant under the Clean Water Act.
- CAS# 107-02-8 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

- None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

Acrolein can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

Hydroquinone can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

- Hazard Symbols: T+ F C N
- Risk Phrases:
  - R 11 Highly flammable.
  - R 24/25 Toxic in contact with skin and if swallowed.
  - R 26 Very toxic by inhalation.
  - R 34 Causes burns.
  - R 50 Very toxic to aquatic organisms.
- Safety Phrases:
  - S 23 Do not inhale gas/fumes/vapour/spray.
  - S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
  - S 28A After contact with skin, wash immediately with plenty of water.
  - S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
  - S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
  - S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

- CAS# 107-02-8: 3
- CAS# 123-31-9: 2

United Kingdom Occupational Exposure Limits

- CAS# 107-02-8: OES-United Kingdom, TWA 0.1 ppm TWA; 0.23 mg/m3 TWA
- CAS# 107-02-8: OES-United Kingdom, STEL 0.3 ppm STEL; 0.70 mg/m3 STEL

United Kingdom Maximum Exposure Limits

- CAS# 123-31-9: MEL-United Kingdom, TWA 0.5 mg/m3 TWA

Canada

- CAS# 107-02-8 is listed on Canada's DSL List.
- CAS# 123-31-9 is listed on Canada's DSL List.
- This product has a WHMIS classification of E, D1A, B2, F.
- CAS# 107-02-8 is listed on Canada's Ingredient Disclosure List.
- CAS# 123-31-9 is listed on Canada's Ingredient Disclosure List.

Exposure Limits

- CAS# 107-02-8: OEL-ARAB Republic of Egypt:TWA 0.1 ppm (0.25 mg/m3)
- OEL-AUSTRALIA:TWA 0.1 ppm (0.25 mg/m3);STEL 0.3 ppm (0.8 mg/m3)
- OEL-AUSTRIA:TWA 0.1 ppm (0.25 mg/m3)
- OEL-BELGIUM:TWA 0.1 ppm (0.23 mg/m3);STEL 0.3 ppm (0.69 mg/m3)
- OEL-CZECHOSLOVAKIA:TWA 0.5 mg/m3;STEL 1 mg/m3
- OEL-DENMARK:TWA 0.1 ppm (0.25 mg/m3)
- OEL-FINLAND:STEL 0.1 ppm (0.25 mg/m3);Skin
- OEL-FRANCE:STEL 0.1 ppm (0.25 mg/m3)
- OEL-GERMANY:TWA 0.1 ppm (0.25 mg/m3)
- OEL-HUNGARY:TWA 0.25 mg/m3;STEL 0.5 mg/m3
- OEL-INDIA:TWA 0.1 ppm (0.25 mg/m3);STEL 0.3 ppm (0.8 mg/m3)
- OEL-JAPAN:TWA 0.1 ppm (0.23 mg/m3)
- OEL-THE NETHERLANDS:TWA 0.1 ppm (0.25 mg/m3) JAN9
- OEL-THE PHILIPPINES:TWA 0.1 ppm (0.25 mg/m3) JAN9
- OEL-POLAND:TWA 0.5 mg/m3
- OEL-RUSSIA:TWA 0.1 ppm;STEL 0.2 mg/m3
- OEL-SWEDEN:TWA 0.1 ppm (0.2 mg/m3);STEL 0.3 ppm (0.7 mg/m3)
- OEL-SWITZERLAND:TWA 0.1 ppm (0.25 mg/m3);STEL 0.2 ppm
- OEL-TURKEY:TWA 0.1 ppm (0.25 mg/m3)
- OEL-UNITED KINGDOM:TWA 0.1 ppm (0.25 mg/m3);STEL 0.3 ppm OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV
- CAS# 123-31-9: OEL-AUSTRALIA:TWA 2 mg/m3
- OEL-BELGIUM:TWA 2 mg/m3
- OEL-DENMARK:STEL 2 mg/m3
- OEL-FINLAND:TWA 2 mg/m3;STEL 4 mg/m3;Skin
- OEL-FRANCE:TWA 2 mg/m3
- OEL-GERMANY:TWA 2 mg/m3
- OEL-THE NETHERLANDS:TWA 2 mg/m3
- OEL-THE PHILIPPINES:TWA 2 mg/m3
- OEL-POLAND:TWA 2 mg/m3
- OEL-SWEDEN:TWA 0.5 mg/m3;STEL 1.5 mg/m3
- OEL-SWITZERLAND:TWA 2 mg/m3;STEL 4 mg/m3
- OEL-TURKEY:TWA 2 mg/m3
- OEL-UNITED KINGDOM:TWA 2 mg/m3;STEL 4 mg/m3 OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

SECTION 16 - ADDITIONAL INFORMATION

MSDS Creation Date: 5/10/1999, **Revision #3 Date:** 7/08/2002

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 107-05-1
Date: 03/09/2001

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: 3-CHLORO-1-PROPENE

SYNONYMS: 3-Chloropropylene, Chlorallylene, 3-Chloropropene, Allyl Chloride

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	OSHA PEL	MAC	Other STEL
3-CHLORO-1-PROPENE	C3H5CL	107-05-1	99+%	1	1	1	2

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.
Can form explosive mixtures with air.
May be fatal if inhaled.
Can cause irritation to eyes, skin, and respiratory tract.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Skin , Ingestion

ACUTE EFFECTS: Can be absorbed through the skin. Vapor or mist is irritating to the eyes, skin, mucous membranes, and upper respiratory tract. Ingestion of the liquid causes gastrointestinal irritation. Inhalation may be fatal due to spasm, inflammation, edema, of the larynx and bronchi, chemical pneumontitis and pulmonary edema. Liquid contact with the eye causes severe corneal injury. Overexposure may cause nausea, headache, dizziness, vomiting and weakness.

CHRONIC EFFECTS: Kidney and liver damage.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - No
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

EYE CONTACT: Do not allow victim to rub or keep eyes tightly shut. Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Seek medical attention as soon as possible.

SKIN CONTACT: Immediately remove contaminated clothing. Rinse the affected area with flooding amounts of water and then wash it with soap and water. For reddened or blistered skin, consult a physician.

INGESTION: Never give anything by mouth to an unconscious person. Contact a poison control center. Unless the poison control center advises otherwise, have the conscious and alert person drink 1 to 2 glasses of water to dilute. Do not induce vomiting.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: -31 deg. C

AUTOIGNITION TEMPERATURE: 485 deg. C

FLAMMABLE LIMITS: Vol.% in air

LOWER: 2.90
UPPER: 11.20

EXTINGUISHING MEDIA: Carbon dioxide, foam, or dry chemical. Water spray.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Keep fire exposed cylinders cool with water spray. If possible, stop the product flow.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide, hydrogen chloride and phosgene.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Cylinder rupture may occur under fire conditions. May form explosive mixture in air. Vapors may travel a considerable distance to the source of ignition and flash back. Emits toxic fumes under fire conditions. Poses an explosion hazard indoors, outdoors, and in sewers.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Shut off source if possible and remove source of heat. Absorb with sand or vermiculite and place in closed containers for disposal. Use non-sparking tools.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use. Storage should be suitable for an OSHA 1B flammable liquid.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Safety glasses . A safety shower and eyewash station should be readily available.

SKIN PROTECTION: Impervious gloves, coveralls, boots, and/or other resistant protective clothing.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless to pale yellow

ODOR: Garlic like odor.

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @20 deg. C: 295 mm Hg

VAPOR DENSITY (AIR=1): 2.6

BOILING POINT (C): 45

SOLUBILITY IN WATER: @20 deg. C: 0.36%

SPECIFIC GRAVITY (H2O=1): @25 deg. C: 0.932

EVAPORATION RATE: (n-BuAC=1): 7

ODOR THRESHOLD: 3-6 ppm

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: Avoid contact with metals. Oxidizing agents, acids and bases.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide and hydrogen chloride. Phosgene.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): NONE ESTABLISHED

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Allyl chloride
HAZARD CLASS: 3 (flammable), Packing group I
INDENTIFICATION NUMBER: UN1100
REPORTABLE QUANTITIES: 1,000 lbs

LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): Class 3, 16(a)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 203-457-6

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: 11-26

S: 16-29-33-45

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

SPI Supplies Division
Structure Probe, Inc.
P.O. Box 656 West Chester, PA 19381-0656 USA
Phone: *1-(610)-436-5400* ***Fax:*** *1-(610)-436-5755*
E-mail: *spi3spi@2spi.com*
WWW: http://www.2spi.com
Manufacturer's CAGE: 1P573

Material Safety Data Sheet

SPI #02515-AA and 02515-AB Ethylene Dichloride

Section 1: Identification

```
Date Effective.......... January 8, 2009
                         (most recent revision)

Chemical Name/Synonyms... Ethylene dichloride; 1,2-Dichloroethane; Glycol dichloride

Emergencies
Contacting CHEMTREC:

24 Hour Emergency Use Only #'s...
Worldwide phone: 1-(703)-527-3887
Worldwide FAX:   1-(703)-741-6090
Toll-free phone: 1-(800)-424-9300 USA only

Product or Trade Name....  SPI #02515-AA and 02515-AB Ethylene Dichloride

Synonyms.................  1,2-Dichloroethane; Glycol dichloride
```

Hazardous Material Information System USA			National Fire Protection Association USA	
	Health	2		
	Fire Hazard	3		
	Reactivity	0		
	Personal Protection			

NFPA Rating:

(estimated) Health: 2; Flammability: 3; Reactivity: 0

Section 2 Composition

Component Name	CAS #	Percent	EINECS/ELINCS
1,2-Dichloroethane	107-06-2	>99	203-458-1

Section 3: Hazard Identification

Emergency overview:

Appearance: Colorless
Flash Point: 13°C (56°F)

Warning! Flammable liquid and vapor.

May cause central nervous system depression.
May cause liver and kidney damage.
May cause cancer based on animal studies.
Causes eye and skin irritation.
Causes respiratory tract irritation.
Irritant.
May be harmful if swallowed.
Potential cancer hazard.

Target Organs:
Kidneys, central nervous system, liver, eyes, skin.

Potential Health Effects

Eye:
Causes eye irritation. Vapors may cause eye irritation. May cause chemical conjunctivitis and corneal damage.

Skin:
Causes skin irritation. May be absorbed through the skin. May cause irritation and dermatitis. May cause cyanosis of the extremities.

Ingestion:
May cause central nervous system depression, kidney damage, and liver damage. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause liver and kidney damage. May cause effects similar

to those for inhalation exposure. May be harmful if swallowed.

Aspiration hazard:
May cause central nervous system depression, kidney damage, and liver damage.

Inhalation:
Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause liver and kidney damage. Aspiration may lead to pulmonary edema. Vapors may cause dizziness or suffocation. Can produce delayed pulmonary edema. May cause burning sensation in the chest.

Chronic:
Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated eye contact may cause conjunctivitis. May cause liver and kidney damage. Effects may be delayed.

Section 4: First Aid Measures

Eyes:

Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately. Do *not* allow victim to rub or keep eyes closed.

Skin:
Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Discard contaminated clothing in a manner which limits further exposure.

Ingestion:
Do *not* induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Possible aspiration hazard. Get medical aid immediately.

Inhalation:
Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. Do *not* use mouth-to-mouth resuscitation.

Notes to Physician:
Treat symptomatically and supportively.

Section 5: Fire Fighting Measures

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Flammable liquid and vapor. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.

Extinguishing Media:
For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. Do NOT use straight streams of water.

Section 6: Accidental Release Measures

General Information:
Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately. Remove all sources of ignition. Use only spark-proof tools in the area that this product is to be used. A vapor suppressing foam may be used to reduce vapors.

Section 7: Handling and Storage

Handling:

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty bottles retain product residue, (liquid and/or vapor), and can be dangerous.

Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Use with adequate ventilation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage:
Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

Flammables-area:
Storage under a nitrogen blanket has been recommended.

Section 8: Exposure Controls and Personal Protection

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local explosion-proof ventilation to keep airborne levels to acceptable levels.

Exposure Limits:

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
1,2-Dichloroethane	10 ppm TWA	1 ppm TWA; 4 mg/m^3 TWA; 50 ppm IDHL	50 ppm TWA 100 ppm ceiling

Occupational Carcinogen - see Appendix A ; see Appendix C (Chloroethanes) for supplementary exposure limits Potential NIOSH carcinogen.

OSHA Vacated PELs:
1,2-Dichloroethane: 1 ppm TWA; 4 mg/m^3 TWA; 2 ppm STEL; 8 mg/m^3 STEL

Personal Protective Equipment

Eyes:
Wear chemical goggles.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
A respiratory protection program that meets OSHA's **29 CFR §1910** .134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Engineering Controls:

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Section 9: Physical and Chemical Properties

Physical State: Liquid
Appearance: Colorless
Odor: Chloroform-like
pH: Not available.

Vapor Pressure: 100 mm Hg @29°C
Vapor Density: 3.4 (Air=1)
Evaporation Rate: 6.5 (Butyl acetate=1)
Viscosity: Not available.
Boiling Point: 81-85°C (178-185°F)

Freezing/Melting Point: -35°C (-31°F)
Autoignition Temperature: 413°C (775°F)
Flash Point: 13.3°C (56°F)
Decomposition Temperature: Not available.

Explosion Limits, Lower: 6.2%
Upper: 15.9%
Solubility in water: Insoluble.
Specific Gravity/Density: 1.25 (Water=1)
Molecular Formula: $C_2H_4Cl_2$

Molecular Weight: 98.96

Section 10: Stability and Reactivity

Chemical Stability:
Stable at room temperature in closed containers under normal storage and handling conditions.

Conditions to Avoid:

Incompatible materials, light, ignition sources, excess heat, electrical sparks.

Incompatibility with Other Materials:
Strong oxidizing agents, strong reducing agents, bases, alkali metals, aluminum, amines, liquid ammonia, nitric acid, organic peroxides, ketones.

Hazardous Decomposition of Products:
Hydrogen chloride, phosgene, carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.

Hazardous Polymerization: Has not been reported.

Section 11: Toxicological Information

RTECS#: KI0525000

CAS#: 107-06-2:

LD_{50}/LC_{50} Information:
CAS #: 107-06-2
Draize test, rabbit, eye: 63 mg Severe;
Draize test, rabbit, eye: 500 mg/24 hours Mild;
Draize test, rabbit, skin: 500 mg/24 hours Mild;
Inhalation, rat: LC_{50}=1000 ppm/7 hours;
Oral, mouse: LD_{50} = 413 mg/kg;
Oral, rabbit: LD_{50} = 860 mg/kg;
Oral, rat: LD_{50} = 670 mg/kg;
Skin, rabbit: LD_{50} = 2800 mg/kg;

Carcinogenicity:
CAS# 107-06-2
ACGIH: A4 - Not Classifiable as a Human Carcinogen
California: carcinogen - initial date 10/1/87
NIOSH: occupational carcinogen
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen

IARC: Group 2B carcinogen

Epidemiology:
IARC Group 2B: Proven animal carcinogenic substance of potential relevance to humans. No data available on human carcinogenicity, however sufficient evidence of carcinogenicity in animals is present.

Teratogenicity:
See actual entry in RTECS for complete information.

Reproductive Effects:
No information found.

Neurotoxicity: No information available.

Mutagenicity:

No information found.

Other Studies: See actual entry in RTECS for complete information.

Section 12: Ecological Information

Exotoxicity:
Water flea Daphnia: 218mg/liter; 48 hours;
Bluegill/Sunfish: 430mg/liter; 96hour;
Static Fathead Minnow: 136mg/liter; 96 hours;
Static No data available.

Environmental Fate:
Terrestrial: Smaller releases on land will evaporate fairly rapidly. Larger releases may leach rapidly through sandy soil into groundwater.

Aquatic:

If released to surface water, its primary loss will be by evaporation. The half-life for evaporation will depend on wind and mixing conditions and was of the order of hours in the laboratory. However a modeling study using the EXAMS model for a eutrophic lake gave a half-life of 10 days.

Atmospheric:
Will degrade by reaction with hydroxyl radicals formed photochemically in the atmosphere. Half-life over one month.

Physical: Not expected to biodegrade or bioconcentrate.

Section 13: Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series: CAS# 107-06-2: waste number U077.

Section 14: Transport Information

US DOT Hazard Class:
Shipping Name: (TOXIC), Ethylene dichloride
Hazard Class: 3 (6.1)
UN Number: UN1184
Packing Group: II

IATA (for international shipments)
Shipping Name: Ethylene dichloride
Hazard Class: 3(6.1)
UN Number: UN1184
Packing Group: II

Additional Information:
Flashpoint: 13°C (55.4°F)

Section 15: Regulatory Information

United States:

TSCA
CAS# 107-06-2 is listed on the TSCA inventory.

Health & Safety Reporting List
CAS# 107-06-2: Effective Date: June 1, 1987; Sunset Date: June 1, 1997

Chemical Test Rules
CAS# 107-06-2: 40 CFR 7.99.5115

Section 12b:
CAS# 107-06-2: Section 4

TSCA Significant New Use Rule:
None of the chemicals in this material have a SNUR under TSCA.

SARA:
CERCLA (RQ)
CAS# 107-06-2: final RQ = 100 pounds (45.4 kg)

SARA:
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes

CAS # 107-06-2: immediate, delayed, fire
Section 313
This material contains 1,2-Dichloroethane (CAS# 107-06-2, 99+%),which is subject to the reporting requirements of Section 313 of SARA Title III and **40 CFR Part 373**.
Clean Air Act:
CAS# 107-06-2 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 107-06-2 is listed as a Hazardous Substance under the CWA.
CAS# 107-06-2 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

State (Individual states in the USA)

CAS# 107-06-2 can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act: WARNING: This product contains 1,2-Dichloroethane, a chemical known to the state of California to cause cancer.

California No Significant Risk Level:
CAS# 107-06-2: no significant risk level = 10 ug/day

California Prop. 65:

Proposition 65 requires manufacturers or distributors of consumer products into the State of California to provide a warning statement if the product contains ingredients for which the State has found to cause cancer, birth defects or other reproductive harm. If this product contains an ingredient listed by the State of California to cause cancer or reproductive toxicity, it will be listed below:

Ethylene dichloride CAS# 107-06-2

European/International Regulations:
European Labeling in Accordance with EC Directives

Hazard Symbols: T F

Risk Phrases:
R 11 Highly flammable.
R 22 Harmful if swallowed.
R 36/37/38 Irritating to eyes, respiratory system and skin.

R 45 May cause cancer.

Safety Phrases:
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.

WGK (Water Danger/Protection):
CAS# 107-06-2: 3

Canada
CAS# 107-06-2 is listed on Canada's DSL List.

This product has a WHMIS classification of B2, D2A, D1B.

CAS# 107-06-2 is listed on Canada's Ingredient Disclosure List.

Exposure Limits:
CAS# 107-06-2: OEL
ARAB Republic of Egypt: TWA 5 ppm (2 mg/m^3)
AUSTRALIA: TWA 10 ppm (40 mg/m^3)
AUSTRIA: TWA 20 ppm (80 mg/m^3)
BELGIUM: TWA 10 ppm (40 mg/m^3)
DENMARK: TWA 1 ppm (4 mg/m^3);Skin
FINLAND: TWA 10 ppm (40 mg/m^3);STEL 20 ppm (80 mg/m^3);CAR
FRANCE: TWA 10 ppm (40 mg/m^3)
GERMANY: Carcinogen
HUNGARY: STEL 4 mg/m^3;Carcinogen
JAPAN: TWA 10 ppm (40 mg/m^3)
THE NETHERLANDS: TWA 50 ppm (200 mg/m^3)
THE PHILIPPINES: TWA 50 ppm (200 mg/m^3)
RUSSIA: TWA 10 ppm
SWEDEN: TWA 1 ppm (4 mg/m^3);STEL 5 ppm (20 mg/m^3);Skin;CAR
SWITZERLAND: TWA 10 ppm (40 mg/m^3);STEL 20 ppm (80 mg/m^3)
TURKEY: TWA 50 ppm (200 mg/m^3)
UNITED KINGDOM: TWA 10 ppm (40 mg/m^3);STEL 15 ppm (60 mg/m^3)

Section 16: Other Information

Disclaimer of Liability:

Caution! Do not use SPI Supplies products or materials in applications involving implantation within the body; direct or indirect contact with the blood pathway; contact with bone, tissue, tissue fluid, or blood; or prolonged contact with mucous membranes. Products offered by SPI Supplies are not designed or manufactured for use in implantation in the human body or in contact with internal body fluids or tissues. SPI Supplies will not

```
provide to customers making devices for such applications any notice,
certification, or information necessary for such medical device use required
by US FDA (Food and Drug Administration) regulation or any other statute.
SPI Supplies and Structure Probe, Inc. make no representation, promise,
express warranty or implied warranty concerning the suitability of these
materials for use in implantation in the human body or in contact with
internal body tissues of fluids.

**********************************************************************
```

The information and recommendations set forth above are taken from sources believed to be accurate as of the date hereof, however SPI Supplies and Structure Probe, Inc. make no warranty with respect to the accuracy of the information or the suitability of the recommendations, and assume no liability to any user thereof. The information contained in this sheet does not constitute a hazard assessment and should not be used in place of the user's own assessment of work place risks as required by other health and safety legislation. Be aware of the Structure Probe, Inc. Copyright Policy. Structure Probe, Inc. grants a nonexclusive license to make unlimited copies of this safety sheet for internal use only. Quite obviously, this information would pertain only to this material when purchased from SPI Supplies as product from other sources, with other ingredients and impurity levels could have substantially different properties.

ON-LINE To Ask a Question or Make a Comment

ON-LINE To Place an Order or Request a Quote

Search SPI Navigator Index

Return to:

- SPI Supplies MSDS Safety Sheets Table of Contents
- SPI Supplies Catalog Table of Contents
- SPI Supplies Home Page

Material Safety Data Sheet (MSDS)
Harmonised Version for Acrylonitrile

Disclaimer

The members of the Acrylonitrile Sector Group recommend that this template document be used for writing up or updating the companies' MSDS for Acrylonitrile. It contains the basic information which the Sector Group recommend to be included in any Acrylonitrile MSDS.

The information, specifications, procedures, methods and recommendations herein are presented in good faith, are believed to be accurate and reliable, but may well be incomplete and/or not applicable to all conditions or situations that may exist or occur. No representation, guarantee or warranty is made as to the accuracy, reliability or completeness of said information, specifications, procedures, methods and recommendations or that the application or use of any of the same will avoid hazards, accidents, losses, damages or injury of any kind to persons or property or that the same will not infringe patents of others or give desired results. Readers are cautioned to satisfy themselves as to the suitability of said information, specifications, procedures, methods and recommendations for the purposes intended prior to use.

Material Safety Data Sheet (MSDS)
Harmonised Version for Acrylonitrile

Section 1 - *Identification of the Substance/Preparation and Company/Undertaking*

Substance Name: Acrylonitrile
Synonyms: Vinyl cyanide, Propene nitrile
Intended Use: Raw material for chemical synthesis
Company: *Name of company*
Manufacture Site: *Address/telephone number of manufacturing site*
Emergency Information: *24-hour emergency telephone number*

Section 2 – *Composition/Information on Ingredients*

Hazardous Components	Classification	Concentration	CAS-No.	EINECS-No	Chemical Formula
Acrylonitrile (stabilised)	F: R11 Carc Cat 2: R45 T: R23/24/25 Xi: R37/38, R41, R43 N: R51/53	>99%	107-13-1	203-466-5	CH_2=CH-CN

Section 3 – *Hazards Identification*

Physical & Chemical
Highly flammable.
May polymerise violently unless stabilised.
May react violently with acids, alkalis or peroxides.

Health
Toxic by inhalation, in contact with skin and if swallowed.
Irritating to respiratory system and skin.
Risk of serious damage to eyes.
May cause sensitisation by skin contact.
May cause cancer.

Environmental
Toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment.

Section 4 – *First Aid Measures*

General Advice
The ready availability of oxygen is essential for First Aid treatment in cases of acrylonitrile poisoning.
Take off all contaminated clothing and shower immediately.
Symptoms include headache, vomiting, dizziness, larger doses may result in unconsciousness, paralysis/cramp, cessation of breathing, death.

Anyone affected by acrylonitrile, significantly exposed to acrylonitrile but not yet showing symptoms or suspected of being significantly exposed to acrylonitrile must be referred promptly to a doctor following any necessary first aid.
First aiders must protect themselves against acrylonitrile.
Mouth-to-mouth resuscitation should not be used.
If a patient stops breathing, mechanical means should be used to inflate the lungs e.g. oxygen resuscitator.
Transfer patient to hospital.
Delayed effects may occur up to 8 hours after exposure.

Inhalation
Remove patient to fresh air.
Administer oxygen continuously even if patient appears healthy.
Keep patient quiet and warm.
Follow up with Medical treatment.

Skin Contact
Remove patient to fresh air.
Remove contaminated clothing including underwear and shoes.
Wash affected area with plenty of water until irritation has stopped.
Keep patient quiet and warm.
Follow up with medical treatment.

Eye Contact
Flush the eye immediately with plenty of water protecting the unaffected eye, until irritation has stopped.
Follow up with medical/ophthalmic treatment.

Ingestion
Conscious patients should drink at least 1 pint of water.
If patient vomits, take care to prevent inhalation of any vomit.
Keep patient quiet and warm.
Follow up with medical treatment.

Refer to Section 16 for medical notes.

Section 5 – *Fire Fighting Measures*

General Hazard
Severe fire hazard.
Highly flammable and volatile liquid.
Highly flammable vapours emitted.
The vapour is heavier than air.

Vapours or gases may ignite at distant ignition sources and flash back.
May be ignited by heat, sparks, static electrical discharge or flame.

Suitable Extinguishing Media
Dry chemical powder, alcohol foam, water spray (fog), CO_2.
After fire is extinguished re-ignition may occur from hot surfaces.
Cool containing vessels with flooding quantities of water until well after fire is out.

Extinguishing Media <u>NOT</u> to be used
Water jet (solid water stream may scatter and spread fire).

Special Exposure Hazards
If involved in a fire acrylonitrile produces very toxic fumes and dense, black, acrid smoke clouds.
Liquid will float and may re-ignite on surface water.

Special Protective Equipment for Fire-fighters
Fire-fighters must wear breathing apparatus and full chemical protection.

Further Information
Contaminated fire water must be contained and prevented from entering water courses.
If the fire is impossible to control withdraw and let it burn.
See sections 8 and 10.

<u>Section 6</u> – *Accidental Release Measures*

General Precautions
Inform emergency services and alert appropriate authorities.
Avoid ignition; vapours may be contained within water spray.
Consider evacuation for large releases.

Personal Precautions
Use personal protective equipment (see section 8) to avoid contact with skin, inhalation or ingestion.
Keep upwind.
Warn people downwind to remain indoors with all windows closed and forced ventilation systems turned off.

Environmental Precautions
Do not allow material to enter drains, water courses or groundwater.
Contain and absorb with earth, sand or other suitable inert material.

Methods for Cleaning Up
Smaller spills should be absorbed in earth or sand.
Dam-up large spills.
Use a non-sparking or explosion-proof means to transfer into an appropriate container for disposal.
After clean-up flush spill area with water.
Observe regulatory requirements for discharge to drain.

<u>Section 7</u> – *Handling and Storage*

Handling
Avoid any personal exposure to vapour or liquid.
Prevent all sources of ignition, including electrostatic discharge.
Handle material in closed systems whenever possible.

Provide appropriately designed ventilation systems, including vent scrubbers, where closed system containment is not possible.
Facilities storing or utilising this material should be equipped with an eyewash facility and a safety shower.
See section 6 (Accidental Release Measures), section 8 (Exposure Controls and Personal Protection) and section 13 (Disposal Considerations).

Storage
Keep containers tightly closed under an inert atmosphere.
Store containers in a cool, well ventilated place, away from physical damage hazards.
Store away from sources of ignition (no smoking), including electrostatic discharge.
Store in carbon steel, stainless steel or aluminium containers; the use of copper or copper containing alloys is not suitable.
Keep away from drainage systems.
Provide secondary containment, e.g. bunding for all storage vessels and kerbed contained areas for drums and IBCs.
Agitation is recommended in storage tanks.
Segregate from and avoid contact with peroxides, alkalis and oxidising agents.
The material is stabilised/inhibited against spontaneous polymerisation prior to dispatch with MEHQ (monomethyl ether of hydroquinone or p-methoxyphenol) and very small amounts of oxygen (ca. 5 ppm). A minimal content of oxygen supports maximum effectiveness of the stabiliser MEHQ. Complete removal of the oxygen content should be avoided. A scenario for complete oxygen removal could be: Long storage periods under nitrogen atmosphere together with constant stripping of the oxygen with nitrogen used for level control. In this case, the presence of oxygen should be confirmed by analysis and eventually re-established by adding dilute air. When adding air, explosion limits have of course to be respected.
If bulk volumes of acrylonitrile are stored for longer periods (about 6 weeks under normal storage conditions) without adding additional volumes of fresh product, the stabiliser content should be checked by analysis.
If stored without proper stabilisation, spontaneous polymerisation could start, detectable by turbidity, cloudiness and rising APHA (Hazen) numbers.
Avoid storage times for the material (in bulk volumes) for periods greater than 6 months.
When possible, transfer to and from tanks on a first in, first out basis.

Section 8 – *Exposure Controls and Personal Protection*

Exposure Limit Values
Workplace Exposure Limits (WELs) EH40/2005 (UK), acrylonitrile, CAS no. 107-13-1, Long-term exposure limit (8-hour TWA) 4.4 mg/m3.

Engineering Measures
Use material in closed systems to avoid any exposure.
All pipework, storage vessels and process equipment should be designed to ensure total containment at all times.
Take measures against the build up of electrostatic charges.
Where total containment cannot be provided, ventilation and/or personal protective equipment should be used to prevent any exposure or ensure exposure limit is not exceeded.
Safety shower and eye wash should be continually available in working area.

Occupational Exposure Controls
Avoid any exposure to liquid and vapours including contact with skin.
Atmospheric concentrations should be prevented or minimised below the occupational exposure limit.
Wear personal protective equipment (PPE) appropriate to task.
PPE manufacturers should be consulted.

Respiratory Protection
Use self-contained breathing apparatus.

Hand Protection
Chemical resistant protective gloves (EN 374). Suitable materials also with prolonged, direct contact *(recommended: Protective index 6, corresponding >480 minutes of permeation time according to EN 374)*: butyl rubber (butyl) - 0.7 mm coating thickness. Supplementary note: the specifications are based on own tests, literature data and information of glove manufacturers or are derived from similar substances by analogy. Due to many conditions (e.g. temperature) it must be considered, that the practical usage of a chemical-protective glove in practice may be much shorter than the permeation time determined in accordance to EN 374. Manufacturer's directions for use should be observed because of great diversity of types.

Eye Protection
Wear appropriate protective eye glasses, face shield or chemical safety goggles to European Standard EN166 (unless breathing apparatus affords full eye protection).

Skin Protection
Wear appropriate protective clothing to prevent skin exposure (to DIN-EN 465), e.g. butyl rubber boots and neoprene suit.
Recommended material(s): >8 hours (breakthrough time); butyl rubber.
Do not wear footwear with leather soles.

Environmental Exposure Controls
Avoid spillage to land or water. See section 6 (Accidental Release Measures), section 7 (Handling and Storage), section 12 (Ecological Information) and section 13 (Disposal Considerations).

Occupational Hygiene
Observe good hygiene and safety practices at all times.
When using do not eat, drink or smoke.
Wash hands, forearms and face thoroughly and immediately after working with this material.
Keep away from food and drinks.
Change contaminated clothing if only lightly contaminated and wash before re-use, otherwise dispose of appropriately.
Contaminated leather items, clothing, footwear, etc. should be appropriately disposed of and not reused.
See section 7 (Handling and Storage) and section 13 (Disposal Considerations).

<u>Section 9</u> – *Physical and Chemical Properties*

Appearance	Clear Liquid
Colour	Colourless
Odour	Mild/sweetish
Freezing/melting point/range	-83°C
Boiling point/range	77°C at atmospheric pressure
Density	806 kg/m^3 at 20°C
Vapour density (Air=1)	1.8
Vapour Pressure	116 mbar at 20°C 400 mbar at 50°C
Viscosity	0.4 cp at 20°C
Solubility in Water	Up to 73 g/l at 20°C
pH Value (at 50 g/l in H_2O)	7 at 20°C
Flash Point	- 1°C Tag closed cup - 5°C DIN 51 758
Auto-ignition Temperature	480°C DIN 51 794
Flammability limits in air	2.8% to 28% by volume
Octanol/Water Partition Coefficient (log Pow)	-0.37 to 0.25 (various data sources)
Explosive properties	None (flammable not explosive)

Oxidising properties	None
Critical temperature	263℃
Heat of combustion	-33173 kJ/kg at 25℃
Surface tension	0.0273 J/m2 at 24℃
Solubility in solvents/fats	Very soluble in acetone, benzene, diethyl ether and ethanol.
Evaporation rate	High
Conductivity	Low

Section 10 – *Stability and Reactivity*

Stability
Stable under recommended storage and handling conditions (see section 7).
Stabilisation/inhibition against polymerisation is essential for storage and transport.
Contains polymerisation inhibitors MEHQ (monomethyl ether of hydroquinone, also known as 4-methoxy phenol or p-methoxy phenol) and water, in the following concentration ranges; MeHQ: 35-45 ppm, Water: 0.2-0.5%.

Thermal Decomposition
Unstable in contact with heat and light.

Conditions to Avoid
Alkaline conditions (pH above 7) may result in rapid polymerisation. See section 7 Handling and Storage.

Materials to Avoid
Alkalis and bases. Materials containing copper. Oxidising agents.

Hazardous Reactions
Contact with strong acids, caustic, or peroxides can cause spontaneous polymerisation generating large amounts of heat. Highly exothermic; heat of polymerisation 17.3 kcal/mol. See section 7 Handling and Storage.

Hazardous Decomposition Products
Hydrogen Cyanide can be produced on decomposition.

Section 11 – *Toxicological Information*

Effects of Exposure
Headache, vomiting, dizziness.
Larger doses may result in unconsciousness, paralysis/cramp, cessation of breathing, death.
The toxicity of acrylonitrile is attributed to the compound itself and its breakdown to cyanide in the body.
Symptoms may not appear for up to 10 hours after exposure due to delayed breakdown of acrylonitrile to hydrogen cyanide in the body.
See section 16 - "Notes for Physician", section 4 (First Aid Measures) and section 8 (Exposure Controls and Personal Protection).

Inhalation
Irritation of respiratory system, headache, vomiting, dizziness, unconsciousness, paralysis/cramp, cessation of breathing, death.

Skin Contact
Irritation, rash, blistering, sensitisation, headache, vomiting, dizziness.

Eye Contact
Irritation, blurred vision, headache, vomiting, dizziness.

Ingestion
Headache, vomiting, dizziness, unconsciousness, paralysis/cramp, cessation of breathing, death.

Acute Toxicity
LD50 rat (oral) - 82 mg/kg
LD50 rabbit (dermal) - 280 mg/kg
LC50 rat (inhalation) - 946 ppm (4 hours)

Corrosivity/Irritation
Irritating to eyes and skin.
Contact with the skin can lead to blistering, and may cause sensitisation.

Sensitisation
Skin contact may cause sensitisation.

Repeated-Dose Toxicity
No known additional effects other than those described elsewhere in this section.

Carcinogenicity/Mutagenicity/Reproductive Toxicity
Known to cause cancer in animals.
Suspected human carcinogen.
No known mutagenic or reproductive toxicity effects.

Section 12 – *Ecological Information*

Ecotoxicity
Freshwater data suggests that Acrylonitrile is of moderate toxicity to aquatic organisms with reported 48 hour LC50 values ranging from 7.6 mg/l (water flea Daphnia Magna) to 70 mg/l (Rainbow trout Oncorhynchus mykiss).

Mobility
Limited solubility in water.
See Section 9 (Physical and Chemical Properties).

Persistence and Degradability
Standard degradation tests indicate that this material will degrade in the aquatic environment but not readily.
Acrylonitrile is readily degraded in acclimatised aerobic systems; anaerobic systems display greater sensitivity and may be inhibited.
Atmospheric degradation occurs via photooxidation.

Bioaccumulative Potential
Acrylonitrile is not expected to bioaccumulate due to its degradability and low octanol/water partition coefficient.

Other Adverse Effects
None known.

Section 13 – *Disposal Considerations*

General

Disposal must be carried out in accordance with local and national regulatory requirements.
In the UK, the *Hazardous Waste (England & Wales) Regulations 2005 (SI 2005 No. 894)* and the *Environmental Protection (Duty of Care) Regulations 1991 (SI 2839)* and subsequent amendments apply.

Material
Handle and dispose of in compliance with current environmental waste legislation.
Seek professional advice regarding disposal.
Incinerate only in an appropriately licensed chemical waste incinerator.
If in doubt consult the Regulator *(in the UK the Environment Agency)*.

Contaminated Material
Empty containers may be suitable for reuse or recycling after cleaning and appropriate disposal of the cleaning liquors.
Disposal method dependent upon degree and nature of contaminated material.
Disposal must be carried out in accordance with local and national regulatory requirements – see *General* above.
If in doubt seek professional advice or contact the Regulator *(in the UK the Environment Agency)*.

Section 14 – *Transport Information*

General	UN No. 1093 Class 3 Subsidiary Hazard 6.1 Proper Shipping Name: ACRYLONITRILE, INHIBITED Packing Group I TREMCARD TEC(R)61
CDG (UK Road)	EAC 3WE
ADR (European Road)	Hazard Identification No 336
IATA (Air)	*Forbidden?*
RID (Rail)	Hazard Identification No 336
IMDG (Sea)	EmS F-E, S-D Marine Pollutant No
I (Inland Water ways)	ADN B2-3
Channel Tunnel	Not permitted

Section 15 – *Regulatory Information*

Regulatory Information
Quote relevant international and national legislation/regulations.

Label
F: Highly flammable
T: Toxic
N: Dangerous for the Environment

Classification
This information already appears in section 2.

Risk Phrases

R11	Highly flammable
R23/24/25	Toxic by inhalation, in contact with skin and if swallowed
R37/38	Irritating to respiratory system and skin
R41	Risk of serious damage to eyes
R43	May cause sensitisation by skin contact
R45	May cause cancer
R51/53	Toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment

Safety Phrases

S9	Keep container in a well ventilated place.
S16	Keep away from sources of ignition – No smoking.
S45	In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).
S53	Avoid exposure - Obtain special instruction before use.
S61	Avoid release to the environment. Refer to special instructions/safety data sheet.

Section 16 – *Other Information*

Material Safety Data Sheet

Vinyl acetate monomer, inhibited with 3-30ppm Hydroquinone

ACC# 01681

Section 1 - Chemical Product and Company Identification

MSDS Name: Vinyl acetate monomer, inhibited with 3-30ppm Hydroquinone
Catalog Numbers: AC140840000, AC140840010, AC140840025, AC140840250, O5057-4, O5057FB115
Synonyms: Ethenyl acetate; Ethenyl ethanoate; Vinyl A monomer; Vinyl ethanoate; 1-Acetoxyethylene.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
108-05-4	Vinyl acetate	99	203-545-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: -8 deg C.
Danger! Possible cancer hazard. May cause cancer based on animal data. Risk of cancer depends on duration and level of exposure. Extremely flammable liquid and vapor. Vapor may cause flash fire. Causes eye and skin irritation and possible burns. May cause allergic skin reaction. May cause respiratory tract irritation. This material has been reported to be susceptible to autoxidation and therefore should be classified as peroxidizable. Light sensitive. Hazardous due to peroxide initiation of polymerization.
Target Organs: Central nervous system, liver, eyes, skin.

Potential Health Effects

Eye: Contact with eyes may cause severe irritation, and possible eye burns.
Skin: May cause mild skin irritation. May be absorbed through the skin in harmful amounts. Material evaporates quickly from open skin. However, it may cause burns if trapped under clothing. May cause an allergic reaction in certain individuals.
Ingestion: Aspiration hazard. May cause gastrointestinal irritation with nausea, vomiting and diarrhea.
Inhalation: Harmful if inhaled. May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Vapors may cause dizziness or suffocation.

Chronic: Possible cancer hazard based on tests with laboratory animals. Chronic ingestion may cause liver damage. Prolonged or repeated skin contact may cause sensitization dermatitis and possible destruction and/or ulceration. Repeated inhalation may cause chronic bronchitis. Prolonged exposure may produce a narcotic effect. Repeated exposure may cause central nervous system damage.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. May accumulate static electrical charges, and may cause ignition of its own vapors. Polymerizes readily if not inhibited; heat can initiate reaction. Extremely flammable liquid and vapor. Vapor may cause flash fire.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Do NOT use water directly on fire. Use water spray to cool fire-exposed containers. Water may be ineffective. Do NOT use straight streams of water. Use water only in flooding quantities as fog.
Flash Point: -8 deg C (17.60 deg F)
Autoignition Temperature: 426 deg C (798.80 deg F)
Explosion Limits, Lower:2.6
Upper: 14.0
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 2

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Ground and bond containers when transferring material. Use spark-

proof tools and explosion proof equipment. Do not get in eyes, on skin, or on clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep away from heat, sparks and flame. Avoid ingestion and inhalation. Store protected from light. Wash clothing before reuse. Discard contaminated shoes. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from sources of ignition. Refrigerator/flammables. Keep away from polymerization catalysts. Store protected from light. Vinyl acetate inhibited with hydroquinone should be stored at temperatures not exceeding 86°F (30°C), and for periods not exceeding 6 months. Refrigeration is recommended.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Ventilation fans and other electrical service must be non-sparking and have an explosion-proof design.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Vinyl acetate	10 ppm TWA; 15 ppm STEL	none listed	none listed

OSHA Vacated PELs: Vinyl acetate: 10 ppm TWA; 30 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: sweetish odor - sharp odor
pH: Not available.
Vapor Pressure: 85 mm Hg @ 20 deg C
Vapor Density: 3.0
Evaporation Rate: Not available.
Viscosity: 0.43 cPús@20 deg C
Boiling Point: 72 - 73 deg C
Freezing/Melting Point:-93 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:.9340
Molecular Formula:C4H6O2
Molecular Weight:86.0408

Section 10 - Stability and Reactivity

Chemical Stability: Peroxide formation may occur in containers that have been opened and remain in storage. May form explosive peroxides. May polymerize violently or explosively if contaminated or overheated. Uncontrolled polymerization can cause rapid evolution of heat and increased pressure which can result in violent rupture of storage vessels or containers.
Conditions to Avoid: Incompatible materials, light, ignition sources, excess heat, oxidizers.
Incompatibilities with Other Materials: Nonoxidizing mineral acids, ammonia, aliphatic amines, ethylene diamine, ethyleneimine, ozone, oleum, peroxides, strong acids, alkanolamines, hydrochloric acid, hydrofluoric acid, nitric acid, sulfuric acid, polymerizing initiators, oxygen.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 108-05-4: AK0875000
LD50/LC50:
CAS# 108-05-4:
Inhalation, mouse: LC50 = 1550 ppm/4H;
Inhalation, rabbit: LC50 = 2500 ppm/4H;
Inhalation, rat: LC50 = 11400 mg/m3/4H;
Oral, mouse: LD50 = 1600 mg/kg;
Oral, rat: LD50 = 2900 mg/kg;
Skin, rabbit: LD50 = 2335 mg/kg;
.

Carcinogenicity:
CAS# 108-05-4:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** Not listed.
- **NTP:** Not listed.
- **IARC:** Group 2B carcinogen

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: LC50 = 31.0 mg/L; 96 Hr.; UnspecifiedFish: Bluegill/Sunfish: LC50 = 31.0 mg/L; 96 Hr.; UnspecifiedFish: Goldfish: LC50 = 31.0 mg/L; 96 Hr.; UnspecifiedWater flea EC50 = 52.0 mg/L; 24 Hr.; Unspecified No data available.
Environmental: Under aerobic conditions, Vinyl acetate readily biodegrades. BOD (5-day) values are in the range of 42-62% of COD. Biodegradation also occurs under anaerobic conditions.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	VINYL ACETATE, STABILIZED	VINYL ACETATE STABILIZED
Hazard Class:	3	3
UN Number:	UN1301	UN1301
Packing Group:	II	II
Additional Info:		FLASHPOINT -8 C

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 108-05-4 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 108-05-4: Effective 2/10/86, Sunset 2/10/96
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 108-05-4: 5000 lb final RQ; 2270 kg final RQ
SARA Section 302 Extremely Hazardous Substances
CAS# 108-05-4: 1000 lb TPQ
SARA Codes
CAS # 108-05-4: immediate, fire, reactive.
Section 313
This material contains Vinyl acetate (CAS# 108-05-4, 99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 108-05-4 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 108-05-4 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE

CAS# 108-05-4 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN F

Risk Phrases:

R 11 Highly flammable.
R 40 Limited evidence of a carcinogenic effect.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 23 Do not inhale gas/fumes/vapour/spray.
S 29 Do not empty into drains.
S 33 Take precautionary measures against static discharges.

WGK (Water Danger/Protection)

CAS# 108-05-4: 2

Canada - DSL/NDSL

CAS# 108-05-4 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2, D2A, F.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 108-05-4 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 5/19/1999
Revision #7 Date: 10/25/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet
Methyl Isobutyl Ketone

ACC# 14550

Section 1 - Chemical Product and Company Identification

MSDS Name: Methyl Isobutyl Ketone
Catalog Numbers: M213 1, M213 20, M213 4, M213-1, M213-20, M213-4, M2131, M21320, M213200, M2134, NC9652550, XX213200LI
Synonyms: Hexone, Isopropylacetone, 4-Methyl-2-Oxopentane, MIBK.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
108-10-1	Methyl isobutyl ketone	>98.5	203-550-1

Hazard Symbols: XN F
Risk Phrases: 11 36/37 20 66

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless. Flash Point: 14 deg C. **Warning! Flammable liquid.** May cause central nervous system depression. May cause liver damage. Causes eye and skin irritation. Causes digestive and respiratory tract irritation. May cause fetal effects.
Target Organs: Central nervous system, liver.

Potential Health Effects

Eye: Vapors may cause eye irritation. May cause painful sensitization to light. Contact produces irritation, tearing, and burning pain.
Skin: Causes skin irritation. Prolonged and/or repeated contact may cause irritation and/or dermatitis.
Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause effects similar to those for inhalation exposure.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. Exposure produces central nervous system depression. May cause liver abnormalities. May cause visual abnormalities.
Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed.
Skin: Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Firefighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. May polymerize explosively when involved in a fire.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. Water may be ineffective. For large fires, use water spray, fog or alcohol-resistant foam. Do NOT use straight streams of water. Cool containers with flooding quantities of water until well after fire is out.

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Avoid runoff into storm sewers and ditches which lead to waterways. Wear a self contained breathing apparatus and appropriate Personal protection. (See Exposure Controls, Personal Protection section). Scoop up with a nonsparking tool, then place into a suitable container for disposal. Remove all sources of ignition. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with skin and eyes. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from sources of ignition. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Methyl isobutyl ketone	50 ppm; 75 ppm STEL	50 ppm TWA; 205 mg/m3 TWA 500 ppm IDLH	100 ppm TWA; 410 mg/m3 TWA

OSHA Vacated PELs: Methyl isobutyl ketone: 50 ppm TWA; 205 mg/m3 TWA

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to minimize contact with skin.

Respirators: Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: Sweet, camphor-like.
pH: Not available.
Vapor Pressure: 15.7 mm Hg @ 20
Vapor Density: 3.5 (air=1)
Evaporation Rate:1.6 (butyl acetate=1)
Viscosity: Not available.
Boiling Point: 117.4 deg C @ 760.00mm Hg
Freezing/Melting Point:-84 deg C
Decomposition Temperature: Not available.
Autoignition Temperature: 460 deg C (860.00 deg F)
Flash Point: 14 deg C (57.20 deg F)
NFPA Rating: (estimated) Health: 2; Flammability: 3; Reactivity: 1
Explosion Limits, Lower:1.40 vol %
Upper: 7.50 vol %
Solubility: 17 g/l (20 c)
Specific Gravity/Density:.8010g/cm3
Molecular Formula:C6H12O
Molecular Weight:100.16

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.

Conditions to Avoid: Incompatible materials, ignition sources, excess heat.

Incompatibilities with Other Materials: Oxidizing agents, potassium tert-butoxide, reducing agents, strong bases. Substance may form explosive peroxides with air.

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.

Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 108-10-1: SA9275000
LD50/LC50:
CAS# 108-10-1:
Inhalation, mouse: LC50 =23300 mg/m3;
Oral, mouse: LD50 = 2671 mg/kg;
Oral, rat: LD50 = 2080 mg/kg;
Skin, rabbit: LD50 = >20 gm/kg;
Carcinogenicity:
CAS# 108-10-1: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology: No information available.
Teratogenicity: Embryo or Fetus: Death, inhalation(ihl)-mouse TCLo=3000 ppm/6H; Stunted fetus, ihl-rat TCLo=300ppm/6H. Specific Developmental Abnormalities: Cardiovascular and Central nervous system, ihl-mouse TCLo=3000ppm/6H; Musculoskeletal, ihl-rat TCLo=300ppm/6H.
Reproductive Effects: No information available.
Neurotoxicity: No information available.
Mutagenicity: No information available.
Other Studies: None.

Section 12 - Ecological Information

Ecotoxicity: Redwinged blackbird, oral LD50=100mg/kg. Goldfish LC50=460mg/L/24H.
Environmental Fate: In soil, substance will undergo direct photolysis, volatilization, or aerobic biodegradation. Substance is highly mobile and may also leach to groundwater. In water, substance will undergo direct photolysis and volatilization. Bioaccumulation is not highly predicted. In air, substance will react with hydroxyl radicals or undergo direct photolysis.
Physical/Chemical: None.
Other: Please refer to the Handbook of Envirnmental Fate and Exposure Data for additional information.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 108-10-1: waste number U161; (Ignitable waste).

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	METHYL ISOBUTYL KETONE				METHYL ISOBUTYL KEYTONES
Hazard Class:	3				3
UN Number:	UN1245				UN1245

Packing Group:	II				II
Additional Info:					FLASHPOINT 18C

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 108-10-1 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 108-10-1: Effective Date: October 4, 1982; Sunset Date: October 4 , 1992
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

Section 302 (RQ)
CAS# 108-10-1: final RQ = 5000 pounds (2270 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 108-10-1: acute, chronic, flammable, reactive.
Section 313
This material contains Methyl isobutyl ketone (CAS# 108-10-1, 98 5%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 108-10-1 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 108-10-1 can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
XN F
Risk Phrases:
R 11 Highly flammable. R 36/37 Irritating to eyes and respiratory system. R 20 Harmful by inhalation. R 66 Repeated exposure may cause skin dryness or cracking.
Safety Phrases:
S 16 Keep away from sources of ignition - No smoking. S 29 Do not empty into drains. S 9 Keep container in a well-ventilated place.
WGK (Water Danger/Protection)
CAS# 108-10-1: 1

Canada
CAS# 108-10-1 is listed on Canada's DSL/NDSL List.
This product has a WHMIS classification of B2, D2B.
CAS# 108-10-1 is not listed on Canada's Ingredient Disclosure List.
Exposure Limits

Section 16 - Additional Information

MSDS Creation Date: 5/19/1999
Revision #3 Date: 8/02/2000
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

ScienceLab.com
Chemicals & Laboratory Equipment

Health	2
Fire	3
Reactivity	0
Personal Protection	J

Material Safety Data Sheet
m-Xylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: m-Xylene

Catalog Codes: SLX1066

CAS#: 108-38-3

RTECS: ZE2275000

TSCA: TSCA 8(b) inventory: m-Xylene

CI#: Not applicable.

Synonym: m-Methyltoluene

Chemical Name: 1,3-Dimethylbenzene

Chemical Formula: C6H4(CH3)2

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
{m-}Xylene	108-38-3	100

Toxicological Data on Ingredients: m-Xylene: ORAL (LD50): Acute: 5000 mg/kg [Rat.]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit.].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant). Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant). Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation. CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to blood, kidneys, the nervous system, liver. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 527°C (980.6°F)

Flash Points: CLOSED CUP: 25°C (77°F). OPEN CUP: 28.9°C (84°F) (Cleveland).

Flammable Limits: LOWER: 1.1% UPPER: 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards:
Explosive in the form of vapor when exposed to heat or flame. Vapor may travel considerable distance to source of ignition and flash back. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid, insoluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes Keep away from incompatibles such as oxidizing agents.

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection: Splash goggles. Lab coat. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 100 STEL: 150 (ppm) from ACGIH (TLV) TWA: 434 STEL: 651 (mg/m3) from ACGIHConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Liquid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 106.17 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 139.3°C (282.7°F)

Melting Point: -47.87°C (-54.2°F)

Critical Temperature: Not available.

Specific Gravity: 0.86 (Water = 1)

Vapor Pressure: 6 mm of Hg (@ 20°C)

Vapor Density: 3.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.62 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether.

Solubility:
Easily soluble in methanol, diethyl ether. Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact.

Toxicity to Animals:
Acute oral toxicity (LD50): 5000 mg/kg [Rat.]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit.].

Chronic Effects on Humans: The substance is toxic to blood, kidneys, the nervous system, liver.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant). Slightly hazardous in case of skin contact (permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
0347 Animal: embryotoxic, foetotoxic, passes through the placental barrier. 0900 Detected in maternal milk in human. Narcotic effect; may cause nervous system disturbances.

Special Remarks on other Toxic Effects on Humans: Material is irritating to mucous membranes and upper respiratory tract.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Xylene : UN1307 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: m-Xylene Massachusetts RTK: m-Xylene TSCA 8(b) inventory: m-Xylene SARA 313 toxic chemical notification and release reporting: m-Xylene CERCLA: Hazardous substances.: m-Xylene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R10- Flammable. R38- Irritating to skin. R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Material safety data sheet emitted by: la Commission de la SantÃ© et de la SÃ©curitÃ© du Travail du QuÃ©bec. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du rÃ¨glement sur le transport des marchandises dangeureuses au canada. Centre de conformitÃ© internatinal LtÃ©e. 1986.

Other Special Considerations: Not available.

Created: 10/10/2005 08:33 PM

Last Updated: 11/01/2010 12:00 PM

MSDS Number: **C5456** * * * * * *Effective Date:* ***05/26/09*** * * * * * *Supercedes:* ***07/06/06***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

m-CRESOL

1. Product Identification

Synonyms: m-Cresol practical; phenol, 3-methyl-; 3-hydroxytoluene; meta-Cresylic Acid; 3-Cresol; m-Cresylic Acid
CAS No.: 108-39-4
Molecular Weight: 108.14
Chemical Formula: C7H8O
Product Codes: F842

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
m-Cresol	108-39-4	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CORROSIVE. CAUSES SEVERE BURNS TO EVERY AREA OF CONTACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, PANCREAS AND CARDIOVASCULAR SYSTEM. VAPOR IS IRRITATING TO EYES AND RESPIRATORY TRACT. COMBUSTIBLE LIQUID AND VAPOR.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 2 - Moderate
Reactivity Rating: 1 - Slight
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: White (Corrosive)

Potential Health Effects

Cresol is toxic via ingestion and skin absorption. Cresol is similar to phenol in its action on the body, but is less severe in its effects.

Inhalation:
Breathing vapor, dust or mist results in digestive disturbances (vomiting, difficulty in swallowing, diarrhea, loss of appetite). Will irritate, possibly burn respiratory tract. Other symptoms listed under ingestion may also occur.
Ingestion:
Poison. Symptoms may include burning pain in mouth and throat, abdominal pain, headache, dizziness, muscular weakness, irregular breathing, weak pulse, lung damage, liver damage, pancreas damage, kidney damage, coma, and possibly death from circulatory or cardiac failure.
Skin Contact:
Corrosive. Causes severe pain followed by numbness. May be absorbed through the skin with systemic poisoning effects to follow. Discoloration and severe burns may occur.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Repeated exposure may cause symptoms described for acute poisoning as well as liver damage.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Onset of systemic effects may be delayed as long as 72 hours.

5. Fire Fighting Measures

Fire:
Flash point: 86C (187F) CC
Autoignition temperature: 1038C (1900F)
Flammable limits in air % by volume:
lel: 1.1; uel: 1.4
Combustible Liquid and Vapor! Contact with strong oxidizers may cause fire.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8.

Solid Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container.

Liquid Spills: Absorb with vermiculite, dry sand, earth or similar material and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer.

Any Spill:
US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Protect from light. Outside or detached storage is preferred. Separate from other storage. Do not allow untrained workers to handle cresol. Containers of this material may be hazardous when empty since they retain product residues (dust, solids, vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
5 ppm (TWA) (skin), cresol, all isomers

-ACGIH Threshold Limit Value (TLV):
5 ppm (TWA) (skin), cresol, all isomers

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full-face piece respirator with an organic vapor cartridge and particulate filter (NIOSH type P100 or R100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. Please note that N series filters are not recommended for this material. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Colorless to yellow liquid.
Odor:
Phenolic odor.
Solubility:
Soluble in water.
Specific Gravity:
1.034 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
No information found.
Boiling Point:
202C (396F)
Melting Point:
11 - 12C (52 - 54F)
Vapor Density (Air=1):
3.72
Vapor Pressure (mm Hg):
0.1528 @ 25C (77F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Darkens on exposure to air or light.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Oxidizing agents and bases.
Conditions to Avoid:
Heat, flame, ignition sources, incompatibles, light, and air.

---

11. Toxicological Information

Toxicological Data:
Rat oral LD50: 242 mg/kg; Rabbit skin LD50: 2050 mg/kg. Irritant (std Draize) rabbit: skin = 517 mg/24H, severe; eye = 103 mg, severe. Investigated as a tumorigen, mutagen, reproductive effector.
Carcinogenicity:
EPA / IRIS classification: Group C - Possible human carcinogen.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
m-Cresol (108-39-4)	No	No	None

---

12. Ecological Information

Environmental Fate:
When released into water, this material is expected to readily biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this

material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals.
Environmental Toxicity:
The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CRESOLS
Hazard Class: 6.1, 8
UN/NA: UN2076
Packing Group: II
Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: CRESOLS, LIQUID
Hazard Class: 6.1, 8
UN/NA: UN2076
Packing Group: II
Information reported for product/size: 4L

International (Air, I.C.A.O.)

Proper Shipping Name: CRESOLS
Hazard Class: 6.1, 8
UN/NA: UN2076
Packing Group: II
Information reported for product/size: 4L

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
m-Cresol (108-39-4)                            Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
m-Cresol (108-39-4)                            Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
--------------------------------------  ---   -----   ----  --------------
m-Cresol (108-39-4)                     No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                -RCRA-    -TSCA-
Ingredient                              CERCLA     261.33     8(d)
--------------------------------------  ------     ------    ------
m-Cresol (108-39-4)                     100        No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: 2X
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **2** Reactivity: **0**

Label Hazard Warning:

POISON! DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CORROSIVE. CAUSES SEVERE BURNS TO EVERY AREA OF CONTACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, PANCREAS AND CARDIOVASCULAR SYSTEM. VAPOR IS IRRITATING TO EYES AND RESPIRATORY TRACT. COMBUSTIBLE LIQUID AND VAPOR.

Label Precautions:

Do not breathe vapor or mist.
Do not get in eyes, on skin, or on clothing.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 3.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

SIGMA-ALDRICH

MATERIAL SAFETY DATA SHEET

Date Printed: 01/17/2008
Date Updated: 01/31/2007
Version 1.2

Section 1 - Product and Company Information

Product Name	BIS(2-CHLOROISOPROPYL)ETHER, 100MG, NEAT
Product Number	48498
Brand	SUPELCO
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	Yes

Formula	C6H12Cl2O
Synonyms	Bis(beta-chloroisopropyl)ether * Bis(2-chloroisopropyl) ether * Bis(2-chloro-1-methylethyl) ether * Bis(1-chloro-2-propyl) ether * (2-Chloro-1-methylethyl) ether * DCIP * DCIP (nematocide) * Dichlorodiisopropyl ether * beta,beta'-Dichlorodiisopropyl ether * Dichloroisopropyl ether * 2,2'-Dichloroisopropyl ether * Isopropylchlorex * NCI-C50044 * Nemamol * Nemamort * Nemamorte * 2,2'-Oxybis(1-chloropropane) * Propane, 2,2'-oxybis(1-chloro- * RCRA waste number U027
RTECS Number:	KN1750000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Harmful.

Harmful if swallowed. Irritating to eyes, respiratory system and skin.

HMIS RATING

HEALTH: 2
FLAMMABILITY: 0
REACTIVITY: 0

NFPA RATING

HEALTH: 2
FLAMMABILITY: 0
REACTIVITY: 0

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE
If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear respirator, chemical safety goggles, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe dust. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed.
Store at 2-8°C

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a dust mask type N95 (US) or type P1 (EN 143) respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash thoroughly after handling.

Section 9 - Physical/Chemical Properties

Appearance Physical State: Solid

Property	Value	At Temperature or Pressure
Molecular Weight	N/A	
pH	N/A	
BP/BP Range	N/A	
MP/MP Range	N/A	
Freezing Point	N/A	
Vapor Pressure	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	N/A	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	N/A	
Explosion Limits	N/A	
Flammability	N/A	
Autoignition Temp	N/A	
Refractive Index	N/A	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: Causes skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: Causes eye irritation.
Inhalation: May be harmful if inhaled. Material is irritating to mucous membranes and upper respiratory tract.
Ingestion: Harmful if swallowed.

SIGNS AND SYMPTOMS OF EXPOSURE
The chemical, physical, and toxicological properties of this product have not been thoroughly investigated.

TOXICITY DATA

Oral
Rat
240 mg/kg
LD50

Skin
Rat
> 2000 mg/kg
LD50

Oral
Mouse
296 mg/kg
LD50

Skin
Rabbit
3 ML/KG
LD50

CHRONIC EXPOSURE - CARCINOGEN
Result: This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC CARCINOGEN LIST

Rating: Group 3

NTP CARCINOGEN LIST

Rating: No evidence.
Species: Rat
Route: Gavage

CHRONIC EXPOSURE - MUTAGEN

Species: Mouse
Dose: 250 MG/L
Cell Type: lymphocyte
Mutation test: Mutation in mammalian somatic cells.

Species: Hamster
Dose: 124 MG/L
Cell Type: ovary
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 11300 UG/L
Cell Type: ovary
Mutation test: Sister chromatid exchange

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Toxic solids, organic, n.o.s.
UN#: 2811
Class: 6.1
Packing Group: Packing Group III
Hazard Label: Toxic substances.
PIH: Not PIH

IATA
Proper Shipping Name: Toxic solid, organic, n.o.s.
IATA UN Number: 2811
Hazard Class: 6.1
Packing Group: III

Section 15 - Regulatory Information

EU ADDITIONAL CLASSIFICATION
Symbol of Danger: Xn
Indication of Danger: Harmful.
R: 22-36/37/38
Risk Statements: Harmful if swallowed. Irritating to eyes, respiratory system and skin.
S: 26
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Harmful.
Risk Statements: Harmful if swallowed. Irritating to eyes, respiratory system and skin.
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: Yes
DEMINIMIS: 1 %

NOTES: This product is subject to SARA section 313 reporting requirements.
TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: No
NDSL: Yes

Section 16 - Other Information

DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 108-67-8
Date: 03/09/2001

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: 1,3,5-TRIMETHYLBENZENE SYNONYMS: Trimethylbenzol, Mesitylene

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	**Formula**	**CAS #**	**Concentration**	**ACGIH TLV**	**OSHA PEL**	**MAC**	**Other STEL**
1,3,5-TRIMETHYLBENZENE	C9H12	108-67-8	99+%	25	NE	NE	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.
Can form explosive mixtures with air.
Can cause skin and respiratory tract irritation.
May cause irritation to the eyes and mucous membrane.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Ingestion

ACUTE EFFECTS: Inhalation of vapors may cause pulmonary edema, circulatory collapse, damage to upper respiratory tract, coughing, difficulty breathing and choking. Symptoms include burning sensation, coughing, wheezing, shortness of breath, headache, nausea, and vomiting. May cause pulmonary edema, fainting, convulsions and coma. Skin contact can cause defatting and dermatitis. Eye contact may result in destruction of eye tissue. Ingestion irritates the digestive tract and results in systemic effects from absorption.

CHRONIC EFFECTS: Kidney and liver damage. Blood effects.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Liver, kidney, skin, and central nervous system diseases or disorders.

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - No
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes. Do not allow victim to rub or keep eyes tightly shut.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Never give anything by mouth to an unconscious person. If ingested, have that conscious and alert person drink 1 to 2 glasses of water. Do not induce vomiting. If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration to the victim.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: 50 deg. C

AUTOIGNITION TEMPERATURE: 595 deg. C

FLAMMABLE LIMITS: Vol. %

LOWER: .93
UPPER: 8.62

EXTINGUISHING MEDIA: Carbon dioxide, foam, or dry chemical. Water is ineffective in putting out a fire, but should be used for cooling fire exposed cylinders.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide may be given off during combustion.

UNUSUAL FIRE AND EXPLOSION HAZARDS: May form explosive mixture in air. Dangerous fire hazard and moderate explosion hazard when heated. Vapors may travel a considerable distance to the source of ignition and flash back.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Remove leaking cylinder to exhaust hood or safe outdoor

area. Shut off source if possible and remove source of heat.

SPECIALIZED EQUIPMENT: Absorb small spills using a solid adsorbent such as vermiculite. Use non-sparking tools.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Safety glasses , Goggles.

SKIN PROTECTION: Protective gloves.

RESPIRATORY PROTECTION: In case of leakage, use self-contained breathing apparatus.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Odorless

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @20 deg.C: 1.86 mm Hg

VAPOR DENSITY (AIR=1): 4.14

BOILING POINT (C): 165

SOLUBILITY IN WATER: Insoluble

SPECIFIC GRAVITY (H2O=1): @4 deg.C: 0.888

EVAPORATION RATE: N/Av

ODOR THRESHOLD: N/Ap

10. STABILITY AND REACTIVITY

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: Oxidizing agents.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): 7,230 ppm, Rat 1 hour

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/AP

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: 1,3,5-Trimethylbenzene
HAZARD CLASS: 3 (flammable), Packing Group III
INDENTIFICATION NUMBER: UN2825
REPORTABLE QUANTITIES: None
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): Class 3, 31(c)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 202-436-9

NUMBER IN ANNEX 1 OF DIR 67/548: Material is listed in annex 1.

EU CLASSIFICATION: N/Av

R: 10

S: 9

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

MSDS Number: **B4080** * * * * * *Effective Date:* ***11/17/99*** * * * * * *Supercedes:* ***12/08/96***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker ®

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

BROMOBENZENE

1. Product Identification

Synonyms: Monobromobenzene, phenyl bromide
CAS No.: 108-86-1
Molecular Weight: 157.01
Chemical Formula: C6H5Br
Product Codes: 2711

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Bromobenzene	108-86-1	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. MAY AFFECT LIVER AND CENTRAL NERVOUS SYSTEM. FLAMMABLE LIQUID AND VAPOR. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 2 - Moderate
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER.
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. Affects central nervous system causing dizziness, incoordination and unconsciousness. May be absorbed into the bloodstream with symptoms similar to ingestion.

Ingestion:
May cause abdominal pain, nausea, vomiting, diarrhea, headache, dullness, central nervous system effects and liver damage. Estimated lethal human dose is 50 - 500 mg/kg.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
No information found.
Aggravation of Pre-existing Conditions:
Persons with pre-existing liver damage may be more susceptible to the effects of this material.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Wash skin with soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Flash point: 51C (124F)
Autoignition temperature: 566C (1051F)
Explosion:
Above the flash point, explosive vapor-air mixtures may be formed. Vapors can flow along surfaces to distant ignition source and flash back. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. Sensitive to static discharge.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Use water spray to blanket fire, cool fire exposed containers, and to flush non-ignited spills or vapors away from fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the substance is apparent, consult an industrial hygienist. For emergencies, or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Characteristic aromatic odor.
Solubility:
Insoluble in water.

Specific Gravity:
1.50 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
No information found.
Boiling Point:
156C (313F)
Melting Point:
-31C (-24F)
Vapor Density (Air=1):
5.41
Vapor Pressure (mm Hg):
10 @ 40C (104F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Oxides of carbon as well as ionic or oxidized halogen.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizers.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Oral rat LD50: 2699 mg/kg. Inhalation rat LC50: 20411 mg/kg. Investigated as a mutagen.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Bromobenzene (108-86-1)	No	No	None

---

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: BROMOBENZENE
Hazard Class: 3
UN/NA: UN2514
Packing Group: III
Information reported for product/size: 500ML

International (Water, I.M.O.)

Proper Shipping Name: BROMOBENZENE
Hazard Class: 3.3
UN/NA: UN2514
Packing Group: III
Information reported for product/size: 500ML

International (Air, I.C.A.O.)

Proper Shipping Name: BROMOBENZENE
Hazard Class: 3.3
UN/NA: UN2514
Packing Group: III
Information reported for product/size: 500ML

---

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Bromobenzene (108-86-1)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

		--Canada--		
Ingredient	Korea	DSL	NDSL	Phil.
Bromobenzene (108-86-1)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

	-SARA 302-		------SARA 313------	
Ingredient	RQ	TPQ	List	Chemical Catg.
Bromobenzene (108-86-1)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

		-RCRA-	-TSCA-
Ingredient	CERCLA	261.33	8(d)
Bromobenzene (108-86-1)	No	No	No

```
Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: No   Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: 2[Y]
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **2** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. MAY AFFECT LIVER AND CENTRAL NERVOUS SYSTEM. FLAMMABLE LIQUID AND VAPOR. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.
Label Precautions:
Wash thoroughly after handling.
Avoid contact with eyes, skin and clothing.
Avoid breathing vapor.
Keep container closed.
Use only with adequate ventilation.
Keep away from heat, sparks and flame.
Label First Aid:
If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.
Product Use:
Laboratory Reagent.
Revision Information:
New 16 section MSDS format, all sections have been revised.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **T3913** * * * * * *Effective Date:* ***09/16/09*** * * * * * *Supercedes:* ***12/07/07***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TOLUENE

1. Product Identification

Synonyms: Methylbenzene; Toluol; Phenylmethane
CAS No.: 108-88-3
Molecular Weight: 92.14
Chemical Formula: C6H5-CH3
Product Codes:
J.T. Baker: 5375, 5812, 9336, 9351, 9364, 9456, 9457, 9459, 9460, 9462, 9466, 9472, 9476
Mallinckrodt: 4483, 8092, 8604, 8608, 8610, 8611, V560

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Toluene	108-88-3	100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation may cause irritation of the upper respiratory tract. Symptoms of overexposure may include fatigue, confusion, headache, dizziness and drowsiness. Peculiar skin sensations (e. g. pins and needles) or numbness may be produced. Very high concentrations may cause unconsciousness and death.
Ingestion:
Swallowing may cause abdominal spasms and other symptoms that parallel over-exposure from inhalation. Aspiration of material into the lungs can cause chemical pneumonitis, which may be fatal.
Skin Contact:
Causes irritation. May be absorbed through skin.
Eye Contact:
Causes severe eye irritation with redness and pain.
Chronic Exposure:
Reports of chronic poisoning describe anemia, decreased blood cell count and bone marrow hypoplasia. Liver and kidney damage may occur. Repeated or prolonged

contact has a defatting action, causing drying, redness, dermatitis. Exposure to toluene may affect the developing fetus.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or impaired liver or kidney function may be more susceptible to the effects of this substance. Alcoholic beverage consumption can enhance the toxic effects of this substance.

4. First Aid Measures

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. CALL A PHYSICIAN IMMEDIATELY.

Ingestion:

Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately. If vomiting occurs, keep head below hips to prevent aspiration into lungs.

Skin Contact:

In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician immediately.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Flash point: 7C (45F) CC
Autoignition temperature: 422C (792F)
Flammable limits in air % by volume:
lel: 1.1; uel: 7.1
Flammable liquid and vapor!
Dangerous fire hazard when exposed to heat or flame. Vapors can flow along surfaces to distant ignition source and flash back.

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion. Sensitive to static discharge.

Fire Extinguishing Media:

Dry chemical, foam or carbon dioxide. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water spray may be used to keep fire exposed containers cool.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

Toluene:
- OSHA Permissible Exposure Limit (PEL):
200 ppm (TWA); 300 ppm (acceptable ceiling conc.); 500 ppm (maximum conc.).
- ACGIH Threshold Limit Value (TLV):
20 ppm (TWA), A4 - Not Classifiable as a Human Carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Aromatic benzene-like.
Solubility:
0.05 gm/100gm water @ 20C (68F).
Specific Gravity:
0.86 @ 20C / 4 C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
111C (232F)
Melting Point:
-95C (-139F)
Vapor Density (Air=1):
3.14
Vapor Pressure (mm Hg):
22 @ 20C (68F)
Evaporation Rate (BuAc=1):
2.24

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Heat, flame, strong oxidizers, nitric and sulfuric acids, chlorine, nitrogen tetraoxide; will attack some forms of plastics, rubber, coatings.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 636 mg/kg; skin rabbit LD50: 14100 uL/kg; inhalation rat LC50: 49 gm/m3/4H; Irritation data: skin rabbit, 500 mg, Moderate; eye rabbit, 2 mg/24H, Severe. Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
Has shown some evidence of reproductive effects in laboratory animals.

```
--------\Cancer Lists\----------------------------------------------------
                                   ---NTP Carcinogen---
Ingredient                         Known    Anticipated    IARC Category
---------------------------------- -----    -----------    -------------
Toluene (108-88-3)                  No          No              3
```

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly

bioaccumulate. This material has a log octanol-water partition coefficient of less than 3.0. Bioconcentration factor = 13.2 (eels).

Environmental Toxicity:

This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TOLUENE
Hazard Class: 3
UN/NA: UN1294
Packing Group: II
Information reported for product/size: 390LB

International (Water, I.M.O.)

Proper Shipping Name: TOLUENE
Hazard Class: 3
UN/NA: UN1294
Packing Group: II
Information reported for product/size: 390LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Toluene (108-88-3)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

		--Canada--		
Ingredient	Korea	DSL	NDSL	Phil.
Toluene (108-88-3)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

	-SARA 302-		------SARA 313------	
Ingredient	RQ	TPQ	List	Chemical Catg.
Toluene (108-88-3)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------------

		-RCRA-	-TSCA-
Ingredient	CERCLA	261.33	8(d)
Toluene (108-88-3)	1000	U220	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 3[Y]E
Poison Schedule: S6
WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **0**
Label Hazard Warning:

POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL.

FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:

Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.

Label First Aid:

Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head below hips to prevent aspiration into lungs. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician immediately.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **C2475** * * * * * *Effective Date:* ***05/19/08*** * * * * * *Supercedes:* ***08/17/05***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

CHLOROBENZENE

1. Product Identification

Synonyms: Monochlorobenzene; Chlorobenzol; Phenyl chloride; Benzene chloride
CAS No.: 108-90-7
Molecular Weight: 112.56
Chemical Formula: C6H5Cl
Product Codes:
J.T. Baker: 5153, 5163, 9179
Mallinckrodt: 4419, 4426

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Chlorobenzene	108-90-7	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM AND LIVER.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 2 - Moderate
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. Affects central nervous system causing dizziness, incoordination and unconsciousness.
Ingestion:
Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. Toxic! May cause systemic poisoning with symptoms paralleling those of inhalation.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. May be slowly absorbed through the skin with possible systemic effects.
Eye Contact:
Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.
Chronic Exposure:
Prolonged or repeated skin exposure may cause dermatitis or skin burns. Prolonged or repeated exposure may cause liver, kidney, or lung damage.
Aggravation of Pre-existing Conditions:

Persons with pre-existing skin, eye or central nervous system disorders, or impaired liver, kidney, or pulmonary function may be more susceptible to the effects of this substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: 28C (82F) CC
Autoignition temperature: 593C (1099F)
Flammable limits in air % by volume:
lel: 1.3; uel: 9.6
Flammable Liquid
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Reactions with incompatibles may pose an explosion hazard. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. This highly flammable liquid must be kept from sparks, open flame, hot surfaces, and all sources of heat and ignition. Combustion by-products include phosgene and hydrogen chloride gases.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials. Storage and use areas should be No Smoking areas. Containers should be bonded and grounded for transfers to avoid static sparks. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
75 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
10 ppm (TWA)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be

worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Faint, almond like odor.

Solubility:
Insoluble in water.

Specific Gravity:
1.11 @ 20C/4C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
132C (270F)

Melting Point:
-45C (-49F)

Vapor Density (Air=1):
3.9

Vapor Pressure (mm Hg):
11.8 @ 25C (77F)

Evaporation Rate (BuAc=1):
1.1

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Oxidizing agents, dimethyl sulfoxide, silver perchlorate, silver chromate.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

For Chlorobenzene: Oral rat LD50: 1110 mg/kg; Inhalation rat LC50: 2965 ppm. Investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Chlorobenzene (108-90-7)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life of less than 1 day. When released into water, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:
The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be slightly toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, CHLOROBENZENE
Hazard Class: 3
UN/NA: UN1134
Packing Group: III
Information reported for product/size: 52L

International (Water, I.M.O.)

Proper Shipping Name: CHLOROBENZENE
Hazard Class: 3
UN/NA: UN1134
Packing Group: III
Information reported for product/size: 52L

International (Air, I.C.A.O.)

Proper Shipping Name: CHLOROBENZENE
Hazard Class: 3
UN/NA: UN1134
Packing Group: III
Information reported for product/size: 52L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Chlorobenzene (108-90-7)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Chlorobenzene (108-90-7)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Chlorobenzene (108-90-7)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Chlorobenzene (108-90-7)	100	U037	Yes

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2Y
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM AND LIVER.
Label Precautions:

Keep away from heat, sparks and flame.
Avoid breathing vapor.
Keep container closed.
Wash thoroughly after handling.
Avoid contact with eyes, skin and clothing.
Use only with adequate ventilation.

Label First Aid:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **P1949** * * * * * *Effective Date:* ***05/19/08*** * * * * * *Supercedes:* ***08/24/05***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

PHENOL, CRYSTALS

1. Product Identification

Synonyms: Carbolic acid; Phenic acid; Phenylic acid; Hydroxybenzene; Phenol, fused; Monohydroxybenzene; Phenol, solid
CAS No.: 108-95-2
Molecular Weight: 94.11
Chemical Formula: C6H5OH
Product Codes:
J.T. Baker: 2858, 2862, 4056
Mallinckrodt: 0028, 0052, 0273, 0605, H602

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Phenol	108-95-2	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. RAPIDLY ABSORBED THROUGH SKIN. CORROSIVE. CAUSES SEVERE BURNS TO EVERY AREA OF CONTACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. COMBUSTIBLE.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 2 - Moderate
Reactivity Rating: 1 - Slight
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: White Stripe (Store Separately)

Potential Health Effects

The major hazard of phenol is its ability to penetrate the skin rapidly, particularly when liquid, causing severe injury which can be fatal. Phenol also has a strong corrosive effect on body tissue causing severe chemical burns. Due to its local anesthetizing properties, skin burns may be painless.

Inhalation:
Breathing vapor, dust or mist results in digestive disturbances (vomiting, difficulty in swallowing, diarrhea, loss of appetite). Will irritate, possibly burn respiratory tract. Other symptoms listed under ingestion may also occur.
Ingestion:
Poison. Symptoms may include burning pain in mouth and throat, abdominal pain, nausea, vomiting, headache, dizziness, muscular weakness, central nervous system effects, increase in heart rate, irregular breathing, coma, and possibly death. Acute exposure is also associated with kidney and liver damage. Ingestion of 1 gram has been lethal to humans.
Skin Contact:
Corrosive. Rapidly absorbed through the skin with systemic poisoning effects to follow. Discoloration and severe burns may occur, but may be disguised by a loss in pain

sensation.

Eye Contact:

Corrosive. Eye burns with redness, pain, blurred vision may occur. May cause severe damage and blindness.

Chronic Exposure:

Repeated exposure may cause symptoms described for acute poisoning as well as eye and skin discoloration.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin, eye or central nervous system disorders, or impaired liver, kidney, or pulmonary function may be more susceptible to the effects of this substance.

4. First Aid Measures

IN CASE OF PHENOL POISONING, start first aid treatment immediately, then get medical attention. People administering first aid should take precautions to avoid contact with phenol. A phenol antidote kit (castor oil or other vegetable oil, polyethylene glycol 300) should be available in any phenol work area. Actions to be taken in case of phenol poisoning should be planned and practiced before beginning work with phenol. Castor oil and or polyethylene glycol can be given by a first responder before medical help arrives.

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion:

If swallowed, immediately administer castor oil or other vegetable oil. Never give anything by mouth to an unconscious person. Be ready to induce vomiting at the advice of physician or poison control center. Castor oil (or vegetable oil) dosage should be between 15 and 30 cc. Get medical attention immediately.

Skin Contact:

In case of skin contact, immediately flush skin with large amounts of water while removing contaminated clothing and shoes. As soon as possible, repeatedly apply polyethylene glycol to affected area. Destroy contaminated clothing and shoes. Flush skin with water for at least 30 minutes. It is very important to avoid rubbing or wiping affected parts which would aggravate irritation and cause product dispersion. Continue treatment until the burned area changes color from white to pink. Expect that this can take a long period of time (20 minutes or more). The polyethylene glycol application should be done during transportation to the hospital. If polyethylene glycol is not available, flush with water for at least 30 minutes prior to going to hospital. Get medical attention immediately.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:

Treat ingestion with gastric lavage using 40% aqueous Bacto-Peptone, milk or water until phenolic odor is eliminated. Then give 15 to 50 cc castor or vegetable oil. Debride necrotic skin. Monitor vital signs, fluid status, electrolytes, BUN, renal and hepatic function, and electrocardiogram. Manage sedation, seizures, renal failure, and fluid electrolyte imbalances symptomatically as indicated.

5. Fire Fighting Measures

Fire:

Flash point: 79C (174F) CC
Autoignition temperature: 715C (1319F)
Flammable limits in air % by volume:
lel: 1.3; uel: 8.6
Combustible. Contact with strong oxidizers may cause fire.

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Sealed containers may rupture when heated.

Fire Extinguishing Media:

Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving this material. Stay away from sealed containers.

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container. Do not flush to the sewer. Dry lime or soda ash may be used on spill for neutralization. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container. Store in a cool, dry, ventilated area away from sources of heat or ignition. Protect against physical damage. Store separately from reactive or combustible materials, and out of direct sunlight. Avoid dust formation and control ignition sources. Employ grounding, venting and explosion relief provisions in accord with accepted engineering practices in any process capable of generating dust and/or static electricity. Empty only into inert or non-flammable atmosphere. Emptying contents into a non-inert atmosphere where flammable vapors may be present could cause a flash fire or explosion due to electrostatic discharge. All phenol workers should be properly trained on its hazards and the proper protective measures required. This training should also include emergency actions. All phenol operations should be enclosed to eliminate any potential exposure routes. Containers of this material may be hazardous when empty since they retain product residues

(dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Phenol:
-OSHA Permissible Exposure Limit (PEL):
5 ppm (TWA) (skin)

-ACGIH Threshold Limit Value (TLV):
5 ppm (TWA) (skin)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full facepiece respirator with organic vapor cartridge and dust/mist filter may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Butyl rubber and neoprene are suitable materials for personal protective equipment.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Colorless to light pink crystals.
Odor:
Sharp, medicinal, sweet, tarry.
Solubility:
1 g/15 ml of water; very soluble in alcohol.
Specific Gravity:
1.06 @ 20C/4C
pH:
ca. 6.0 Aqueous solution
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
182C (360F)
Melting Point:
43C (109F)
Vapor Density (Air=1):
3.2
Vapor Pressure (mm Hg):
0.4 @ 20C (68F)
Evaporation Rate (BuAc=1):
< 0.01

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Heat will contribute to instability.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition. Toxic gases and vapors may be released if involved in a fire.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Oxidizers, aluminum chloride and nitrobenzene, calcium hypochlorite, butadiene, halogens, formaldehyde, mineral oxidizing acids, isocyanates, sodium nitrite and many other materials. Hot liquid phenol will attack aluminum, magnesium, lead, and zinc metals.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 317 mg/Kg; skin rabbit LD50:630 mg/kg; inhalation rat LC50: 316 mg/m3; irritation data: skin rabbit, standard Draize, 500 mg/24H severe; eye rabbit, standard Draize 5 mg/30S rinse, mild. Investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Phenol (108-95-2)	No	No	3

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is not expected to leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to have a half-life between 1 and 10 days. When released into water, this material is expected to readily biodegrade. When released into water, this material is not expected to evaporate significantly. When released into water, this material is expected to have a half-life between 10 and 30 days. This material has an estimated bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be moderately degraded by photolysis. When released into the air, this material is expected to have a half-life of less than 1 day.
Environmental Toxicity:
This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: PHENOL, SOLID
Hazard Class: 6.1
UN/NA: UN1671
Packing Group: II
Information reported for product/size: 2.5KG

International (Water, I.M.O.)

Proper Shipping Name: PHENOL, SOLID
Hazard Class: 6.1
UN/NA: UN1671
Packing Group: II
Information reported for product/size: 2.5KG

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Phenol (108-95-2)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	--Canada-- Korea	DSL	NDSL	Phil.
Phenol (108-95-2)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Phenol (108-95-2)	1000	500*	Yes	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Phenol (108-95-2)	1000	U188	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No

SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: 2X
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **4** Flammability: **2** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. RAPIDLY ABSORBED THROUGH SKIN. CORROSIVE. CAUSES SEVERE BURNS TO EVERY AREA OF CONTACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. COMBUSTIBLE.
Label Precautions:
Do not breathe dust.
Do not get in eyes, on skin, or on clothing.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat, sparks and flame.
Label First Aid:
IN ALL CASES, GET MEDICAL ATTENTION IMMEDIATELY. KEEP A PHENOL ANTIDOTE KIT in area of product use or storage. Administer castor oil and/or polyethylene glycol per pre-planned directions. If swallowed, immediately administer castor oil or other vegetable oil. Never give anything by mouth to an unconscious person. In case of skin contact, immediately flush skin with large amounts of water while removing contaminated clothing and shoes. As soon as possible, repeatedly apply polyethylene glycol to affected area. Destroy contaminated clothing and shoes. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes while lifting lower and upper eyelids.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **T1222** * * * * * *Effective Date:* ***09/11/08*** * * * * * *Supercedes:* ***11/17/06***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TETRAHYDROFURAN

1. Product Identification

Synonyms: Diethylene oxide, oxacyclopentane; THF; tetrahydrofuran and stabilizer; 1,4-Epoxybutane; Butylene Oxide; Cyclotetramethylene Oxide; Furan, tetrahydro
CAS No.: 109-99-9
Molecular Weight: 72.11
Chemical Formula: CH2CH2CH2CH2O
Product Codes:
J.T. Baker: 9439, 9440, 9441, 9442, 9446, 9447, 9449, 9450, V530
Mallinckrodt: 2858, 8497, 8498, 8499, V558

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Tetrahydrofuran	109-99-9	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. MAY FORM EXPLOSIVE PEROXIDES. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. THF is an anesthetic agent in high concentrations. Overexposure may cause dizziness, headache, nausea and possible fluid in the lungs. May cause liver, kidney or lung injury.
Ingestion:
Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. May cause sore throat and abdominal pain. May cause liver or kidney injury.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain.
Eye Contact:
Causes irritation, redness, and pain. Contact may cause permanent eye damage.
Chronic Exposure:
Repeated or high exposures may cause kidney or liver damage; may affect the lungs. Repeated skin exposure can cause dryness, cracking of skin and rash.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: -14C (7F) CC
Autoignition temperature: 321C (610F)
Flammable limits in air % by volume:
lel: 2.0; uel: 11.8
Extremely Flammable Liquid and Vapor! Vapor may cause flash fire. Dangerous fire hazard when exposed to heat or flame.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. May form explosive organic peroxides when exposed to air or light or with age. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water spray may be used to keep fire exposed containers cool. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures. Vapors can flow along surfaces to distant ignition source and flash back.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Store in dark glass bottles or steel drums. Protect against physical damage. Store in a cool, dry well-ventilated location, away from direct sunlight and any area where the fire hazard may be acute. Store in tightly closed containers (preferably under nitrogen atmosphere). Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment. Do not use compressed air for filling, discharging, or handling. Peroxides can be removed by treatment with strong ferrous sulfate solution made slightly acidic with sodium bisulfite. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do Not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death. Do not allow to evaporate to near dryness unless absence of peroxides has been shown. Addition of appropriate reducing agents will lessen peroxide formation.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
200 ppm (TWA).

-ACGIH Threshold Limit Value (TLV):
50 ppm (TWA), 100 ppm (STEL): A3 Confirmed Animal Carcinogen with Unknown Relevance to Humans.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH

document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Other Control Measures:

Odor threshold: 2 - 50 ppm

---

9. Physical and Chemical Properties

Appearance:

Colorless, mobile liquid.

Odor:

Ether odor.

Solubility:

Miscible in water.

Specific Gravity:

0.88 @ 20C/4C

pH:

ca. 7

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

66C (151F)

Melting Point:

-108C (-162F)

Vapor Density (Air=1):

2.5

Vapor Pressure (mm Hg):

129 @ 20C (68F)

Evaporation Rate (BuAc=1):

8.0

---

10. Stability and Reactivity

Stability:

Stable in closed containers with oxygen and light excluded. Distillation or evaporation can concentrate peroxides (if present) to create an explosion hazard.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition. May also release toxic and irritating vapors.

Hazardous Polymerization:

May occur.

Incompatibilities:

Tetrahydrofuran reacts violently with air on standing. LiAlH2, strong oxidizers, NaAlH2 and potassium hydroxide. Will attack some forms of plastics, rubbers and coatings.

Conditions to Avoid:

Heat, flame, ignition sources, incompatibles, light, and air.

---

11. Toxicological Information

Toxicological Data:

Oral rat LD50: 1650 mg/kg. Inhalation rat LC50: 21,000 ppm/3H. Investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:

Animal data show developmental effects only at exposures levels producing other toxic effects in the adult animal. Animal testing for reproductive effects show no change in reproductive performance.

Carcinogenicity:

Under the National Toxcology Program (NTP), the U.S. Public Health Service completed a 2-year (lifetime) inhalation study in rats and mice on Tetrahydrofuran (THF) which suggests that THF is a carcinogen in laboratory animals. There is no data linking THF exposure to cancer in humans. The data shows carcinogenic activity in the liver and kidneys of laboratory animals.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Tetrahydrofuran (109-99-9)	No	No	None

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material may biodegrade to a moderate extent. This material is not expected to significantly bioaccumulate. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.
Environmental Toxicity:
96-hour LC50,fathead minnows: 2160 mg/L.
24 Hr EC50 Daphnia magna(Water flea): >10000 mg/L.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TETRAHYDROFURAN
Hazard Class: 3
UN/NA: UN2056
Packing Group: II
Information reported for product/size: 400LB

International (Water, I.M.O.)

Proper Shipping Name: TETRAHYDROFURAN
Hazard Class: 3
UN/NA: UN2056
Packing Group: II
Information reported for product/size: 400LB

---

15. Regulatory Information

F, Xi
R11 - Highly flammable
R19 - May form explosive peroxides
R36/37 - Irritating to eyes and respiratory system
S2 - Keep out of the reach of children
S16 - Keep away from sources of ignition - No smoking
S29 - Do not empty into drains
S33 - Take precautionary measures against static discharges

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Tetrahydrofuran (109-99-9)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

		--Canada--		
Ingredient	Korea	DSL	NDSL	Phil.
Tetrahydrofuran (109-99-9)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

	-SARA 302-		------SARA 313------	
Ingredient	RQ	TPQ	List	Chemical Catg.
Tetrahydrofuran (109-99-9)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

		-RCRA-	-TSCA-
Ingredient	CERCLA	261.33	8(d)
Tetrahydrofuran (109-99-9)	1000	U213	Yes

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes
SARA 311/312: Acute: Yes Chronic: No Fire: Yes Pressure: No
Reactivity: Yes (Pure / Liquid)

Australian Hazchem Code: 2SE
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **1**
Label Hazard Warning:
DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. MAY FORM EXPLOSIVE PEROXIDES. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Avoid breathing vapor or mist.
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.
Do not allow to evaporate to near dryness unless absence of peroxides has been shown. Addition of appropriate reducing agents will lessen peroxide formation.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 15.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Back to Hexanes, C.P.

Material Safety Data Sheet
Hexanes, c.p.

ACC# 98123

Section 1 - Chemical Product and Company Identification

MSDS Name: Hexanes, c.p.
Catalog Numbers: AC210590000, AC210590010, AC210590025
Synonyms: n-Hexane; Hexyl Hydride; Dipropyl
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fairlawn, NJ 07410

For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies outside the US, call: 0032(0) 14575299

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
110-54-3	Hexanes	100.0	203-777-6

Hazard Symbols: XN F
Risk Phrases: 11 48/20

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless. Flash Point: -22 deg C. **Danger! Extremely flammableliquid.** May cause respiratory tract irritation. Causesskin irritation. Air sensitive. May cause central nervous systemdepression. Aspiration hazard. May cause reproductive effects basedupon animal studies. Causes severe eye irritation. May causedigestive tract irritation with nausea, vomiting, and diarrhea.
Target Organs: Central nervous system.

Potential Health Effects

Eye: Causes severe eye irritation.
Skin: Causes skin irritation. Causes irritation with burning pain, itching, and redness. May cause blistering of the skin.
Ingestion: Aspiration hazard. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal. May cause central nervous system effects.
Inhalation: Causes respiratory tract irritation. May cause severe irritation of the upper respiratory tract with pain, burns, and inflammation. Exposure produces central nervous system depression. Aspiration may cause respiratory swelling and pneumonitis. Vapors may cause dizziness or suffocation.
Chronic: May cause reproductive and fetal effects. Chronic exposure produces peripheral

neuropathy.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately.
Skin: Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. Allow the victim to rinse his mouth and then to drink 2-4 cupfuls of water, and seek medical advice.
Inhalation: Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Firefighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Use water spray to keep fire-exposed containers cool. Extremely flammable liquid. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.
Extinguishing Media: Use water spray to cool fire-exposed containers. In case of fire, use water fog, dry chemical, carbon dioxide, or regular foam. Do NOT use straight streams of water. Contact professional fire-fighters immediately.
Autoignition Temperature: 225 deg C (437.00 deg F)
Flash Point: -22 deg C (32.00 deg F)
NFPA Rating: health-1; flammability-3; reactivity-0 Explosion Limits, Lower: 1.10 vol % Upper: 7.50 vol %

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container. Remove all sources of ignition. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use only in a well ventilated area. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Take precautionary measures against static discharges. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a

tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Hexanes	(50) ppm ; (176) mg/m3	50 ppm TWA; 180 mg/m3 TWA 1100 ppm IDLH (10 percent lower explosive limit)	500 ppm TWA; 1800 mg/m3 TWA

OSHA Vacated PELs: Hexanes: 50 ppm TWA; 180 mg/m3 TWA

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: gasoline-like
pH: Not available.
Vapor Pressure: 150 mm Hg @24.8C
Vapor Density: 3.0 (air=1)
Evaporation Rate:
Viscosity: 0.31 mPas 20 de
Boiling Point: 156 deg F
Freezing/Melting Point:-95 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:0.7
Molecular Formula:C6H14
Molecular Weight:

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Ignition sources, exposure to air, excess heat, electrical sparks.
Incompatibilities with Other Materials: Strong oxidizing agents, coatings, plastics, rubber.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported

Section 11 - Toxicological Information

RTECS#:
CAS# 110-54-3: MN9275000
LD50/LC50:
CAS# 110-54-3:
Oral, rat: LD50 = 28710 mg/kg;
Carcinogenicity:
CAS# 110-54-3: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology: Carcinogenicity:Calculated mean lifetime cancer risk in huma ns from indoor pollution levels of 1.8-51.0 5g/m3 was negl igible.
Teratogenicity: Effects on Newborn: reduced weight gain, ihl-rat TCLo=1000 ppm/6H.Embryo or Fetus: Stunted fetus, ihl-rat TCLo=5000 ppm/20H.Inhalation pregnant rat and offspring 500, 800, 1000, 1500 ppm, 23 hr/day showed concentration dependant intrauterine mortality. Offspring exposed prenatally only showed reduced body growth at all concentrations and delayed cerebellar cortex maturation. In pre- and post-exposure cases, effects of malnutrition added to the solvent-induced retardation causing delayed tissue maturation and cell maturation.Neurotoxicity was restricted to axonal damage in adults.
Reproductive Effects: ihl-rat TCLo: 10000ppm/7H (15D pre-mating)ihl-rat TCLo: 1000 ppm/6H (8-16D preg)ihl-rat TCLo: 5000 ppm/20H (6-19D preg)orl-mus TDLo: 238 gm/kg (6-15D preg)Paternal Effects: Testes/sperm duct/epididymis,ihl-rat TCLo=1 pph/6H.Inhalation rat 5000 ppm for <6 wk caused testicular damage. The earliest lesions were observed after 24 hr continuous treatment which involved primary spermatocytes and spermatids, while numerous exfoliated injured germ cells reached the epididymus. After interruption, testicular lesions became increasingly severe suggesting an irreversible sterility.
Neurotoxicity: Of 56 offset printing workers exposed to n-Hexane, 20 develo ped symptomatic peripheral neuropathy and 26 had sub-c linical neuropathy. Development of neuropathy bore no relati onship to the duration of exposure.Calculated whole body dermal permeability constants for humans were two to four times less than experimental permeability constants for rats exposed to 60,000 ppm probably due to physiological differences in skin.
Mutagenicity: cyt-ham: fbr 500 mg/lsln-smc: 132 mmol/lSalmonella typhimurium TA98, TA100 with and without metabolic activation negative.
Other Studies: None.

Section 12 - Ecological Information

Ecotoxicity: Fish toxicity:LC50 (24 hr) goldfish 4 mg/lLC5, LC50, LC95 cichlid 40-185.5 ppm at pH 7.1 and 27.80C (duration unspecified).Exposed fish showed gill damage, respiratory distress and loss of balance.Invertebrate toxicity:LC50 Branchiura sowerbyi 3290 ppm at pH 7.1 and 27.80C (duration unspecified).LC50 (96 hr) Chlorella vulgaris 1097 mg/l.
Environmental Fate: Substance readily volatilizes when released on soil or to water (with minor absorption to soil or sediment). The potential for aquatic bioconcentration is low. In air, substance is predicted to exist in vapor phase and will react with photochemically produced hydroxyl radicals.Degradation studies:Hydroxylated and oxidised to the corresponding alcohol, aldehyde, acid and ketone mixture by methane oxidising bacterium H-2 (type I).ThOD 3.52 mg/l O2.
Physical/Chemical: No information available.
Other: Degradation studies:Incubation with natural flora in groundwater in presence of other components of high octane gasoline (100 5l/l), biodegraded by 46% after 192 hr at 130C, initial concentration 1.36 5l/l.Catabolically degraded by gasoline-degrading bacteria Pseudomonas sp., Nocardia sp. and Micrococcus sp.Abiotic removal:Photooxidation by UV light in aqueous medium at 500C, 50.51% degraded to carbon dioxide after 24 hr.

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration ofContaminants: None listed.
RCRA D-Series Chronic Toxicity ReferenceLevels: None listed.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	HEXANES	HEXANES	HEXANES	HEXANES	No information available.
Hazard Class:	3	3	3(3B)	3.1	
UN Number:	UN1208	UN1208	UN1208	UN1208	
Packing Group:	II	II		II	

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 110-54-3 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

Section 302 (RQ)
None of the chemicals in this material have an RQ.
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 110-54-3: acute, chronic, flammable, sudden release of pressure.
Section 313
This material contains Hexanes (CAS# 110-54-3, 100 0%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 110-54-3 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 110-54-3 can be found on the following state right to know lists: New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
XN F
Risk Phrases:
R 11 Highly flammable. R 48/20 Harmful : danger of serious damage to health by prolonged exposure through inhalation.
Safety Phrases:
S 16 Keep away from sources of ignition - No smoking. S 24/25 Avoid contact with skin and eyes. S 29 Do not empty into drains. S 51 Use only in well ventilated areas. S 9 Keep container in a well-ventilated place.
WGK (Water Danger/Protection)
CAS# 110-54-3: 1
Canada
CAS# 110-54-3 is listed on Canada's DSL/NDSL List.
WHMIS: Not available.
CAS# 110-54-3 is not listed on Canada's Ingredient Disclosure List.
Exposure Limits
CAS# 110-54-3: OEL-AUSTRALIA:TWA 50 ppm (180 mg/m3) OEL-BELGIUM:TWA 50 ppm (176 mg/m3) OEL-DENMARK:TWA 50 ppm (180 mg/m3) OEL-FINLAND:TWA 50 ppm (180 mg/m3);STEL 150 ppm (530 mg/m3) OEL-FRANCE:TWA 50 ppm (170 mg/m3) OEL-GERMANY:TWA 50 ppm (180 mg/m3) OEL-HUNGARY:TWA 100 mg/m3;STEL 200 mg/m3;Skin OEL-JAPAN:TWA 40 ppm (140 mg/m3);Skin OEL-THE NETHERLANDS:TWA 100 ppm (360 mg/m3) OEL-THE PHILIPPINES:TWA 500 ppm (1800 mg/m3) JAN9 OEL-POLAND:TWA 400 mg/m3 OEL-RUSSIA:TWA 40 ppm;STEL 300 mg/m3 OEL-SWEDEN:TWA 25 ppm (90 mg/m3);STEL 50 ppm (180 mg/m3) OEL-SWITZERLAND:TWA 50 ppm (180 mg/m3);STEL 100 ppm (360 mg/m3) OEL-TURKEY:TWA 500 ppm (1800 mg/m3) OEL-UNITED KINGDOM:TWA 100 ppm (360 mg/m3);STEL 125 ppm OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 11/19/1996
Revision #3 Date: 10/20/1997
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet
trans-1,4-Dichloro-2-butene, 95%

ACC# 00269

Section 1 - Chemical Product and Company Identification

MSDS Name: trans-1,4-Dichloro-2-butene, 95%
Catalog Numbers: AC325930000, AC325930050, AC325930250
Synonyms:
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
110-57-6	trans-1,4-Dichloro-2-butene	95%	203-779-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Not available.
Target Organs: Respiratory system, gastrointestinal system, eyes, skin.

Potential Health Effects
Eye: Causes eye burns. Lachrymator (substance which increases the flow of tears).
Skin: Causes skin burns. Toxic in contact with skin.
Ingestion: Poison by ingestion. Causes gastrointestinal tract burns.
Inhalation: May be fatal if inhaled. Causes chemical burns to the respiratory tract. May cause abdominal pain, nausea, vomiting, and inflammation of the gums and mouth.
Chronic: May cause cancer in humans.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. SPEED IS ESSENTIAL. A DOCTOR MUST BE NOTIFIED AT ONCE.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Will burn if involved in a fire.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: 53 deg C (127.40 deg F)
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: Not published.

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool.

Section 7 - Handling and Storage

Handling: Use spark-proof tools and explosion proof equipment. Do not breathe dust, mist, or vapor. Do not get in eyes, on skin, or on clothing. Use only in a chemical fume hood.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Store in a dry area. Keep under an argon blanket. Keep refrigerated. (Store below 4°C/39°F.)

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
trans-1,4-Dichloro-2-butene	none listed	none listed	none listed

OSHA Vacated PELs: trans-1,4-Dichloro-2-butene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Not available.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to minimize contact with skin.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colorless
Odor: Not available.
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 74 - 76 deg C @ 40.
Freezing/Melting Point:1 - 3 deg C
Decomposition Temperature: Not available.
Solubility: Miscible.
Specific Gravity/Density:1.1830g/cm3
Molecular Formula: ClCH2CH=CHCH2Cl
Molecular Weight:125.00

Section 10 - Stability and Reactivity

Chemical Stability: Not available.
Conditions to Avoid: Light, exposure to moist air or water.
Incompatibilities with Other Materials: Strong oxidizing agents, strong bases.
Hazardous Decomposition Products: Hydrogen chloride, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported

Section 11 - Toxicological Information

RTECS#:
CAS# 110-57-6: EM4903000
LD50/LC50:
CAS# 110-57-6:
Inhalation, rat: LC50 = 86 ppm/4H;
.

Carcinogenicity:
CAS# 110-57-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	DOT regulated - small quantity provisions apply (see 49CFR173.4)	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 110-57-6 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
CAS# 110-57-6: 500 lb TPQ
Section 313
This material contains trans-1,4-Dichloro-2-butene (CAS# 110-57-6, 95%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 110-57-6 can be found on the following state right to know lists: New Jersey,

Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T+ N

Risk Phrases:

R 26 Very toxic by inhalation.
R 34 Causes burns.
R 45 May cause cancer.
R 24/25 Toxic in contact with skin and if swallowed.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.
S 60 This material and its container must be disposed of as hazardou s waste.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 110-57-6: No information available.

Canada - DSL/NDSL

CAS# 110-57-6 is listed on Canada's NDSL List.

Canada - WHMIS

WHMIS: Not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 2/01/1999
Revision #4 Date: 3/28/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet
Cyclohexane

ACC# 05870

Section 1 - Chemical Product and Company Identification

MSDS Name: Cyclohexane
Catalog Numbers: AC111110000, AC111110010, AC111110025, AC111110050, AC111110100, AC111110250, AC167740000, AC167740010, AC167740025, AC167745000, AC176810000, AC176810010, AC176810025, AC176810050, AC176810250, AC176815000, AC210570000, AC210570010, AC210570025, AC279590000, AC279590010, AC279590025, AC326590000, AC326590010, AC326590025, AC326830000, AC326831000, AC326832500, AC364660000, AC364660010, AC364661000, AC406020000, AC406025000, AC610040040, AC610150040, AC610291000, S79990, S79990-1, S93227, S93228, S93327A, S93328A, C553-4, C555-1, C555-4, C556-1, C556-4, C556-500, C620-1, C620-4, C620SK-1, C620SK-4, O2093-20, O2093-4
Synonyms: Benzene hexahydride; Hexahydrobenzene; Hexamethylene.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
110-82-7	Cyclohexane	>99	203-806-2

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless liquid. Flash Point: -20 deg C.
Danger! Extremely flammable liquid and vapor. Vapor may cause flash fire. Breathing vapors may cause drowsiness and dizziness. Causes skin irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause eye and respiratory tract irritation.
Target Organs: Central nervous system, skin.

Potential Health Effects

Eye: May cause mild eye irritation. Vapors may cause eye irritation.
Skin: May cause irritation with burning pain, itching and redness. Not expected to cause an allergic skin reaction. A single prolonged skin exposure is not likely to result in the material being absorbed in harmful amounts.
Ingestion: Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal. May cause central nervous system depression.
Inhalation: May cause respiratory tract irritation. Inhalation of vapors may cause drowsiness and

dizziness.
Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Liquid will float and may reignite on the surface of water. Extremely flammable liquid and vapor. Vapor may cause flash fire. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.
Extinguishing Media: Water may be ineffective. This material is lighter than water and insoluble in water. The fire could easily be spread by the use of water in an area where the water cannot be contained. Do NOT use straight streams of water. For large fires, use water spray, fog or regular foam. For small fires, use dry chemical, carbon dioxide, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.
Flash Point: -20 deg C (-4.00 deg F)
Autoignition Temperature: 245 deg C (473.00 deg F)
Explosion Limits, Lower:1.3
Upper: 8.0
NFPA Rating: (estimated) Health: 1; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Remove all sources of ignition. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing.

Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Avoid breathing vapor.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Cyclohexane	100 ppm TWA	300 ppm TWA; 1050 mg/m3 TWA 1300 ppm IDLH	300 ppm TWA; 1050 mg/m3 TWA

OSHA Vacated PELs: Cyclohexane: 300 ppm TWA; 1050 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colorless
Odor: sweetish odor - chloroform-like
pH: Not available.
Vapor Pressure: 96.9 mm Hg @ 25 deg C
Vapor Density: 2.90 (air=1)
Evaporation Rate:6.1 (Butyl acetate=1)
Viscosity: 1.02 cP @ 17 deg C
Boiling Point: 80.7 deg C
Freezing/Melting Point:6.5 deg C
Decomposition Temperature: Not available.
Solubility: Practically insoluble in water.
Specific Gravity/Density:0.77 (Water=1)
Molecular Formula:C6H12
Molecular Weight:84.15

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.

Conditions to Avoid: Ignition sources, excess heat, confined spaces.
Incompatibilities with Other Materials: Strong oxidizing agents, nitrogen dioxide.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 110-82-7: GU6300000
LD50/LC50:
CAS# 110-82-7:
Draize test, rabbit, skin: 1548 mg/2D (Intermittent);
Inhalation, mouse: LC50 = 70000 mg/m3/2H;
Oral, mouse: LD50 = 813 mg/kg;
Oral, rat: LD50 = 12705 mg/kg;
.

Carcinogenicity:
CAS# 110-82-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No data available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: LC50 = 117.0 mg/L; 96 Hr.; Static conditionsFish: Bluegill/Sunfish: LC50 = 34.72 mg/L; 96 Hr.; 25 degrees CWater flea Daphnia: EC50 = 400.00 mg/L; 48 Hr.; UnspecifiedBacteria: Phytobacterium phosphoreum: EC50 = 227.00 mg/L; 5, 30 minutes; Microtox test No data available.
Environmental: Atmospheric Fate: Cyclohexane is expected to partition to the atmosphere where it will rapidly react with hydroxyl radicals. TERRESTRIAL FATE: If released on land, cyclohexane will be lost through volatilization and should leach into the ground. Cyclohexane is resistant to biodegradation but may biodegrade slowly in the presence of other hydrocarbons that are themselves degraded. AQUATIC FATE: Volatilization from water (estimated half-life 2 hr in a model river) should be the most important fate process occuring in aquatic systems.
Physical: ATMOSPHERIC FATE: In the atmosphere, cyclohexane will degrade by reaction with photochemically produced hydroxyl radicals (half-life 52 hr). The half-life is much faster under photochemical smog conditions with half-lives as low as 6 hr being reported.
Other: No experimental data are available on the bioconcentration of cyclohexane in aquatic organisms. Using the octanol/water partition coefficient, 3.44, one can estimate a BCF of 242 using a recommended regression equation.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3.

Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 110-82-7: waste number U056 (Ignitable waste).

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	CYCLOHEXANE	CYCLOHEXANE
Hazard Class:	3	3
UN Number:	UN1145	UN1145
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 110-82-7 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 110-82-7: Effective 12/19/85, Sunset 12/19/95
Chemical Test Rules
CAS# 110-82-7: 40 CFR 799.5000
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 110-82-7: 1000 lb final RQ; 454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 110-82-7: immediate, delayed, fire.
Section 313
This material contains Cyclohexane (CAS# 110-82-7, >99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 110-82-7 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 110-82-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN F N

Risk Phrases:

R 11 Highly flammable.
R 38 Irritating to skin.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R 65 Harmful: may cause lung damage if swallowed.
R 67 Vapours may cause drowsiness and dizziness.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 25 Avoid contact with eyes.
S 33 Take precautionary measures against static discharges.
S 9 Keep container in a well-ventilated place.
S 60 This material and its container must be disposed of as hazardous waste.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.
S 62 If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

WGK (Water Danger/Protection)

CAS# 110-82-7: 1

Canada - DSL/NDSL

CAS# 110-82-7 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 110-82-7 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/04/1999
Revision #7 Date: 12/01/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Composition/Information on Ingredient

Cas:
11096-82-5
Code:
M
RTECS:
TQ1362000
Code:
M
Name:
POLYCHLORINATED BIPHENYL, PCB, AROCLOR 1260, (CL
Other REC Limits:
0.001 MG/CUM NIOSH
OSHA PEL:
N/K
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
N/K
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
USE ORGANIC VAPOR CARTRIDGE, FULL FACE PIECE OR SELF-CONTAINED OR AIR SUPPLIED RESPIRATOR
Ventilation:
LOCAL EXHAUST: USE IN HOOD.
Protective Gloves:
VITON OR NEOPRENE
Eye Protection:
SPLASH GOGGLES
Other Protective Equipment:
Equipment LABORATORY COAT, CLOSED SHOES
Work Hygienic Practices:
USE CAREFUL LABORATORY TECHNIQUE. AVOID HAND CONTACT.
Supplemental Safety and Health:
SEVERAL OF THE PCB'S & PESTICIDES, AS WELL AS OTHER EPA PRIORITY POLLUTANTS HAVE BEEN LISTED AS
ANIMAL SUSPECT, ANIMAL POSITIVE HUMAN SUSPECT, OR HUMAN POSITIVE CARCINOGENS BY VARIOUS AGENCIES.

HANDLE THESE SPECIMENS WITH CARE & APPROPRIATE CAUTION FOR THIS REASON.

Health Hazards Data

LD50LC50Mixture:
N/K
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
YES
IARC:
YES
OSHA:
NO
Health Hazards Acute And Chronic:
INHALATION: DAMAGES ALL TISSUES, IRRITATION, LIVER, KIDNEY, & LUNG DAMAGE, JAUNDICE, NAUSEA, VOMITING, UREMIA, ACIDOSIS, COUGHING, & WHEEZING. SKIN: REDN, DRY SCALY, CRACKING, WEEPING, ALLERGIC DERMAT ITIS, & CHLORACNE.
Explanation Of Carcinogenicity:
SUFFICIENT EVIDENCE FOR THE CARCINOGENICITY OF SEVERAL MIXTURES OF POLYCHLORINATED BIPHENYLS.
Signs And Symptions Of Overexposure:
INHALATION: CARDIAC ARRYTHMIA, SENSITIZE HEART TO EPINEPHRINE, ACIDOSIS, BLINDNESS, & MAY CAUSE CANCER IN HUMANS.
Medical Cond Aggravated By Exposure:
DERMATITIS, LIVER & KIDNEY DISEASE
First Aid:
INHALATION: REMOVE FROM EXPOSURE. BE PREPARED TO DO CPR IF UNCONSCIOUS. INGESTION: GIVE SYRUP OF IPECAC 60CC W/180CC WATER. SKIN: WASH W/SOAP & WATER. OBTAIN MEDICAL ATTENTION IN ALL CASES.
Spill Release Procedures:
DAM UP & ABSORB. VENTILATE AREA. CALL CLEANUP TEAM. DON'T WASH TO DRAINS.
Neutralizing Agent:
N/K
Waste Disposal Methods:
ABSORB & INCINERATE OR DISPOSE AS HAZARDOUS WASTE.
Handling And Storage Precautions:
AVOID FREEZING, BREAKAGE. HANDLE W/CARE. MATERIAL CONTAINS CARCINOGENS.
Other Precautions:
N/K 3

Fire and Explosion Hazard Information

Flash Point Method:
TOC
Flash Point:
Flash Point Text:
15.5C
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
DRY CHEMICAL, CO2, ALCOHOL FOAM
Fire Fighting Procedures:
USE SELF-CONTAINED BREATHING APPARATUS & WET DOWN TO KEEP FROM EXPLODING. USE WATER MIST OR ALCOHOL FOAM.
Unusual Fire/Explosion Hazard:
MAY FORM CO, PHOSGENE, & CARBONYL BROMIDE WHEN INVOLVED IN FIRE.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
4
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
64.5C
Melt/Freeze Pt:
M.P/F.P Text:
N/K
Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
N/K
Vapor Density:
1.11
Volatile Org Content %:
Spec Gravity:
0.792
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K

Solubility in Water:
COMPLETE
Appearance and Odor:
CLEAR, COLORLESS LIQUID W/ORGANIC ODOR
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
CHROMIC ANHYDRIDE, IODINE, ETHANOL, MERCURIC OXIDE, POTASSIUM HYDROXIDE, SODIUM HYDROXIDE, CHLOROFORM, LEAD PERCHLORATE
Hazardous Decomposition Products:
CO, PHOSGENE, &CARBONYL BROMIDE WHEN INVOLVED IN FIRE
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

handling or from contact with the above product. See reverse side of invoice or packing slip for additional
terms and conditions of sale.

MATERIAL SAFETY DATA SHEET

Date Printed: 09/03/2008
Date Updated: 01/04/2006
Version 1.3

Section 1 - Product and Company Information

Product Name	AROCLOR 1254, 50MG, NEAT
Product Number	48586
Brand	SUPELCO
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
AROCLOR 1254	11097-69-1	No

Synonyms: Arochlor 1254 * Aroclor 1254 * Chlorierte biphenyle, chlorgehalt 54% (German) * Chlorodiphenyl (54% chlorine) (ACGIH,OSHA) * Chlorodiphenyl (54% Cl) * Clorodifenili, cloro 54% (Italian) * Diphenyle chlore, 54% de chlore (French) * NCI-C02664 * PCB (OSHA)

RTECS Number: TQ1360000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Toxic.
May cause cancer. Harmful if swallowed.
Target organ(s): Liver.

HMIS RATING

HEALTH: 1*
FLAMMABILITY: 0
REACTIVITY: 0

NFPA RATING

HEALTH: 1
FLAMMABILITY: 0
REACTIVITY: 0

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Carbon dioxide, dry chemical powder, or appropriate foam. Water spray.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Absorb on sand or vermiculite and place in closed containers for disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Avoid prolonged or repeated exposure. Do not breathe vapor. Avoid contact with eyes, skin, and clothing.

STORAGE
Suitable: Keep tightly closed.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES

Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	0.5 MG/M3
Remarks: Skin			
USA	MSHA Standard-air	TWA	0.5 MG/M3 (SKIN)
USA	OSHA.	PEL	8H TWA 0.5 MG/M3 (SKIN)
New Zealand OEL			
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	0.001 MG/M3

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	1 MG/M3
Poland		NDSCh	-
Poland		NDSP	-

Section 9 - Physical/Chemical Properties

Appearance: Physical State: Liquid

Property	Value	At Temperature or Pressure
Molecular Weight	N/A	
pH	N/A	
BP/BP Range	N/A	
MP/MP Range	N/A	
Freezing Point	N/A	
Vapor Pressure	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	N/A	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	N/A	
Explosion Limits	N/A	
Flammability	N/A	
Autoignition Temp	N/A	
Refractive Index	N/A	
Optical Rotation	N/A	

Miscellaneous Data	N/A
Solubility	N/A

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Hydrogen chloride gas.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: May cause eye irritation.
Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)
Liver.

SIGNS AND SYMPTOMS OF EXPOSURE
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

TOXICITY DATA

Oral
Rat
1010 mg/kg
LD50

Intravenous
Rat
358 MG/KG
LD50
Remarks: Lungs, Thorax, or Respiration:Dyspnea.
Behavioral:Somnolence (general depressed activity).
Gastrointestinal:Hypermotility, diarrhea.

Intraperitoneal
Mouse
880 MG/KG
LD50

Oral
Mammal
4000 mg/kg
LD50

Intraperitoneal
Mammal

>1250 MG/KG
LD50

CHRONIC EXPOSURE - CARCINOGEN
Result: This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Species: Rat
Route of Application: Oral
Dose: 73500 MG/KG
Exposure Time: 2Y
Frequency: C
Result: Tumorigenic:Carcinogenic by RTECS criteria. Liver:Tumors.

Species: Mouse
Route of Application: Oral
Dose: 17 GM/KG
Exposure Time: 48W
Frequency: C
Result: Tumorigenic:Neoplastic by RTECS criteria. Liver:Tumors.

Species: Mouse
Route of Application: Skin
Dose: 4 MG/KG
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Skin and Appendages: Other: Tumors. Tumorigenic:Tumors at site or application.

Species: Mouse
Route of Application: Intraperitoneal
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Tumorigenic Effects: Uterine tumors. Lungs, Thorax, or Respiration:Tumors.

Species: Rat
Route of Application: Oral
Dose: 1 MG/KG
Exposure Time: D
Frequency: C
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal:Tumors.

Species: Rat
Route of Application: Oral
Dose: 3 MG/KG
Exposure Time: D
Frequency: C
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal:Tumors.

Species: Rat
Route of Application: Oral
Dose: 4 GM/KG
Exposure Time: 2Y
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal:Tumors. Liver:Tumors.

IARC CARCINOGEN LIST

Rating: Group 2A

NTP CARCINOGEN LIST

Rating: Equivocal evidence.
Species: Rat
Route: Feed

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 90 MG/KG
Route of Application: Oral
Exposure Time: (7-15D PREG)
Result: Specific Developmental Abnormalities: Hepatobiliary system.

CHRONIC EXPOSURE - MUTAGEN

Species: Rat
Route: Oral
Dose: 25 PPM
Exposure Time: 2Y
Mutation test: Morphological transformation.

Species: Rat
Route: Oral
Dose: 1295 MG/KG
Mutation test: DNA damage

Species: Rat
Route: Intraperitoneal
Dose: 500 MG/KG
Mutation test: DNA damage

Species: Rat
Dose: 300 UMOL/L
Cell Type: liver
Mutation test: DNA damage

Species: Rat
Dose: 20 MG/L
Cell Type: liver
Mutation test: Unscheduled DNA synthesis

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 192 MG/KG
Route of Application: Oral
Exposure Time: (6D POST)
Result: Effects on Newborn: Delayed effects. Effects on Newborn: Physical. Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Species: Rat
Dose: 148 MG/KG
Route of Application: Oral
Exposure Time: (6-21D PREG/21D POST)
Result: Effects on Newborn: Behavioral.

Species: Rat
Dose: 35 MG/KG

Route of Application: Oral
Exposure Time: (10-16D PREG)
Result: Effects on Newborn: Biochemical and metabolic.

Species: Rat
Dose: 40 MG/KG
Route of Application: Oral
Exposure Time: (5D POST)
Result: Effects on Newborn: Delayed effects.

Species: Rat
Dose: 750 MG/KG
Route of Application: Oral
Exposure Time: (5D MALE)
Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea).

Species: Rat
Dose: 96 MG/KG
Route of Application: Oral
Exposure Time: (6-21D PREG)
Result: Effects on Newborn: Behavioral.

Species: Rat
Dose: 250 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (15D PREG)
Result: Maternal Effects: Other effects. Effects on Newborn: Biochemical and metabolic.

Species: Mouse
Dose: 59400 UG/KG
Route of Application: Oral
Exposure Time: (3D PRE-21D POST)
Result: Effects on Newborn: Behavioral.

Species: Rabbit
Dose: 350 MG/KG
Route of Application: Oral
Exposure Time: (1-28D PREG)
Result: Effects on Fertility: Abortion. Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetal death.

Species: Rabbit
Dose: 280 MG/KG
Route of Application: Oral
Exposure Time: (1-28D PREG)
Result: Effects on Newborn: Biochemical and metabolic.

Species: Mammal
Dose: 14 MG/KG
Route of Application: Oral
Exposure Time: (30D PRE)
Result: Effects on Fertility: Female fertility index (e.g., # females pregnant per # sperm positive females; # females pregnant per # females mated).

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Caution: contains PCB's (polychlorinated biphenyls). For proper disposal information contact the US Environmental Protection Agency. Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

Section 14 - Transport Information

DOT
Proper Shipping Name: Polychlorinated biphenyls, liquid
UN#: 2315
Class: 9
Packing Group: Packing Group II
Hazard Label: Class 9
PIH: Not PIH

IATA
Proper Shipping Name: Polychlorinated biphenyls, liquid
IATA UN Number: 2315
Hazard Class: 9
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: N
Indication of Danger: Dangerous for the environment.
R: 33-50/53
Risk Statements: Danger of cumulative effects. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S: 35-60-61
Safety Statements: This material and its container must be disposed of in a safe way. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Toxic.
Risk Statements: May cause cancer. Harmful if swallowed.
Safety Statements: Avoid exposure - obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
US Statements: Target organ(s): Liver.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: No
NOTES: This product is subject to SARA section 313 reporting requirements.

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

MATERIAL SAFETY DATA SHEET

Date Printed: 09/03/2008
Date Updated: 08/23/2005
Version 1.3

Section 1 - Product and Company Information

Product Name	AROCLOR 1221, 50MG, NEAT
Product Number	48587
Brand	SUPELCO
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
AROCLOR 1221	11104-28-2	No

Synonyms Aroclor 1221 * Chlorodiphenyl (21% Cl)
RTECS Number: TQ1352000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Harmful.
Danger of cumulative effects. Irritating to eyes, respiratory system and skin. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Target organ(s): Nerves. Probable Carcinogen (US).

HMIS RATING

HEALTH: 2*
FLAMMABILITY: 0
REACTIVITY: 0

NFPA RATING

HEALTH: 2
FLAMMABILITY: 0
REACTIVITY: 0

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of contact, immediately wash skin with soap and copious amounts of water.

EYE EXPOSURE
In case of contact, immediately flush eyes with copious amounts of water for at least 15 minutes.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear respirator, chemical safety goggles, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Absorb on sand or vermiculite and place in closed containers for disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Mechanical exhaust required. Safety shower and eye bath.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	NIOSH	TWA	0.001 MG/M3

Section 9 - Physical/Chemical Properties

Appearance Physical State: Liquid

Property	Value	At Temperature or Pressure
Molecular Weight	N/A	
pH	N/A	
BP/BP Range	N/A	
MP/MP Range	N/A	
Freezing Point	N/A	
Vapor Pressure	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	N/A	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	N/A	
Explosion Limits	N/A	
Flammability	N/A	
Autoignition Temp	N/A	
Refractive Index	N/A	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Hydrogen chloride gas.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.

Eye Contact: May cause eye irritation.
Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)
Nerves.

SIGNS AND SYMPTOMS OF EXPOSURE
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

TOXICITY DATA

Oral
Rat
3980 mg/kg
LD50

Oral
Mammal
> 750 mg/kg
LD50

Intraperitoneal
Mammal
>500 MG/KG
LD50

CHRONIC EXPOSURE - CARCINOGEN
Result: Carcinogen.

IARC CARCINOGEN LIST
Rating: Group 2A Group 2A

NTP CARCINOGEN LIST
Rating: Reasonably anticipated to be carcinogenic.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 1 GM/KG
Route of Application: Subcutaneous
Exposure Time: (1D PRE)
Result: Maternal Effects: Uterus, cervix, vagina.

Species: Rat
Dose: 2 GM/KG
Route of Application: Subcutaneous
Exposure Time: (2D PRE)
Result: Effects on Fertility: Other measures of fertility

Species: Rabbit
Dose: 28 MG/KG
Route of Application: Oral
Exposure Time: (1-28D PREG)
Result: Effects on Newborn: Biochemical and metabolic.

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Caution: contains PCB's (polychlorinated biphenyls). For proper disposal information contact the US Environmental Protection Agency. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Polychlorinated biphenyls, liquid
UN#: 2315
Class: 9
Packing Group: Packing Group II
Hazard Label: Class 9
PIH: Not PIH

IATA
Proper Shipping Name: Polychlorinated biphenyls
IATA UN Number: 2315
Hazard Class: 9
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: N
Indication of Danger: Dangerous for the environment.
R: 33-50/53
Risk Statements: Danger of cumulative effects. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S: 35-60-61
Safety Statements: This material and its container must be disposed of in a safe way. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Harmful.
Risk Statements: Danger of cumulative effects. Irritating to eyes, respiratory system and skin. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. This material and its container must be disposed of in a safe way. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.
US Statements: Target organ(s): Nerves. Probable Carcinogen (US).

UNITED STATES REGULATORY INFORMATION
SARA LISTED: No
NOTES: This product is subject to SARA section 313 reporting requirements.

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

MATERIAL SAFETY DATA SHEET

Date Printed: 09/29/2008
Date Updated: 04/27/2006
Version 1.2

Section 1 - Product and Company Information

Product Name	AROCLOR 1232, 10MG, NEAT
Product Number	48588
Brand	SUPELCO
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
AROCLOR 1232	11141-16-5	No

Synonyms Aroclor 1232 * Chlorodiphenyl (32% Cl)
RTECS Number: TQ1354000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Dangerous for the environment.
Danger of cumulative effects. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

HMIS RATING

HEALTH: 1
FLAMMABILITY: 0
REACTIVITY: 0

NFPA RATING

HEALTH: 0
FLAMMABILITY: 0
REACTIVITY: 0

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE

If inhaled, remove to fresh air. If breathing becomes difficult, call a physician.

DERMAL EXPOSURE

In case of contact, immediately wash skin with soap and copious amounts of water.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Exercise appropriate precautions to minimize direct contact with skin or eyes and prevent inhalation of vapors.

METHODS FOR CLEANING UP
Absorb on sand or vermiculite and place in closed containers for disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Avoid inhalation. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Respiratory protection is not required. Where protection is desired, use multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges.
Hand: Protective gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	NIOSH	TWA	0.001 MG/M3

Section 9 - Physical/Chemical Properties

Appearance Physical State: Liquid

Property	Value	At Temperature or Pressure
Molecular Weight	N/A	
pH	N/A	
BP/BP Range	N/A	
MP/MP Range	N/A	
Freezing Point	N/A	
Vapor Pressure	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	N/A	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	N/A	
Explosion Limits	N/A	
Flammability	N/A	
Autoignition Temp	N/A	
Refractive Index	N/A	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Hydrogen chloride gas.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: May cause eye irritation.
Inhalation: May be harmful if inhaled. Material may be

irritating to mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed.

SIGNS AND SYMPTOMS OF EXPOSURE
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

TOXICITY DATA

Oral
Rat
4470 mg/kg
LD50

Section 12 - Ecological Information

No data available.

ADDITIONAL RESULTS/DATA FROM RELEVENT SCIENTIFIC EXPERIMENTS
Avoid contamination of the environment

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Caution: contains PCB's (polychlorinated biphenyls). For proper disposal information contact the US Environmental Protection Agency. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Polychlorinated biphenyls, liquid
UN#: 2315
Class: 9
Packing Group: Packing Group II
Hazard Label: Class 9
PIH: Not PIH

IATA
Proper Shipping Name: Polychlorinated biphenyls, liquid
IATA UN Number: 2315
Hazard Class: 9
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: N
Indication of Danger: Dangerous for the environment.
R: 33-50/53
Risk Statements: Danger of cumulative effects. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S: 35-60-61
Safety Statements: This material and its container must be disposed of in a safe way. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Dangerous for the environment.

Risk Statements: Danger of cumulative effects. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Safety Statements: This material and its container must be disposed of in a safe way. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: No
NOTES: This product is subject to SARA section 313 reporting requirements.

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

EN

**** MATERIAL SAFETY DATA SHEET ****

2,2-Dichlorodiethylether, 99+%

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: 2,2-Dichlorodiethylether, 99+%
Catalog Numbers:
26494-0000, 26494-0050, 26494-2500
Synonyms:
Bis-2-chloroethyl ether
Company Identification (Europe): Acros Organics BVBA
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium
Company Identification (USA): Acros Organics
One Reagent Lane
Fairlawn, NJ 07410
For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies in Europe, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#	Haz Symbols	Risk Phrases
111-44-4	2,2-Dichlorodiethylether		203-870-1		

Hazard Symbols: T+
Risk Phrases: 10 26/27/28 40

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Flammable. Very toxic by inhalation, in contact with skin and if swallowed. Limited evidence of a carcinogenic effect.

Potential Health Effects

Eye:
Lachrymator (substance which increases the flow of tears).
Skin:
Not available.
Ingestion:
Not available.
Inhalation:
Not available.
Chronic:
Not available.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids.
Skin:
Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion:
Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation:
Remove from exposure and move to fresh air immediately.
Notes to Physician:

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full

protective gear.
Extinguishing Media:
In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Not available.
Storage:
Not available.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Personal Protective Equipment

Eyes:
Wear safety glasses and chemical goggles if splashing is possible.
Skin:
Wear appropriate protective gloves and clothing to prevent skin exposure.
Clothing:
Wear appropriate protective clothing to minimize contact with skin.
Respirators:
Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Clear liquid
Color:	colorless
Odor:	Not available.
pH:	Not available.
Vapor Pressure:	1.1 mbar @ 20 deg C
Viscosity:	Not available.
Boiling Point:	178.5 deg C @ 760.00mm Hg
Freezing/Melting Point:	0 deg C
Autoignition Temperature:	369 deg C (696.20 deg F)
Flash Point:	55 deg C (131.00 deg F)
Explosion Limits, lower:	.80 vol %
Explosion Limits, upper:	.00 vol %
Decomposition Temperature:	
Solubility in water:	insoluble
Specific Gravity/Density:	1.2200g/cm3
Molecular Formula:	O(CH2CH2Cl)2
Molecular Weight:	143.02

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Not available.
Incompatibilities with Other Materials:
Oxidizing agents.
Hazardous Decomposition Products:
Hydrogen chloride, carbon monoxide, carbon dioxide

hydrogen chloride, carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 111-44-4: KN0875000
LD50/LC50:
CAS# 111-44-4: Dermal, guinea pig: LD50 = 300 mg/kg; Draize test, rabbit, eye: 100 mg Severe; Inhalation, mouse: LC50 = 650 mg/m3/2H; Inhalation, rat: LC50 = 330 mg/m3/4H; Inhalation, rat: LC50 = 330 mg/m3; Oral, mouse: LD50 = 209 mg/kg; Oral, mouse: LD50 = 112 mg/kg; Oral, rabbit: LD50 = 126 mg/kg; Oral, rat: LD50 = 75 mg/kg; Skin, rabbit: LD50 = 90 mg/kg.
Carcinogenicity:
2,2-Dichlorodiethylether -
California: carcinogen; initial date 4/1/88
NIOSH: potential occupational carcinogen
See actual entry in RTECS for complete information.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.

**** SECTION 14 - TRANSPORT INFORMATION ****

IATA
Shipping Name: 2,2'-DICHLORODIETHYL ETHER
Hazard Class: 6.1
UN Number: 1916
Packing Group: II
IMO
Shipping Name: 2,2'-DICHLORODIETHYL ETHER
Hazard Class: 6.1
UN Number: 1916
Packing Group: II
RID/ADR
Shipping Name: 2,2'-DICHLORODIETHYL ETHER
Hazard Class: 6.1
UN Number: 1916
Packing group: II
USA RQ:CAS# 111-44-4: 10 lb final RQ; 4.54 kg final RQ

**** SECTION 15 - REGULATORY INFORMATION ****

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: T+
Risk Phrases:

R 10 Flammable.
R 26/27/28 Very toxic by inhalation, in contact with skin and if swallowed.
R 40 Limited evidence of a carcinogenic effect.

Safety Phrases:

S 7/9 Keep container tightly closed and in a well-ventilated place.
S 27 Take off immediately all contaminated clothing.
S 38 In case of insufficient ventilation, wear suitable respiratory equipment.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)
CAS# 111-44-4: 2
United Kingdom Occupational Exposure Limits

United Kingdom Maximum Exposure Limits

Canada

CAS# 111-44-4 is listed on Canada's NDSL List.
CAS# 111-44-4 is listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 111-44-4: OEL-AUSTRALIA:TWA 5 ppm (30 mg/m3);STEL 10 ppm (60 mg/m 3);Skin
OEL-AUSTRIA:TWA 10 ppm (60 mg/m3);Skin
OEL-BELGIUM:TWA 5 ppm (29 mg/m3);STEL 10 ppm (58 mg/m3);Skin
OEL-DENMARK:TWA 5 ppm (30 mg/m3);Skin
OEL-FINLAND:TWA 5 ppm (30 mg/m3);STEL 10 ppm (60 mg/m3);Skin
OEL-FRANCE:TWA 5 ppm (30 mg/m3);Skin
OEL-GERMANY:TWA 10 ppm (60 mg/m3);Skin
OEL-JAPAN:TWA 15 ppm (88 mg/m3);Skin
OEL-THE NETHERLANDS:TWA 5 ppm (30 mg/m3);Skin
OEL-THE PHILIPPINES:TWA 15 ppm (90 mg/m3);Skin
OEL-POLAND:TWA 10 mg/m3
OEL-RUSSIA:STEL 0.6 mg/m3;Skin
OEL-RUSSIA:TWA 15 ppm;STEL 2 mg/m3;Skin
OEL-SWEDEN;Carcinogen
OEL-SWITZERLAND:TWA 5 ppm (30 mg/m3);STEL 25 ppm;Skin
OEL-SWITZERLAND:TWA 5 ppm (30 mg/m3);STEL 25 ppm (50 mg/m3);Skin
OEL-THAILAND:TWA 15 ppm (90 mg/m3)
OEL-TURKEY:TWA 15 ppm (90 mg/m3);Skin
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

US FEDERAL

TSCA

CAS# 111-44-4 is listed on the TSCA inventory.

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 7/16/1996 Revision #0 Date: Original.

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

Material Safety Data Sheet
Octane

ACC# 17260

Section 1 - Chemical Product and Company Identification

MSDS Name: Octane
Catalog Numbers: AC129370020, AC129370250, AC129375000, AC325950010, AC325950020, AC325950025, AC325950250, O3980-1
Synonyms: n-Octane.
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
111-65-9	Octane	>95	203-892-1

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 13 deg C.
Warning! Flammable liquid and vapor. Causes eye, skin, and respiratory tract irritation. Breathing vapors may cause drowsiness and dizziness. Aspiration hazard if swallowed. Can enter lungs and cause damage.
Target Organs: Central nervous system.

Potential Health Effects

Eye: Causes eye irritation.
Skin: Causes skin irritation. May be absorbed through the skin in harmful amounts. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis.
Ingestion: Aspiration hazard. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation: Causes respiratory tract irritation. May cause narcotic effects in high concentration.
Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. May accumulate static electrical charges, and may cause ignition of its own vapors. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. This liquid floats on water and may travel to a source of ignition and spread fire.
Extinguishing Media: Use foam, dry chemical, or carbon dioxide. Water may be ineffective. Water may spread fire.
Flash Point: 13 deg C (55.40 deg F)
Autoignition Temperature: 206 deg C (402.80 deg F)
Explosion Limits, Lower:1.0
Upper: 6.5
NFPA Rating: (estimated) Health: 1; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep away from heat, sparks and flame. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Octane	300 ppm TWA	75 ppm TWA; 350 mg/m3 TWA 1000 ppm IDLH	500 ppm TWA; 2350 mg/m3 TWA

OSHA Vacated PELs: Octane: 300 ppm TWA; 1450 mg/m3 TWA

Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance: clear, colorless

Odor: mild odor - gasoline-like

pH: Not available.

Vapor Pressure: 11 mm Hg @ 20 deg C

Vapor Density: 3.9 (air=1)

Evaporation Rate:0.6 (butyl acetate=1)

Viscosity: Not available.

Boiling Point: 124-127 deg C

Freezing/Melting Point:-57 deg C

Decomposition Temperature: Not available.

Solubility: Insoluble.

Specific Gravity/Density:0.708

Molecular Formula:C8H18

Molecular Weight:114.23

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Ignition sources, excess heat.

Incompatibilities with Other Materials: Strong oxidizing agents.

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:

CAS# 111-65-9: RG8400000

LD50/LC50:

CAS# 111-65-9:
Inhalation, rat: LC50 = 118 gm/m3/4H;
.

Carcinogenicity:
CAS# 111-65-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Water flea EC50 = 0.38 mg/L; 48 Hr.; Unspecified ConditionsBacteria: Phytobacterium phosphoreum: EC50 = 890 mg/L; 30 minutes; Microtox test No data available.
Environmental: No information available.
Physical: No information available.
Other: AQUATIC FATE: Photolysis or hydrolysis of n-octane in aquatic systems is not expected to be important. The biodegradation of n-octane may occur in aquatic environments, however volatilization and adsorption are expected to be far more important fate processes. The log bioconcentration factor (log BCF) for n-octane has been estimated to range from 2.89 to 3.71suggesting bioconcentration may be an important factor in aquatic systems. An estimated range for Koc from 5500 to 15,600 indicates n-octane will strongly absorb to carbon.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	OCTANES	OCTANES
Hazard Class:	3	3
UN Number:	UN1262	UN1262
Packing Group:	II	II
Additional Info:		FLASHPOINT 13C

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 111-65-9 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 111-65-9: immediate, fire.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 111-65-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN F N

Risk Phrases:

R 11 Highly flammable.
R 38 Irritating to skin.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R 65 Harmful: may cause lung damage if swallowed.
R 67 Vapours may cause drowsiness and dizziness.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 29 Do not empty into drains.
S 33 Take precautionary measures against static discharges.
S 9 Keep container in a well-ventilated place.
S 60 This material and its container must be disposed of as hazardous waste.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets

/safety data sheets.

S 62 If swallowed, do not induce vomiting: seek medical advice immed iately and show this container or label.

WGK (Water Danger/Protection)

CAS# 111-65-9: 1

Canada - DSL/NDSL

CAS# 111-65-9 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2, D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 111-65-9 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/08/1999
Revision #6 Date: 5/24/2006

Material Safety Data Sheet
n-Nonane

ACC# 11826

Section 1 - Chemical Product and Company Identification

MSDS Name: n-Nonane
Catalog Numbers: AC129110000, AC129110020, AC129110025, AC129111000, AC129115000, AC264310000 AC264310000, AC264310010, AC264310020, AC264311000, AC264315000
Synonyms: Nonane.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
111-84-2	n-Nonane	99+	203-913-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 31 deg C.
Danger! Flammable liquid and vapor. Harmful if inhaled. Breathing vapors may cause drowsiness and dizziness. Causes eye and skin irritation. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. May cause respiratory tract irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage.
Target Organs: Blood, kidneys, liver, respiratory system, eyes.

Potential Health Effects

Eye: Causes eye irritation.
Skin: Causes skin irritation. May be harmful if absorbed through the skin.
Ingestion: Aspiration hazard. May cause irritation of the digestive tract. May cause nausea and vomiting. May be harmful if swallowed. May cause lung damage.
Inhalation: May cause respiratory tract irritation. Harmful if inhaled. Aspiration hazard. Inhalation of vapors may cause drowsiness and dizziness.
Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis. May cause liver and kidney damage. Chronic exposure may cause blood effects.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the

upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Containers may explode in the heat of a fire. Flammable liquid and vapor.
Extinguishing Media: Use water spray to cool fire-exposed containers. Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: 31 deg C (87.80 deg F)
Autoignition Temperature: 206 deg C (402.80 deg F)
Explosion Limits, Lower:0.8 Vol %
Upper: 2.9 Vol %
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Remove all sources of ignition. Use a spark-proof tool. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Use spark-proof tools and explosion proof equipment. Do not get in eyes, on skin, or on clothing. Take precautionary measures against static discharges. Keep away from heat, sparks and flame. Do not ingest or inhale. Use only in a chemical fume hood.
Storage: Keep away from sources of ignition. Store in a cool, dry place. Store in a tightly closed container. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
n-Nonane	200 ppm TWA	200 ppm TWA; 1050 mg/m3 TWA	none listed

OSHA Vacated PELs: n-Nonane: 200 ppm TWA; 1050 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: gasoline-like
pH: Not available.
Vapor Pressure: 5 hPa @ 20 deg C
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 151 deg C @ 760 mmHg
Freezing/Melting Point:-53 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:0.718
Molecular Formula:C9H20
Molecular Weight:128.26

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, ignition sources, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 111-84-2: RA6115000
LD50/LC50:
CAS# 111-84-2:
Inhalation, rat: LC50 = 3200 ppm/4H;
Inhalation, rat: LC50 = 17000 mg/m3/4H;

.

Carcinogenicity:
CAS# 111-84-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: Terrestrial: Photolysis or hydrolysis is not expected to be important in soils. Biodegradation may occur in soils; however, volatilization and adsorption are expected to be far more important fate processes. Aquatic: Photolysis and hydrolysis in aquatic systems are not expected to be important. The log bioconcentration factor has been estimated to range from 3.31 to 3.92, suggesting bioconcentration may be an important fate process in aquatic systems. Atmospheric: Expected to exist almost entirely in the vapor phase in ambient air.
Physical: No information available.
Other: Do not empty into drains.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	NONANES	NONANES
Hazard Class:	3	3
UN Number:	UN1920	UN1920
Packing Group:	III	III
Additional Info:		FLASHPOINT 31C

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 111-84-2 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
CAS# 111-84-2: 40 CFR 799.5115
Section 12b
CAS# 111-84-2: Section 4, 1 % de minimus concentration
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 111-84-2: immediate, fire.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 111-84-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
XN
Risk Phrases:
R 10 Flammable.
R 38 Irritating to skin.
R 20 Harmful by inhalation.
R 53 May cause long-term adverse effects in the aquatic environment.
R 65 Harmful: may cause lung damage if swallowed.
R 67 Vapours may cause drowsiness and dizziness.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 37 Wear suitable gloves.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)
CAS# 111-84-2: 1
Canada - DSL/NDSL
CAS# 111-84-2 is listed on Canada's DSL List.
Canada - WHMIS

Canada - WHMIS

This product has a WHMIS classification of B2, D1B, D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 111-84-2 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 3/11/1997
Revision #10 Date: 7/24/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

MATERIAL SAFETY DATA SHEET
F-120
07/13/89 LAST REVISED JUNE 1989

SECTION I PRODUCT SPECIFICATIONS
CAT. NO. F43 BIS(2-CHLOROETHOXY)METHANE
CAS. NO. 111-91-1
SUPPLIED BY CHEM SERVICE, INC. PO BOX 3108, WEST CHESTER, PA, 19381
(215) 692-3026
EMERGENCY PHONE #: 215-386-2100
SECITON II TOXICITY DATA

RAT OR MOUSE LD50	RTECS#	OSHA PEL	ACGIH TLV
NA	PA3675000	NA	NA

NO TOXICITY DATA HAS BEEN FOUND. ASSUME THIS CHEMICAL TO BE HAZARDOUS.

SECTION III PHYSICAL DATA

MELTING POINT	BOILING POINT	DENSITY	VAPOR PRESSURE	VAPOR DENSITY
NA	218-219 C	1.21	NA	NA

EVAPORATION RATE (BUTYL ACETATE=1)	ODOR	COLOR	PHASE	SOLUBILITY IN WATER
NA	NA		LIQUID	

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: DATA NOT AVAILABLE.
EXTINGUISHING MEDIA: CARBON DIOXIDE, DRY CHEMICAL POWDER OR SPRAY.
NO EXPLOSION LIMITS ARE AVAILABLE FOR THIS COMPOUND.

SECTION V HEALTH HAZARD DATA

CONTACT LENSES SHOULD NOT BE WORN IN THE LABORATORY.
ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS - AVOID DIRECT PHYSICAL CONTACT!

SECTION VI FIRST AID

AN ANTIDOTE IS A SUBSTANCE INTENDED TO COUNTERACT THE EFFECT OF A POISON. IT SHOULD BE ADMINISTERED ONLY BY A PHYSICIAN OR TRAINED EMERGENCY PERSONNEL. MEDICAL ADVICE CAN BE OBTAINED FROM A POISON CONTROL CENTER.
IN CASE OF CONTACT: FLUSH EYES CONTINUOUSLY WITH WATER FOR 15-20 MINUTES. FLUSH SKIN WITH WATER FOR 15-20 MINUTES. IF NO BURNS HAVE OCCURRED, USE SOAP AND WATER TO CLEANSE SKIN. IF INHALED REMOVE PATIENT TO FRESH AIR. ADMINISTER OXYGEN IF PATIENT IS HAVING DIFFICULTY BREATHING. IF PATIENT HAS STOPPED BREATHING ADMINISTER ARTIFICIAL RESPIRATION. IF PATIENT IS IN CARDIAC ARREST ADMINISTER CPR. CONTINUE LIFE SUPPORTING MEASURES UNTIL MEDICAL ASSISTANCE HAS ARRIVED. REMOVE AND WASH CONTAMINATED CLOTHING. IF PATIENT IS EX-HIBITING SIGNS OF SHOCK - KEEP WARM AND QUIET. CONTACT POISON CONTROL CENTER IMMEDIATELY IF NECESSARY. DO NOT ADMINISTER LIQUIDS OR INDUCE VOMITING TO AN UNCONSCIOUS OR CONVSULSING PERSON.

IF PATIENT IS VOMITING - WATCH CLOSELY TO MAKE SURE AIRWAY DOES NOT BECOME OBSTRUCTED BY VOMIT.
GET MEDICAL ATTENTION IF NECESSARY.

SECTION VII REACTIVITY DATA

REACTIVITY UNAVAILABLE.

SECTION VIII SPILL OR LEAK PROCEDURES

SPILLS OR LEAKS: EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE OR SIMILAR MATERIAL. SWEEP UP AND PLACE IN AN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
DISPOSAL: BURN IN A CHEMICAL INCINERATOR WITH AN AFTER BURNER AND SCRUBBER.

SECTION IX PRECAUTIONS TO BE TAKEN IN HANDLING

THIS CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD. EYE SHIELDS SHOULD BE WORN. USE APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT. AVOID CONTACT WITH SKIN, EYES AND CLOTHING. KEEP TIGHTLY CLOSED IN A COOL DRY PLACE. STORE ONLY WITH COMPATIBLE CHEMICALS.

SECTION X SPECIAL PRECAUTIONS AND COMMENTS

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT ON THE DATE IT IS PUBLISHED AND MUST NOT BE CONSIDERED ALL INCLUSIVE. THE INFORMATION HAS BEEN OBTAINED ONLY BY A SEARCH OF AVAILABLE LITERATURE AND IS ONLY A GUIDE FOR HANDLING THE CHEMICALS. OSHA REGULATIONS REQUIRE THAT IF OTHER HAZARDS BECOME EVIDENT, AN UPGRADED MSDS MUST BE MADE AVAILABLE TO THE EMPLOYEE WITHIN THREE MONTHS. RESPONSIBILITY FOR UPDATES LIES WITH THE EMPLOYER AND NOT WITH CHEM SERVICE, INC. PERSONS NOT SPECIFICALLY AND PROPERLY TRAINED SHOULD NOT HANDLE THIS CHEMICAL OR ITS CONTAINER. THIS MSDS IS PROVIDED WITHOUT ANY WARRANTY EXPRESSED OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

THIS PRODUCT IS FURNISHED FOR LABORATORY USE ONLY! OUR PRODUCT MAY NOT BE USED AS DRUGS, COSMETICS, AGRICULTURAL OR PESTICIDAL PRODUCTS, FOOD ADDITIVES OR AS HOUSEHOLD CHEMICALS.

BOC GASES

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: PROPYLENE

1. Chemical Product and Company Identification

BOC Gases,
Division of
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974

TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800) 424-9300

BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER:
(905) 501-0802
EMERGENCY RESPONSE PLAN NO: 20101

PRODUCT NAME: PROPYLENE
CHEMICAL NAME: Propylene
COMMON NAMES/SYNONYMS: Propene
TDG (Canada) CLASSIFICATION: 2.1
WHMIS CLASSIFICATION: A, B1, D2B

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 6/7/96

2. Composition, Information on Ingredients

INGREDIENT	% VOLUME	PEL-OSHA[1]	TLV-ACGIH[2]	LD_{50} or LC_{50} Route/Species
Propylene FORMULA: C_3H_6 CAS: 115-07-1 RTECS #: UC6740000	99.0 to 99.7	Simple Asphyxiant	Simple Asphyxiant	Not Available

[1] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[2] As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW

This product does not contain oxygen and may cause asphyxia if released in a confined area. Simple hydrocarbons can cause irritation and central nervous system depression at high concentrations. Extremely flammable.

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	No

HEALTH EFFECTS:

Exposure Limits	Irritant	Sensitization
No	Yes	No
Teratogen	Reproductive Hazard	Mutagen
No	No	No
Synergistic Effects None Reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:
Irritation may occur.

SKIN EFFECTS:
None anticipated as product is a gas at room temperature.

INGESTION EFFECTS:
Ingestion is unlikely.

INHALATION EFFECTS:
Product is relatively nontoxic. Simple hydrocarbons can irritate the eyes, mucous membranes and respiratory system at high concentrations.

Inhalation of high concentrations may cause dizziness, disorientation, incoordination, narcosis, nausea or narcotic effects.

This product may displace oxygen if released in a confined space. Maintain oxygen levels above 19.5% at sea level to prevent asphyxiation.

Effects of oxygen deficiency resulting from simple asphyxiants may include: rapid breathing, diminished mental alertness, impaired muscular coordination, faulty judgement, depression of all sensations, emotional instability, and fatigue. As asphyxiation progresses, nausea, vomiting, prostration, and loss of consciousness may result, eventually leading to convulsions, coma, and death.

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

NFPA HAZARD CODES	**HMIS HAZARD CODES**	**RATINGS SYSTEM**
Health: 1	Health: 0	0 = No Hazard
Flammability: 4	Flammability: 4	1 = Slight Hazard
Reactivity: 1	Reactivity: 0	2 = Moderate Hazard
		3 = Serious Hazard
		4 = Severe Hazard

4. First Aid Measures

EYES:
Never introduce oil or ointment into the eyes without medical advice! If pain is present, refer the victim to an ophthalmologist for further treatment and follow up.

SKIN:
Remove contaminated clothing and flush affected area with cold water and soap. DO NOT USE HOT WATER.

INGESTION:
Not normally required. Seek immediate medical attention.

INHALATION:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO PRODUCT. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given assisted (artificial) respiration and supplemental oxygen. Further treatment should be symptomatic and supportive.

5. Fire Fighting Measures

Conditions of Flammability: Flammable liquid and vapor		
Flash point: -162°F (-108°C)	Method: TCC	Autoignition Temperature: 927°F (460°C)
LEL(%): 2.0	UEL(%): 11.1	
Hazardous combustion products: Carbon monoxide, Carbon dioxide		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: Not Available		

FIRE AND EXPLOSION HAZARDS:
This product will ignite at ambient temperatures and can be expected to form a flammable mixture upon release to the atmosphere. May burn with an almost invisible flame in bright light.

EXTINGUISHING MEDIA:
Water, carbon dioxide, dry chemical.

FIRE FIGHTING INSTRUCTIONS:
If possible, stop the flow of gas with a remote valve. Use water spray to cool fire exposed containers. If fire is extinguished and flow of gas is continued, increase ventilation to prevent a build up of a flammable/explosive atmosphere. Extinguish sources of ignition.

Be cautious of a Boiling Liquid Evaporating Vapor Explosion, BLEVE, if flame is impinging on surrounding containers. Direct 500 GPM water stream onto containers above the liquid level with remote monitors. Limit the number of personnel in proximity to the fire. Evacuate surrounding areas to at least 3000 feet in all directions.

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. Increase ventilation to prevent build up of a flammable/explosive atmosphere. Extinguish all sources of ignition! If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location

7. Handling and Storage

Earth bond and ground all lines and equipment associated with the product system. Electrical equipment should be non-sparking and explosion proof.

Propylene is non-corrosive and may be used with any common structural material.

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure regulator when connecting cylinder to lower pressure (<250 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130°F (54°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

Post "No Smoking" signs in storage or use areas.

For additional recommendations consult Compressed Gas Association Pamphlet P-1.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

8. Exposure Controls, Personal Protection

EXPOSURE LIMITS[1]:

INGREDIENT	% VOLUME	PEL-OSHA[2]	TLV-ACGIH[3]	LD_{50} or LC_{50} Route/Species
Propylene FORMULA: C_3H_6 CAS: 115-07-1 RTECS #: UC6740000	>99.0 to 99.7	Simple Asphyxiant	Simple Asphyxiant	Not Available

[1] Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.
[2] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[3] As stated in the ACGIH 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

ENGINEERING CONTROLS:
Use local exhaust to prevent accumulation. Use general ventilation to prevent build up of flammable concentrations. May use hood with forced ventilation when handling small quantities. If product is handled routinely where the potential for leaks exists, all electrical equipment must be rated for use in potentially flammable atmospheres. Consult the National Electrical Code for details.

EYE/FACE PROTECTION:
Safety goggles or glasses.

SKIN PROTECTION:
Protective gloves made of plastic or rubber.

RESPIRATORY PROTECTION:
Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

OTHER/GENERAL PROTECTION:
Safety shoes, safety shower, eyewash.

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure at 70°F	: 151	psia
Vapor density at STP (Air = 1)	: 1.43	
Evaporation point	: Not Available	
Boiling point	: -53.9	°F
	: -47.7	°C
Freezing point	: Not Available	
	: Not Available	
pH	: Not Available	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H20)	: Slightly soluble	
Odor threshold	: Not Available	
Odor and appearance	: A colorless gas with a mild olefinic odor.	

10. Stability and Reactivity

STABILITY:
Stable

INCOMPATIBLE MATERIALS:
Keep away from open flames, oxygen and oxidizing materials. Reacts violently with oxides of nitrogen (NO_2, N_2O_4 and N_2O). Oxidizers, mineral acids, halogenated compounds, nitrogen dioxide, molten sulfur.

HAZARDOUS DECOMPOSITION PRODUCTS:
Carbon monoxide

HAZARDOUS POLYMERIZATION:
Will not occur.

11. Toxicological Information

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

No chronic effects data given in the Registry of Toxic Effects of Chemical Substances (RTECS) or Sax, Dangerous Properties of Industrial Materials, 7th ed.

12. Ecological Information

No data given.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Propylene	Propylene
HAZARD CLASS:	2.1	2.1
IDENTIFICATION NUMBER:	UN 1077	UN 1077
SHIPPING LABEL:	FLAMMABLE GAS	FLAMMABLE GAS

15. Regulatory Information

Propylene is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

SARA TITLE III NOTIFICATIONS AND INFORMATION
This product contains the following toxic chemical subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

CAS NUMBER	INGREDIENT NAME	PERCENT BY VOLUME
115-07-1	PROPYLENE	99.0 to 99.7

This information must be included on all MSDSs that are copied and distributed for this material.

SARA TITLE III - HAZARD CLASSES:
Acute Health Hazard
Fire Hazard
Sudden Release of Pressure Hazard

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

MSDS Number: **E6500** * * * * * *Effective Date:* ***07/06/06*** * * * * * *Supercedes:* ***01/15/04***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

DIOCTYLPHTHALATE

1. Product Identification

Synonyms: Di-(2-ethylhexyl)phthalate; DEHP; bis(2-ethylhexyl)phthalate; DOP; 1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl)ester; Di-sec-octyl phthalate
CAS No.: 117-81-7
Molecular Weight: 390.56
Chemical Formula: C24H38O4
Product Codes: H187

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Di-sec-octyl Phthalate	117-81-7	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE CENTRAL NERVOUS SYSTEM, LIVER, REPRODUCTIVE SYSTEM, AND GASTROINTESTINAL TRACT. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure. MAY CAUSE ADVERSE REPRODUCTIVE EFFECTS.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Cancer)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Green (General Storage)

Potential Health Effects

Inhalation:
The low vapor pressure of this material essentially eliminates inhalation hazards unless the material is heated or misted. Inhalation of mists can cause nausea and is irritating to the respiratory tract.
Ingestion:
Ingestion causes nausea, abdominal cramps, diarrhea. CNS depression - lethargy, drowsiness, staggering and sleepiness - can result from absorbing large amounts.
Skin Contact:
Slight skin irritation may occur from prolonged skin contact. Low levels may be absorbed through the skin.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
Material is a suspected carcinogen and a suspected teratogen.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Do NOT induce vomiting. Give large amounts of water. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: 215C (419F) OC
Autoignition temperature: 390C (734F)
Flammable limits in air % by volume:
lel: 0.3
Slight fire hazard.
Explosion:
Above the flash point, explosive vapor-air mixtures may be formed.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
5 mg/m3 (TWA).
- ACGIH Threshold Limit Value (TLV):
5 mg/m3 (TWA); A3 - animal carcinogen.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece particulate respirator (with NIOSH type P100 or R100 filters) may be worn for up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. Please note that N series filters are not recommended for this material. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear oily liquid.
Odor:
Slightly amine to odorless.
Solubility:
Insoluble in water.
Specific Gravity:
0.9861 @ 20C/20C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
No information found.
Boiling Point:
230C (446F)
Melting Point:
-50C (-58F)
Vapor Density (Air=1):
16
Vapor Pressure (mm Hg):
1.32 @ 200C (392F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Nitrates, strong oxidizers, acids and alkalis.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Oral rat LD50: 30 g/kg; Skin rabbit LD50: 25 g/kg. Irritation Data (rabbit, std Draize, 500mg/24H): Skin, mild; Eye, mild. Investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------			
	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
Di-sec-octyl Phthalate (117-81-7)	No	Yes	3

---

12. Ecological Information

Environmental Fate:
When released into water, this material may biodegrade to a moderate extent. This material may bioaccumulate to some extent. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.
Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Not regulated.

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\--------------------------------
Ingredient                                  TSCA  EC   Japan  Australia
---------------------------------------------  ----  ---  -----  ---------
Di-sec-octyl Phthalate (117-81-7)            Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\--------------------------------
                                                       --Canada--
Ingredient                                  Korea  DSL   NDSL  Phil.
---------------------------------------------  -----  ---   ----  -----
Di-sec-octyl Phthalate (117-81-7)            Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Di-sec-octyl Phthalate (117-81-7)       No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                    -RCRA-    -TSCA-
Ingredient                              CERCLA      261.33     8(d)
----------------------------------------  ------      ------    ------
Di-sec-octyl Phthalate (117-81-7)       100         U028       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE CENTRAL NERVOUS SYSTEM, LIVER, REPRODUCTIVE SYSTEM, AND GASTROINTESTINAL TRACT. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure. MAY CAUSE ADVERSE REPRODUCTIVE EFFECTS.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 3.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Composition/Information on Ingredient

Cas:
117-84-0
Code:
M
RTECS:
TI1925000
Code:
M
Name:
N-DIOCTYLPHTHALATE (SARA III)
Other REC Limits:
NK
OSHA PEL:
NOT ESTABLISHED
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
NOT ESTABLISHED
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
NIOSH/MAHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN(FPN)
Ventilation:
VOL&PATTERN TO KEEP CONC.OF HZDUS INGRED BELOW THE LOWEST LEVEL LISTED.RME DECOMP PROD
GENERATED WHEN HEATING.VENT VAPOR
Protective Gloves:
SOLVENT IMPERMABLE GLOVES
Eye Protection:
CHEMICAL WORKER GOGGLES(FPN)
Other Protective Equipment:
Equipment EYEWASH FACILITY,SAFETY SHOWER
Work Hygienic Practices:
N/P
Supplemental Safety and Health:
VAP-DENS:>1; WT/GL: 7L7 LBS. ALSO CONTAINS:ISOPROPYL ALCOHOL 1-11%,TLVS,400 PPM: ETHYL ACETATE 2-
12%,TLV 400 PPM. MEETS TT-L- 32, TYPE II.

Health Hazards Data

LD50LC50Mixture:
N/P
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:

NO
OSHA:
NO
Health Hazards Acute And Chronic:
INGEST:GI IRRITATION,NAUSEA&VOMITING,ASPIRATION INTO LUNG MAY CAUSE CHEM PNEUMONITIS,WHICH CAN BE FATAL.
INHALE:ANESTHETIC,IRRITATION TO NOSE&THROAT,ACUTE NERVOUS SYSTEM DEPRESS.CHAR BY:HEADACHE,DIZZI
NESS,CONFUSION,NAUSEA,UNCONSCIOUSNESS,AND ASPHYXIATION.EYE:MAY CAUSE IRRIT.SKIN:PRIMARY IRRITANT.DEFATTING&IRRIT
OF SKIN
Explanation Of Carcinogenicity:
N/P
Signs And Symptions Of Overexposure:
RPTED OVEREXPOSURE TO TOULENE MAY CAUSE LIVER DAMAGE.RPTS HAVE ASSOC PRLNGD/RPTED OCCUPATIONAL OVEREXPOSURE TO
SOLVENTS W/PERMANENT BRAIN & NERVOUS SYSTEM DAMAGE.INTENTIONAL MISUSE BY DILIBERTELY CONC ENTRATING AND INHALING
THE CONTENTS MAYHARMFUL OR FATAL. 5
Medical Cond Aggravated By Exposure:
TOULENE HAS BEEN FOUND TO CAUSE KIDNEY,LUNG AND SPLEN DAMAGE IN LABORATORY ANIMALS.
First Aid:
INGEST:CALL POISON CNTRL CENT,ER, OR PHYSICIAN IMMED. INHALE:RME TO FRESH AIR IMMED.IF BREATHING HAS SPED,GIVE ART
RESP,KEEP WARM&QUIET,GET MED ATTN IMMED.EYE:FLUSH W/LRG AMTS OF H*2O,LIFTING LIDS OCCASIONAAY.CONT FOR 15MIN.GET
MED ATTEN.SKIN:IMMED FLUSH THE CONTAMINATED AREA W/LRG AMTS OF H*2O.RME CONTAMINATED CLOTHING AS H*2O IS
APPLIED.GET MEDICAL ATTENTION IF IRRITATION PERSISTS.
Spill Release Procedures:
WEAR PPE APPROPRIATE FOR EXPOSURE OF CONCERN.ELIMINATE SOURCES OF IGNITION.DIKE AND CONTAIN SPILL W/INERT
MATERIALS.TRANS LIQUID TO COVERED METAL CONTAINER FOR RECOVERY OR DISPOSAL,OR RME W/INERT ABSO RBENTS.USE
NONSPRK TOOLS.PLACE ABS (SEESUPP DATA)
Neutralizing Agent:
N/P
Waste Disposal Methods:
DISPOSE OF IAW FED,STATE,&LOCAL LAWS.INCINERATE ONLY IN EPA APPRVD FACILITY.DO NOT INCINERATE CLSD
CONTAINER.CONTAMINATED ABSORBENT MAY BE DISPOSED OF IN A HZDOUS WST LANDFILL.
Handling And Storage Precautions:
DO NOT STORE ABOVE 95F/35C.STORE LARGE QUANTITIES IN COMPLIANCE W/OSHA 29CFR1910.106.
Other Precautions:
DO NOT TAKE INTERNALLY.CLOSE CONTAINERS AFTER USE.EMPTY CONTAINERS MUST NOT BE WASHED AND REUSED FOR ANY
PURPOSE.CONTAINERS SHOULD BE GROUNDED AND BONDED TO THE RECEIVING CONTAINER.DO NOT WELD,BRAZE,O R CUT ON EMPTY
CONTAINER.(SEE SUPP DATA)

Fire and Explosion Hazard Information

Flash Point Method:
N/P
Flash Point:
Flash Point Text:
20F/-6.6C CAL
Autoignition Temp:
Autoignition Temp Text:
N/K
Lower Limits:
NK

Upper Limits:
NK
Extinguishing Media:
6 CO*2,DRY CHEM,ALCOHOL FOAM, POLYMER FOAM IS PREFERRED FOR LARGE FIRES.
Fire Fighting Procedures:
FIREFIGHTERS SHOULD WEAR SCBA.H*2O MAY BE INEFFECTIVE,MAY BE USED TO COOL EXPOSD CONTS TO PVNT PRESSURE BUILDUP &
POSS AUTOIGNITION OR EXPLO WHEN (SEE SUPP DATA
Unusual Fire/Explosion Hazard:
DURING EMER CONDITIONS,OVEREXPOS TO DECOMP PRODT MAY CAUSE A HLTH HZD.SYMPTOMS MAY NOT BE IMMED APPARENT.OBTAIN
MEDICAL ATTENTION.

Physical/Chemical Properties

HCC:
7 F2
NRC/State LIC No:
N/A
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
180F-428F
Melt/Freeze Pt:
M.P/F.P Text:
NK
Decomp Temp:
Decomp Text:
N/A
Vapor Pres:
NK
Vapor Density:
>AIR
Volatile Org Content %:
Spec Gravity:
0.91
VOC Pounds/Gallon:
PH: N/P
VOC Grams/Liter:
Viscosity:
N/K
Evaporation Rate & Reference:
SLOWER THAN ETHER
Solubility in Water:
NK
Appearance and Odor:
NK
Percent Volatiles by Volume:
79
Corrosion Rate:
N/P

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
AVOID EXCESSIVE HEAT AND SOURCES OF IGNITION.
Materials To Avoid:
STRONG ACIDS OR ALKALINE MATERIALS. OXIDIZING MATERIALS.
Hazardous Decomposition Products:
BURNING,INCL WHEN HEATED BY WELDING OR CUTTING,WILL PROD SMOKE,CO,CO*2,OF NITROGEN MAY BE GENERATED.
Hazardous Polymerization Indicator:

NO
Conditions To Avoid Polymerization:
KEEP AWAY FROM HEAT SPARKS AND FLAME.

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

For R&D use only. Not for drug, household or other uses.

Back to 1,2,4-Trichlorobenzene, 99%

Material Safety Data Sheet
1,2,4-Trichlorobenzene, 99%

ACC# 95590

Section 1 - Chemical Product and Company Identification

MSDS Name: 1,2,4-Trichlorobenzene, 99%
Catalog Numbers: AC157900000, AC157900010, AC157900025
Synonyms: unsym-Trichlorobenzene
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fairlawn, NJ 07410

For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies outside the US, call: 0032(0) 14575299

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
120-82-1	1,2,4-TRICHLOROBENZENE	99%	204-428-0

Hazard Symbols: XN
Risk Phrases: 22 38 51/53

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless. **Caution!** May be harmful if swallowed. May causecentral nervous system depression. Causes severe eye irritation.Causes digestive and respiratory tract irritation. May cause blurredvision. May cause severe skin irritation.
Target Organs: Kidneys, central nervous system,liver.

Potential Health Effects

Eye: May cause severe eye irritation.
Skin: Causes skin irritation. May cause dermatitis.
Ingestion: Harmful if swallowed. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause a narcotic effect with possible coma. May cause central nervous system depression.
Inhalation: May cause respiratory tract irritation.
Chronic: Prolonged or repeated skin contact may cause dermatitis. May cause liver and kidney damage.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately.
Skin: Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.
Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Do NOT adminster adrenaline after exposure via inhalation or ingestion.

Section 5 - Firefighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire. Use water spray to keep fire-exposed containers cool. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Combustible material; may burn but does not ignite readily.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, halon, or water spray. Do NOT get water inside containers. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray. Cool containers with flooding quantities of water until well after fire is out.
Autoignition Temperature: 571 deg C (1,059.80 deg F)
Flash Point: 110 deg C (230.00 deg F)(estimated) Health: 2; Flammability: 1; Reactivity: 0 Explosion Limits, Lower: 2.50 vol % Upper: 6.60 vol %

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Scoop up with a nonsparking tool, then place into a suitable container for disposal. Remove all sources of ignition. Provide ventilation. Do not get water inside containers.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Avoid breathing dust, vapor, mist, or gas. Avoid contact with skin and eyes. Avoid ingestion and inhalation.
Storage: Keep away from sources of ignition. Store in a cool, dry place. Store in a tightly closed container.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
1,2,4-TRICHLOROBENZENE	C 5 ppm; C 37 mg/m3	none listed	none listed

OSHA Vacated PELs: 1,2,4-TRICHLOROBENZENE: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to minimize contact with skin.
Respirators: Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: Characteristic aromatic odor

pH: Not available.
Vapor Pressure: 2 hPa @ 50 deg C
Vapor Density: 6.26
Evaporation Rate:
Viscosity: Not available.
Boiling Point: 214760.00 deg C
Freezing/Melting Point:16 deg C
Decomposition Temperature: Not available.
Solubility: insoluble
Specific Gravity/Density:1.4540g/cm3
Molecular Formula:C6H3Cl3
Molecular Weight:

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: High temperatures, incompatible materials, ignition sources, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 120-82-1: DC2100000
LD50/LC50:
CAS# 120-82-1:
Oral, mouse: LD50 = 300 mg/kg;
Oral, rat: LD50 = 756 mg/kg;
Skin, rat: LD50 = 6139 mg/kg;
Carcinogenicity:
CAS# 120-82-1: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: orl-rat TDL0: 1800 mg/kg (9-13D preg) ipr-rat TDL0: 750 mg/kg (3D pre)
Neurotoxicity: No information available.
Mutagenicity: mnt-mus-ipr: 210 mg/kg/24H
Other Studies: No data available.

Section 12 - Ecological Information

Ecotoxicity: Acute fish toxicity: LC50 on Poecilia reticula: approx. 2,4 mg/l. Duration of test: 14 d (Verschueren,K. Handb.of Environm. Data on Org.Chem., 2 ed., 1983); LC50 on Lepomis macrochirus: approx. 3,4 mg/l (Buccafusco,R.J. et al. Bull.Environm.Toxicol.26,446-452,1981).
Environmental Fate: According to WORNE biological degradation with complete ring cleavage occurs within 46 hours at 30xC in the presence of Pseudomonas sp. The test was conducted with adapted bacteria (Worne,H.E. Magazine from BECEWA, Liege, Belgium 22, 1972, 61-71).
Physical/Chemical: Not available.
Other: Not available.

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration ofContaminants: None listed.
RCRA D-Series Chronic Toxicity ReferenceLevels: None listed.
RCRA F-Series: None listed.
RCRA P-Series: None listed.

RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	TRICHLOROBENZENES, LIQUID	TRICHLOROBENZENES, LIQUID	TRICHLOROBENZENES, LIQUID	TRICHLOROBENZENES, LIQUID	TRICHLOROBENZENES, LIQUID
Hazard Class:	6.1	6.1	6.1(15C)	6.1	6.1
UN Number:	UN2321	UN2321	UN2321	UN2321	UN2321
Packing Group:	III	III		III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 120-82-1 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
CAS# 120-82-1: Testing required by: manufacturers; processors (40 CFR 799.1
Section 12b
CAS# 120-82-1: export notification required - Section 4
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

Section 302 (RQ)
CAS# 120-82-1: final RQ = 100 pounds (45.4 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 120-82-1: acute, chronic.
Section 313
This material contains 1,2,4-TRICHLOROBENZENE (CAS# 120-82-1, 99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 120-82-1 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 120-82-1 is listed as a Priority Pollutant under the Clean Water Act. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 120-82-1 can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level: None of the chemicals in this product are listed. **European/International Regulations**
European Labeling in Accordance with EC Directives
Hazard Symbols:
XN
Risk Phrases:
R 22 Harmful if swallowed. R 38 Irritating to skin. R 51/53 Toxic to aquatic organisms; may cause long-term adverse effects in the aquatic environment.
Safety Phrases:
S 36/37 Wear suitable protective clothing and gloves. S 61 Avoid release to the environment. Refer to special

instructions/Safety data sheets.

WGK (Water Danger/Protection)

CAS# 120-82-1: 3

Canada

CAS# 120-82-1 is listed on Canada's DSL/NDSL List.

This product does not have a WHMIS classification.

CAS# 120-82-1 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 120-82-1: OEL-AUSTRALIA:TWA 5 ppm (40 mg/m3) OEL-BELGIUM:STEL 5 ppm (37 mg/m3) OEL-DENMARK:TWA 5 ppm (40 mg/m3) OEL-FINLAND:TWA 5 ppm (40 mg/m3);STEL 10 ppm (74 mg/m3);Skin OEL-FRANCE:TWA 5 ppm (40 mg/m3) OEL-GERMANY:TWA 5 ppm (40 mg/m3) OEL-THE NETHERLANDS:TWA 5 ppm (40 mg/m3) OEL-SWITZERLAND:TWA 5 ppm (40 mg/m3) OEL-UNITED KINGDOM:TWA 5 ppm (40 mg/m3);STEL 5 pp (40 mg/m3) OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 11/24/1995

Revision #3 Date: 9/08/1998

Material Safety Data Sheet
2,4-Dichlorophenol, 99%

ACC# 93183

Section 1 - Chemical Product and Company Identification

MSDS Name: 2,4-Dichlorophenol, 99%
Catalog Numbers: AC147720000, AC147720050, AC147721000, AC147725000
Synonyms: 2,4-Dichlorohydroxybenzene; 2,4-DCP.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
120-83-2	2,4-Dichlorophenol	99	204-429-6

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: white crystals.
Danger! Causes eye and skin burns. Causes digestive and respiratory tract burns. May be fatal if absorbed through the skin. Harmful if swallowed.
Target Organs: Blood, kidneys, liver, eyes, skin, mucous membranes.

Potential Health Effects

Eye: Causes eye burns.
Skin: May be fatal if absorbed through the skin. Causes skin burns. Molten or hot 2,4-dichlorophenol (2,4-DCP) is immediately absorbed through the skin in amounts that have caused death to humans. Rapid death in humans has been caused by skin exposure without immediate decontamination. Amounts of molten 2,4-DCP that may cover as little as 1% body surface area (palm of hand-sized) may cause death. 2,4-DCP is absorbed more readily through skin when in solution or molten than as a solid.
Ingestion: Harmful if swallowed. Causes gastrointestinal tract burns.
Inhalation: Causes severe respiratory tract irritation with possible burns.
Chronic: May cause liver and kidney damage. Chronic exposure may cause blood effects.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid immediately.

Skin: SPEEDY ACTION IS CRITICAL! Destroy contaminated shoes. In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.
Ingestion: If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Material may destroy the nerve endings in the skin; the absence of pain does not necessarily mean the skin has been properly decontaminated.
Antidote: It is recommended that further amounts of 2,4-DCP may be removed from the skin by repeatedly spraying/swabbing the skin with polyethylene or polypropylene glycol mixtures, alternating with rinsing with large quantities of water for 30 minutes.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. This material in sufficient quantity and reduced particle size is capable of creating a dust explosion.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or appropriate foam. Solid streams of water or high volume water jet may spread fire.
Flash Point: 104 deg C (219.20 deg F)
Autoignition Temperature: 653 deg C (1,207.40 deg F)
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Do not breathe dust, mist, or vapor. Do not get in eyes, on skin, or on clothing. Use only with adequate ventilation.
Storage: Store in a cool, dry place. Store in a tightly closed container. Do not store in copper or copper alloy storage vessels. Moisture in 2,4-DCP increases the potential for corrosion, therefore, rendering carbon steel inadequate as a material of construction. Stainless steel should be avoided due to the potential for stress-corrosion cracking.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. EXPOSURE GUIDELINE

for 2,4-DCP: Dow Agrosciences industrial hygiene guideline is 1 ppm, Skin. (Immediately absorbed through the skin in amounts that have caused rapid death to humans).

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
2,4-Dichlorophenol	none listed	none listed	none listed

OSHA Vacated PELs: 2,4-Dichlorophenol: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear chemical splash goggles and face shield.

Skin: Wear appropriate protective gloves to prevent skin exposure. Nitrile or Neoprene gloves are recommended.

Clothing: Wear appropriate protective clothing to prevent skin exposure. Recommended personal protective clothing includes neoprene boots and suit of Saranex, Neoprene, or Kapler CPF3.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Crystals
Appearance: white
Odor: phenolic
pH: Not available.
Vapor Pressure: 0.07 mm Hg @ 25 deg C
Vapor Density: 5.6 (air=1)
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 209-210 deg C @ 760 mm Hg
Freezing/Melting Point:41-44 deg C
Decomposition Temperature: Not available.
Solubility: Slightly soluble.
Specific Gravity/Density:1.382 @ 60°/4°C
Molecular Formula:C6H4Cl2O
Molecular Weight:163.00

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: High temperatures, dust generation.
Incompatibilities with Other Materials: Oxidizing agents, acid chlorides, copper, steel, acid anhydrides.
Hazardous Decomposition Products: Hydrogen chloride, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 120-83-2: SK8575000
LD50/LC50:

CAS# 120-83-2:
Draize test, rabbit, skin: 500 uL/24H Severe;
Oral, mouse: LD50 = 1276 mg/kg;
Oral, mouse: LD50 = 1276 mg/kg;
Oral, mouse: LD50 = 580 mg/kg;
Oral, rat: LD50 = 47 mg/kg;
Oral, rat: LD50 = 380 mg/kg;
.
Liquid 2,4-DCP is immediately absorbed through the skin in amounts that have caused death to humans. The dermal LD50 for humans is estimated to be 50-190 mg/kg.
Carcinogenicity:
CAS# 120-83-2:

- **ACGIH:** Not listed.
- **California:** Not listed.
- **NTP:** Not listed.
- **IARC:** Group 2B carcinogen

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: See actual entry in RTECS for complete information.
Mutagenicity: See actual entry in RTECS for complete information.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: 7.75 mg/l.; 96 hour; bioassay not specified

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 120-83-2: waste number U081.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	TOXIC SOLIDS, CORROSIVE, ORGANIC, N.O.S.	Toxic Solid, Corrosive, Organic, N.O.S.
Hazard Class:	6.1	6.1
UN Number:	UN2928	UN2928
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 120-83-2 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

CAS# 120-83-2: Section 4, 0.1 % de minimus concentration [see 40 CFR 766 and 707.72]

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 120-83-2: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 120-83-2: immediate, delayed.

Section 313

This material contains 2,4-Dichlorophenol (CAS# 120-83-2, 99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 120-83-2 is listed as a Priority Pollutant under the Clean Water Act. CAS# 120-83-2 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 120-83-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T C N

Risk Phrases:

R 22 Harmful if swallowed.
R 24 Toxic in contact with skin.
R 34 Causes burns.
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face pr

otection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)
CAS# 120-83-2: 3

Canada - DSL/NDSL
CAS# 120-83-2 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D1A, E.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 120-83-2 is not listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 2/23/1998
Revision #4 Date: 9/26/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet

acc. to OSHA and ANSI

Printing date 11/10/2008 Reviewed on 11/10/2008

1 Identification of substance:

Product details:

Product name: 2,4-Dinitrotoluene

Manufacturer/Supplier:
Shangyu Jiehua Chemical Co., Ltd
51 Baiheng Rd., Sanpeng Bridge, Shangyu
312351, Zhejiang
P.R.China
Emergency Phone: +86 575 82131151
CHEMTREC: (800) 424-9300
Web Site: www.runyoutech.com

Information Department: Health, Safety and Environmental Department
Emergency information:
During normal hours the Health, Safety and Environmental Department.
After normal hours call Chemtrec at (800) 424-9300.

2 Composition/Data on components:

Chemical characterization:
Description: (CAS#)
2,4-Dinitrotoluene (CAS# 121-14-2): 100%
Identification number(s):
EINECS Number: 204-450-0
Index number: 609-007-00-9

3 Hazards identification

Hazard description:

T Toxic
N Dangerous for the environment

Information pertaining to particular dangers for man and environment

R 45 May cause cancer.
R 23/24/25 Also toxic by inhalation, in contact with skin and if swallowed.
R 48/22 Also harmful: danger of serious damage to health by prolonged exposure if swallowed.
R 62 Possible risk of impaired fertility
R 68 Possible risk of irreversible effects.
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

Classification system
HMIS ratings (scale 0-4)
(Hazardous Materials Identification System)

HEALTH	3
FIRE	1
REACTIVITY	1

Health (acute effects) = 3
Flammability = 1
Reactivity = 1

(Contd. on page 2)

Material Safety Data Sheet

acc. to OSHA and ANSI

Printing date 11/10/2008 Reviewed on 11/10/2008

Product name: 2,4-Dinitrotoluene

(Contd. of page 1)

4 First aid measures

General information
Immediately remove any clothing soiled by the product.
Remove breathing apparatus only after contaminated clothing has been completely removed.
In case of irregular breathing or respiratory arrest provide artificial respiration.

After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.

After skin contact
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.

After eye contact
Rinse opened eye for several minutes under running water. Then consult a doctor.

After swallowing
Do not induce vomiting; immediately call for medical help.
Seek immediate medical advice.

5 Fire fighting measures

Suitable extinguishing agents
Carbon dioxide, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

Special hazards caused by the material, its products of combustion or resulting gases:
In case of fire, the following can be released:
Carbon monoxide and carbon dioxide
Nitrogen oxides (NOx)

Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

6 Accidental release measures

Person-related safety precautions:
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation

Measures for environmental protection:
Do not allow material to be released to the environment without proper governmental permits.

Measures for cleaning/collecting:
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.

Additional information:
See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

(Contd. on page 3)

Material Safety Data Sheet
acc. to OSHA and ANSI

Printing date 11/10/2008 Reviewed on 11/10/2008

Product name: 2,4-Dinitrotoluene

(Contd. of page 2)

7 Handling and storage

Handling
Information for safe handling:
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Open and handle container with care.
Information about protection against explosions and fires:
Keep ignition sources away.

Storage
Requirements to be met by storerooms and receptacles:
No special requirements.
Information about storage in one common storage facility:
Store away from oxidizing agents.
Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.

8 Exposure controls and personal protection

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Components with limit values that require monitoring at the workplace:
Not required.
Additional information: No data

Personal protective equipment
General protective and hygienic measures
The usual precautionary measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the eyes and skin.
Breathing equipment:
Use suitable respirator when high concentrations are present.
Protection of hands:
Impervious gloves
Check protective gloves prior to each use for their proper condition.
Material of gloves
The selection of suitable gloves not only depends on the material, but also on quality. Quality will vary from manufacturer to manufacturer.
Eye protection: Safety glasses
Body protection: Protective work clothing.

9 Physical and chemical properties:

General Information	
Form:	Crystalline
Color:	Yellow

(Contd. on page 4)

Material Safety Data Sheet
acc. to OSHA and ANSI

Printing date 11/10/2008 Reviewed on 11/10/2008

Product name: 2,4-Dinitrotoluene

(Contd. of page 3)

Odor:	Not determined
Change in condition	
Melting point/Melting range:	67-70°C (153-158°F)
Boiling point/Boiling range:	Not determined
Sublimation temperature / start:	Not determined
Flash point:	> 110°C (> 230°F)
Ignition temperature:	Not determined
Decomposition temperature:	Not determined
Danger of explosion:	Product does not present an explosion hazard.
Explosion limits:	
Lower:	Not determined
Upper:	Not determined
Vapor pressure:	Not determined
Density:	Not determined
Solubility in / Miscibility with	
Water:	Insoluble

10 Stability and reactivity

Thermal decomposition / conditions to be avoided:
Decomposition will not occur if used and stored according to specifications.
Materials to be avoided: Oxidizing agents
Dangerous reactions No dangerous reactions known
Dangerous products of decomposition:
Carbon monoxide and carbon dioxide
Nitrogen oxides

11 Toxicological information

Acute toxicity:

LD/LC50 values that are relevant for classification:		
Oral	LD50	790 mg/kg (mouse)
		268 mg/kg (rat)
Dermal	LD50	>1 gm/kg (guinea pig)
Irritation of skin	mild	500 mg/24H (rabbit)

Primary irritant effect:
on the skin: Irritant to skin and mucous membranes.
on the eye: Irritating effect.
Sensitization: No sensitizing effects known.
Other information (about experimental toxicology):
Tumorigenic effects have been observed on tests with laboratory animals.
Reproductive effects have been observed on tests with laboratory animals.
Mutagenic effects have been observed on tests with bacteria.
Mutagenic effects have been observed on tests with insects.
Mutagenic effects have been observed on tests with laboratory animals.

(Contd. on page 5)

Material Safety Data Sheet

acc. to OSHA and ANSI

Printing date 11/10/2008 Reviewed on 11/10/2008

Product name: 2,4-Dinitrotoluene

(Contd. of page 4)

Subacute to chronic toxicity:
Subacute to chronic toxicity:
The Registry of Toxic Effects of Chemical Substances (RTECS) reports the following effects in laboratory animals:
Behavioral - food intake (animal).
Related to Chronic Data - death.
Related to Chronic Data - changes in testicular weight.
Liver - changes in liver weight.
Blood - normocytic anemia.
Blood - changes in serum composition (e.g. TP, bilirubin, cholesterol).
Blood - methemoglobinemia-carboxyhemoglobin.
Blood - changes in other cell count (unspecified)
Blood - other changes.
Endocrine - changes in spleen weight.
Endocrine - changes in luteinizing hormone.
Brain and Coverings - other degenerative changes.
Nutritional and Gross Metabolic - weight loss or decreased weight gain.
Reproductive - Paternal Effects - spermatogenesis (including genetic material, sperm morphology, motility, and count).
Reproductive - Paternal Effects - testes, epididymis, sperm duct.
Skin and Appendages - tumors.
Kidney, Ureter, Bladder - Kidney tumors.
Kidney, Ureter, Bladder - tumors.
Reproductive - Fertility - pre-implantation mortality (e.g. reduction in number of implants per female; total number of implants per corpora lutea)
Reproductive - Fertility - other measures of fertility.
Reproductive - Paternal Effects - spermatogenesis.
Tumorigenic - neoplastic by RTECS criteria.
Tumorigenic - carcinogenic by RTECS criteria.
Tumorigenic - equivocal tumorigenic agent by RTECS criteria.
Additional toxicological information:
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
Danger through skin absorption.
Possible risk of impaired fertility.
IARC-2B: Possibly carcinogenic to humans: limited evidence in humans in the absence of sufficient evidence in experimental animals.

12 Ecological information:

Ecotoxical effects:
Remark: Toxic for fish
General notes:
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
Also poisonous for fish and plankton in water bodies.
Do not allow material to be released to the environment without proper governmental permits.
Toxic for aquatic organisms

(Contd. on page 6)

Material Safety Data Sheet

acc. to OSHA and ANSI

Printing date 11/10/2008 *Reviewed on 11/10/2008*

Product name: 2,4-Dinitrotoluene

(Contd. of page 5)

13 Disposal considerations

Product:
Recommendation
Consult state, local or national regulations to ensure proper disposal.

Uncleaned packagings:
Recommendation: Disposal must be made according to official regulations.

14 Transport information

DOT regulations:

Hazard class:	6.1
Identification number:	UN3454
Packing group:	II
Proper shipping name (technical name):	DINITROTOLUENES, SOLID
Label	6.1

Land transport ADR/RID (cross-border)

ADR/RID class:	6.1 (T2) Toxic substances
Danger code (Kemler):	60
UN-Number:	3454
Packaging group:	II
Description of goods:	3454 DINITROTOLUENES, SOLID

Maritime transport IMDG:

IMDG Class:	6.1
UN Number:	3454
Label	6.1
Packaging group:	II
Proper shipping name:	DINITROTOLUENES, SOLID

Air transport ICAO-TI and IATA-DGR:

ICAO/IATA Class:	6.1
UN/ID Number:	3454
Label	6.1

(Contd. on page 7)

Material Safety Data Sheet
acc. to OSHA and ANSI

Printing date 11/10/2008 Reviewed on 11/10/2008

Product name: 2,4-Dinitrotoluene

(Contd. of page 6)

Packaging group:	II
Proper shipping name:	DINITROTOLUENES, SOLID

15 Regulations

Product related hazard informations:

Hazard symbols:
T Toxic
N Dangerous for the environment

Risk phrases:
45 May cause cancer.
23/24/25 Also toxic by inhalation, in contact with skin and if swallowed.
48/22 Also harmful: danger of serious damage to health by prolonged exposure if swallowed.
62 Possible risk of impaired fertility
68 Possible risk of irreversible effects.
51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

Safety phrases:
53 Avoid exposure - obtain special instructions before use.
45 In case of accident or if you feel unwell, seek medical advice immediately.
61 Avoid release to the environment. Refer to special instructions/Safety data sheets

National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
This product contains a chemical known to the state of California to cause cancer or reproductive toxicity.
All components of this product are listed on the Canadian Domestic Substances List (DSL).

Information about limitation of use:
For use only by technically qualified individuals.
This product is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.

16 Other information:
Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing MSDS: Health, Safety and Environmental Department.
Contact: Paul V. Connolly

Material Safety Data Sheet
n-Butyl acetate

ACC# 15380

Section 1 - Chemical Product and Company Identification

MSDS Name: n-Butyl acetate
Catalog Numbers: AC107750000, AC107750010, AC107750025, AC167680000, AC167680010, AC167680040, AC167685000, AC327850000, AC327850010, B395-4, B396-1, B396-4, B396-4LC, B3961LC, B396FB115, B396FB19, B396FB200, B396FB50, B396POP19, B396POP200, B396POP50, B396POPB200, B396POPB50, B396RB200, B396RB50, B396RS200, B396RS50, B396SS115, B396SS19, B396SS200, B396SS28, B396SS50, BP1135-500, NC9461437
Synonyms: Acetic acid, butyl ester; Butyl acetate; 1-Butyl acetate; Butyl ethanoate.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
123-86-4	n-Butyl acetate	>98	204-658-1

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 22 deg C.
Warning! Flammable liquid and vapor. Breathing vapors may cause drowsiness and dizziness. Causes eye and respiratory tract irritation. Repeated exposure may cause skin dryness or cracking.
Target Organs: Central nervous system, respiratory system, eyes, skin.

Potential Health Effects
Eye: Causes eye irritation. Vapors cause eye irritation.
Skin: Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. Not expected to cause an allergic skin reaction. A single prolonged skin exposure is not likely to result in the material being absorbed in harmful amounts. Fifty subjects underwent repeated insult patch-testing with n-butyl acetate. Patches containing 0.5 ml of butyl acetate were applied for nine 24-hour applications over a 3-week period; challenge patches were applied 10 to 14 days after the final induction application. No subject was sensitized.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Ingestion of large amounts may cause CNS depression.
Inhalation: Causes respiratory tract irritation. Inhalation of vapors may cause drowsiness and dizziness.

Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Liquid will float and may reignite on the surface of water. Flammable liquid and vapor. May accumulate static electrical charges, and may cause ignition of its own vapors. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Water may be ineffective.
Flash Point: 22 deg C (71.60 deg F)
Autoignition Temperature: 407 deg C (764.60 deg F)
Explosion Limits, Lower:1.3
Upper: 7.6
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Use water spray to disperse the gas/vapor. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only

with adequate ventilation. Keep away from heat, sparks and flame. Avoid breathing vapor.
Storage: Keep away from sources of ignition. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
n-Butyl acetate	150 ppm TWA; 200 ppm STEL	150 ppm TWA; 710 mg/m3 TWA 1700 ppm IDLH	150 ppm TWA; 710 mg/m3 TWA

OSHA Vacated PELs: n-Butyl acetate: 150 ppm TWA; 710 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: ester-like - sweet, fruity odor
pH: Not available.
Vapor Pressure: 11.5 mm Hg @ 25 deg C
Vapor Density: 4.0 (air=1)
Evaporation Rate:5.8 (CCl4=1)
Viscosity: 0.73 cps @ 20 deg C
Boiling Point: 125 - 126 deg C
Freezing/Melting Point:-77 deg C
Decomposition Temperature: Not available.
Solubility: Slightly soluble.
Specific Gravity/Density:0.8800 @ 20°C
Molecular Formula:C6H12O2
Molecular Weight:116.16

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid: Ignition sources, excess heat, confined spaces.
Incompatibilities with Other Materials: Strong oxidizing agents, strong acids, nitrates, caustics (e.g. ammonia, ammonium hydroxide, calcium hydroxide, potassium hydroxide, sodium hydroxide), potassium tert-butoxide. Reacts w/H2O on standing to form acetic acid & n-butyl alcohol. This is a

very slow reaction..
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 123-86-4: AF7350000
LD50/LC50:
CAS# 123-86-4:
Draize test, rabbit, eye: 100 mg Moderate;
Draize test, rabbit, skin: 500 mg/24H Moderate;
Inhalation, mouse: LC50 = 6 gm/m3/2H;
Inhalation, rat: LC50 = 390 ppm/4H;
Oral, mouse: LD50 = 6 gm/kg;
Oral, rabbit: LD50 = 3200 mg/kg;
Oral, rat: LD50 = 10768 mg/kg;
Skin, rabbit: LD50 = >17600 mg/kg;
.

Carcinogenicity:
CAS# 123-86-4: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: Exposure to n-butyl acetate vapors throughout gestation did not cause significant teratogenicity in rabbits, rats, or mice.
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: LC50 = 18.0 mg/L; 96 Hr.; UnspecifiedFish: Bluegill/Sunfish: LC50 = 100.0 mg/L; 96 Hr.; Static conditionWater flea EC50 = 44.0 mg/L; 48 Hr.; 23 degrees CAlgae: LC50 =320.0 mg/L; 96 Hr.; UnspecifiedBacteria: Phytobacterium phosphoreum: EC50 =3100.0-130 mg/L; 5, 15 minutes; Microtox test, 15 degrees CDaphnia: Daphnia: 44-205 mg/l; 96 H; LC50 No data available.
Environmental: Based on estimated Koc values of 34 and 233, n-butyl acetate may be subject to moderate-to-high leaching. Volatilization from dry soil surfaces is likely to be rapid. n-Butyl acetate may be susceptible to significant biodegradation in natural water.
Physical: n-Butyl acetate will exist almost entirely in the vapor-phase in the ambient atmosphere due to its relatively high vapor pressure. The half-life for the vapor-phase reaction of n-butyl acetate with photochemically produced hydroxyl radicals has been estimated to be about 6 days in an average atmosphere indicating that this reaction will be the dominant removal mechanism.
Other: ThOD: 2.207 g oxygen/gBOD-5: 1.020 g oxygen/gBOD-20: 1.45 g oxygen/g

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3.

Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	BUTYL ACETATES	BUTYL ACETATES
Hazard Class:	3	3
UN Number:	UN1123	UN1123
Packing Group:	II	II
Additional Info:		FLASHPOINT 22 C

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 123-86-4 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
CAS# 123-86-4: 40 CFR 799.5000
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 123-86-4: 5000 lb final RQ; 2270 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 123-86-4: immediate, fire.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 123-86-4 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 123-86-4 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

Not available.

Risk Phrases:

R 10 Flammable.
R 66 Repeated exposure may cause skin dryness or cracking.
R 67 Vapours may cause drowsiness and dizziness.

Safety Phrases:

S 25 Avoid contact with eyes.

WGK (Water Danger/Protection)

CAS# 123-86-4: 1

Canada - DSL/NDSL

CAS# 123-86-4 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 123-86-4 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/16/1999
Revision #8 Date: 6/29/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

MSDS Number: **D7552** * * * * * *Effective Date:* ***05/19/08*** * * * * * *Supercedes:* ***08/16/05***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

DIOXANE

1. Product Identification

Synonyms: Diethylene dioxide; 1,4-dioxane; dioxyethylene ether; p-dioxane; Diethylene Ether
CAS No.: 123-91-1
Molecular Weight: 88.12
Chemical Formula: C4H8O2
Product Codes:
J.T. Baker: 9196, 9228, 9231
Mallinckrodt: 4937

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Dioxane	123-91-1	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! TENDS TO FORM EXPLOSIVE PEROXIDES, ESPECIALLY WHEN ANHYDROUS. FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Cancer)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Highly toxic by inhalation. Easily absorbed through lungs. Symptoms include irritation of the respiratory tract, headache, nausea, vomiting, dizziness, and narcosis. Can cause liver damage and brain and lung edema. Death may occur from kidney failure. Dioxane poisoning has poor warning properties.
Ingestion:
Sore throat, abdominal pain. Other symptoms parallel those from inhalation.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.
Chronic Exposure:
Prolonged exposure may cause central nervous system depression, loss of appetite, nausea, abdominal tenderness, and liver or kidney damage. Prolonged skin contact

may cause dermatitis. Suspected human carcinogen based on animal data. Repeated inhalation exposures to low concentrations have been fatal.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Flash point: 12C (54F) CC
Autoignition temperature: 180C (356F)
Flammable limits in air % by volume:
lel: 2.0; uel: 22.0
Flammable.

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Substance can explode when redistilled. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. Sensitive to static discharge.

Fire Extinguishing Media:

Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. This highly flammable liquid must be kept from sparks, open flame, hot surfaces, and all sources of heat and ignition.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from direct sunlight and any area where the fire hazard may be acute. Store in tightly closed containers (preferably under nitrogen atmosphere). Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment. Protect from freezing. Before using bulk quantities of this material, test for presence of explosive peroxides. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA) skin
-ACGIH Threshold Limit Value (TLV):
20 ppm (TWA) skin, A3 - Animal Carcinogen

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH

document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has questionable warning properties.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Nitrile is recommended as a suitable material for personal protective equipment.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless solution.
Odor:
Faint ether-like odor.
Solubility:
Soluble
Specific Gravity:
1.03 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
101C (214F)
Melting Point:
11.8C (54F)
Vapor Density (Air=1):
3.03
Vapor Pressure (mm Hg):
27 @ 20C (68F)
Evaporation Rate (BuAc=1):
2.7

---

10. Stability and Reactivity

Stability:
Stable in closed containers under nitrogen at room temperature. Anhydrous dioxane slowly reacts with atmospheric oxygen to form explosive peroxides. If these peroxides are concentrated by evaporation or distillation, there exists a serious risk of explosion.
Hazardous Decomposition Products:
Reacts with air to form explosive peroxides under certain conditions; exposure to sunlight accelerates this formation. Decomposes to carbon monoxide.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Silver perchlorate, oxidizing agents, sulfur trioxide. Dioxane may react with hydrogen in the presence of Raney nickel above 210C (410F).
Conditions to Avoid:
Heat, flame, ignition sources, incompatibles, air, sunlight.

---

11. Toxicological Information

Oral rat LD50:4200 mg/kg; inhalation rat LC50: 46 gm/m3/2H; skin rabbit LD50: 7600 mg/kg; investigated as a mutagen, tumorigen, reproductive effector.

--------\Cancer Lists\----------			
	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
Dioxane (123-91-1)	No	Yes	2B

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into water, this material is not expected to biodegrade. When released into water, this material may evaporate to a moderate extent. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day.
Environmental Toxicity:

This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, DIOXANE
Hazard Class: 3
UN/NA: UN1165
Packing Group: II
Information reported for product/size: 473LB

International (Water, I.M.O.)

Proper Shipping Name: DIOXANE
Hazard Class: 3
UN/NA: UN1165
Packing Group: II
Information reported for product/size: 473LB

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
Dioxane (123-91-1)                             Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                      --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
Dioxane (123-91-1)                             Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Dioxane (123-91-1)                      No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                 -RCRA-    -TSCA-
Ingredient                              CERCLA     261.33     8(d)
----------------------------------------  ------     ------    ------
Dioxane (123-91-1)                      100        U108       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: Yes         (Pure / Liquid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2SE
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **1**
Label Hazard Warning:
DANGER! TENDS TO FORM EXPLOSIVE PEROXIDES, ESPECIALLY WHEN ANHYDROUS. FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

Label Precautions:
Wash thoroughly after handling.
Do not breathe vapor.
Keep container tightly closed.
Use only with adequate ventilation.
Do not get in eyes, on skin, or on clothing.
Keep away from heat, sparks and flame.
Do not evaporate to dryness unless absence of peroxides has been shown.

Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

Product Use:
Laboratory Reagent.

Revision Information:
No Changes.

Disclaimer:
****

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 124-48-1
Date: 03/09/2001

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: CHLORODIBROMOMETHANE SYNONYMS: Dibromochloromethane

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	**Formula**	**CAS #**	**Concentration**	**ACGIH TLV**	**OSHA PEL**	**MAC**	**Other STEL**
CHLORODIBROMOMETHANE	ClBr2CH	124-48-1	99+%	NE	NE	NE	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Nonflammable liquid and vapor.
Can cause irritation to the upper respiratory tract.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Ingestion

ACUTE EFFECTS: Skin and eye irritation may occur. If inhaled, may be irritating to mucous membrane and upper respiratory tract. Prolonged exposure can cause nausea, dizziness and headaches. High concentrations may have a narcotic effect.

CHRONIC EFFECTS: None

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - No
OSHA REGULATED - No

4. FIRST AID MEASURES

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Never give anything by mouth to an unconscious person. Do not induce vomiting because of aspiration hazard.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: Nonflammable

AUTOIGNITION TEMPERATURE: N/Ap

FLAMMABLE LIMITS: Nonflammable

LOWER:
UPPER:

EXTINGUISHING MEDIA: Use what is appropriate for surrounding fire. Use water spray to keep fire exposed cylinders cool.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide, hydrogen chloride, and hydrogen bromide.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Cylinder rupture may occur under fire conditions.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Remove leaking cylinder to exhaust hood or safe outdoor area. Shut off source if possible and remove source of heat.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas away from heat and source of ignition. Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation.

EYE / FACE PROTECTION: Safety glasses

SKIN PROTECTION: Protective gloves.

RESPIRATORY PROTECTION: In case of leakage, use self-contained breathing apparatus.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Pale yellow heavy liquid.

ODOR: N/Av

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: N/Av

VAPOR DENSITY (AIR=1): N/Av

BOILING POINT (C): 120

SOLUBILITY IN WATER: N/Av

SPECIFIC GRAVITY (H2O=1): @20 deg. celsius: 2.451

EVAPORATION RATE: N/Av

ODOR THRESHOLD: N/Av

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: Strong bases, strong oxidizing agents and magnesium.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Fumes of carbon monoxide, hydrogen chloride gas and hydrogen bromide gas.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): None established

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Return cylinders to supplier with any valve outlet plugs or caps secured and valve protection cap in place. Empty cylinders will contain hazardous residue.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: This material is not hazardous according to DOT definitions. No DOT label or shipping paper work is required.
HAZARD CLASS: N/Ap
INDENTIFICATION NUMBER: N/Ap
REPORTABLE QUANTITIES: None
LABELING: N/Ap

ADR / RID (EU Only): N/Av

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: N/Av

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: N/Av

S: N/Av

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

MATERIAL SAFETY DATA SHEET

Date Printed: 09/03/2008
Date Updated: 11/10/2005
Version 1.4

Section 1 - Product and Company Information

Product Name	AROCLOR 1248, 50MG, NEAT
Product Number	48589
Brand	SUPELCO
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
AROCLOR 1248	12672-29-6	No

Synonyms Aroclor 1248 * Chlorodiphenyl (48% Cl)
RTECS Number: TQ1358000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Harmful. Dangerous for the environment.
Danger of cumulative effects. Irritating to eyes and skin. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Target organ(s): Liver.

HMIS RATING

HEALTH: 2*
FLAMMABILITY: 0
REACTIVITY: 0

NFPA RATING

HEALTH: 2
FLAMMABILITY: 0
REACTIVITY: 0

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE

If inhaled, remove to fresh air. If breathing becomes difficult, call a physician.

DERMAL EXPOSURE
In case of contact, immediately wash skin with soap and copious amounts of water.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Absorb on sand or vermiculite and place in closed containers for disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are

appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	NIOSH	TWA	0.001 MG/M3

Section 9 - Physical/Chemical Properties

Appearance — Physical State: Liquid

Property	Value	At Temperature or Pressure
Molecular Weight	N/A	
pH	N/A	
BP/BP Range	N/A	
MP/MP Range	N/A	
Freezing Point	N/A	
Vapor Pressure	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	N/A	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	N/A	
Explosion Limits	N/A	
Flammability	N/A	
Autoignition Temp	N/A	
Refractive Index	N/A	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Hydrogen chloride gas.

HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: May cause eye irritation.
Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)
Liver.

SIGNS AND SYMPTOMS OF EXPOSURE
Nausea, dizziness, and headache. Sweating. Symptoms may include, muscle pain and weakness, stiffness in the neck, throat, trunk and limbs, headache, thick feeling in the tongue, constant thirst, difficulty in swallowing and speaking, sweating, and vomiting. Myoglobinuria may also develop. In the most severe cases, respiratory failure, hyperkalemic cardiac arrest, and renal failure may result. *

TOXICITY DATA

Oral	Oral
Rat	Rat
11000 mg/kg	11000 mg/kg
LD50	LD50

CHRONIC EXPOSURE - CARCINOGEN
Result: This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

IARC CARCINOGEN LIST
Rating: Group 2A Group 2A

CHRONIC EXPOSURE - TERATOGEN

Species: Rabbit Rabbit
Dose: 165 MG/KG 165 MG/KG
Route of Application: Oral Oral
Exposure Time: (1-31D PREG) (1-31D PREG)
Result: Specific Developmental Abnormalities: Immune and reticuloendothelial system. Specific Developmental Abnormalities: Immune and reticuloendothelial system.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD
Result: Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Species: Monkey Monkey
Dose: 32 MG/KG 32 MG/KG
Route of Application: Oral Oral
Exposure Time: (1-23W PREG/91D POST) (1-23W PREG/91D POST)
Result: Effects on Newborn: Behavioral. Effects on Newborn: Behavioral.

Species: Monkey Monkey
Dose: 55 MG/KG 55 MG/KG

Route of Application: Oral Oral
Exposure Time: (26W PRE-13W POST) (26W PRE-13W POST)
Result: Effects on Newborn: Growth statistics (e.g., reduced weight gain). Effects on Newborn: Physical. Effects on Newborn: Growth statistics (e.g., reduced weight gain). Effects on Newborn: Physical.

Species: Monkey Monkey
Dose: 17 MG/KG 17 MG/KG
Route of Application: Oral Oral
Exposure Time: (26W PRE) (26W PRE)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Monkey Monkey
Dose: 35 MG/KG 35 MG/KG
Route of Application: Oral Oral
Exposure Time: (26W PRE) (26W PRE)
Result: Effects on Fertility: Abortion. Effects on Fertility: Abortion.

Species: Monkey Monkey
Dose: 24 MG/KG 24 MG/KG
Route of Application: Oral Oral
Exposure Time: (17W PRE) (17W PRE)
Result: Maternal Effects: Menstrual cycle changes or disorders. Maternal Effects: Menstrual cycle changes or disorders.

Species: Monkey Monkey
Dose: 83 MG/KG 83 MG/KG
Route of Application: Oral Oral
Exposure Time: (58W PRE-13W POST) (58W PRE-13W POST)
Result: Effects on Newborn: Other postnatal measures or effects. Effects on Newborn: Growth statistics (e.g., reduced weight gain). Effects on Newborn: Behavioral. Effects on Newborn: Other postnatal measures or effects. Effects on Newborn: Growth statistics (e.g., reduced weight gain). Effects on Newborn: Behavioral.

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Caution: contains PCB's (polychlorinated biphenyls). For proper disposal information contact the US Environmental Protection Agency. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Polychlorinated biphenyls, liquid
UN#: 2315
Class: 9
Packing Group: Packing Group II
Hazard Label: Class 9
PIH: Not PIH

IATA
Proper Shipping Name: Polychlorinated biphenyls, liquid
IATA UN Number: 2315
Hazard Class: 9
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: N
Indication of Danger: Dangerous for the environment.
R: 33-50/53
Risk Statements: Danger of cumulative effects. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S: 35-60-61
Safety Statements: This material and its container must be disposed of in a safe way. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Harmful. Dangerous for the environment.
Risk Statements: Danger of cumulative effects. Irritating to eyes and skin. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Safety Statements: This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.
US Statements: Target organ(s): Liver.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: No
NOTES: This product is subject to SARA section 313 reporting requirements.

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

MATERIAL SAFETY DATA SHEET

Date Printed: 09/03/2008
Date Updated: 10/19/2005
Version 1.3

Section 1 - Product and Company Information

Product Name	AROCLOR 1016, 50MG, NEAT
Product Number	48591
Brand	SUPELCO
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
AROCHLOR 1016	12674-11-2	Yes

Synonyms Aroclor 1016 * Chlorodiphenyl (41% Cl)
RTECS Number: TQ1351000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Dangerous for the environment.
Danger of cumulative effects. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Probable Carcinogen (US). Target organ(s): Nerves. Calif. Prop. 65 carcinogen & developmental hazard.

HMIS RATING

HEALTH: 1*
FLAMMABILITY: 0
REACTIVITY: 0

NFPA RATING

HEALTH: 0
FLAMMABILITY: 0
REACTIVITY: 0

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE

If inhaled, remove to fresh air. If breathing becomes difficult, call a physician.

DERMAL EXPOSURE
In case of contact, immediately wash skin with soap and copious amounts of water.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Exercise appropriate precautions to minimize direct contact with skin or eyes and prevent inhalation of vapors.

METHODS FOR CLEANING UP
Absorb on sand or vermiculite and place in closed containers for disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Avoid inhalation. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Respiratory protection is not required. Where protection is desired, use multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges.
Hand: Protective gloves.

Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash thoroughly after handling.

Section 9 - Physical/Chemical Properties

Appearance — Physical State: Liquid

Property	Value	At Temperature or Pressure
Molecular Weight	N/A	
pH	N/A	
BP/BP Range	N/A	
MP/MP Range	N/A	
Freezing Point	N/A	
Vapor Pressure	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	N/A	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	N/A	
Explosion Limits	N/A	
Flammability	N/A	
Autoignition Temp	N/A	
Refractive Index	N/A	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Hydrogen chloride gas.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: May occur
Hazardous Polymerization Reactions: May polymerize on exposure to heat.

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.

Eye Contact: May cause eye irritation.
Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed.

SIGNS AND SYMPTOMS OF EXPOSURE

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

TOXICITY DATA

Oral
Rat
2300 mg/kg
LD50

CHRONIC EXPOSURE - CARCINOGEN

Result: This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 31500 UG/KG
Route of Application: Oral
Exposure Time: (1-21D POST)
Result: Specific Developmental Abnormalities: Central nervous system.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 120 MG/KG
Route of Application: Oral
Exposure Time: (8-21D PREG)
Result: Effects on Newborn: Biochemical and metabolic.

Species: Monkey
Dose: 18410 UG/KG
Route of Application: Oral
Exposure Time: (30W PRE-17W POST)
Result: Effects on Newborn: Behavioral.

Species: Mammal
Dose: 750 MG/KG
Route of Application: Oral
Exposure Time: (17W PRE-28D POST)
Result: Effects on Fertility: Other measures of fertility
Effects on Newborn: Weaning or lactation index (e.g., # alive at weaning per # alive at day 4). Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Section 12 - Ecological Information

No data available.

ADDITIONAL RESULTS/DATA FROM RELEVENT SCIENTIFIC EXPERIMENTS

Avoid contamination of the environment

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Caution: contains PCB's (polychlorinated biphenyls). For proper disposal information contact the US Environmental Protection Agency. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Polychlorinated biphenyls, liquid
UN#: 2315
Class: 9
Packing Group: Packing Group II
Hazard Label: Class 9
PIH: Not PIH

IATA
Proper Shipping Name: Polychlorinated biphenyls, liquid
IATA UN Number: 2315
Hazard Class: 9
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: N
Indication of Danger: Dangerous for the environment.
R: 33-50/53
Risk Statements: Danger of cumulative effects. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S: 35-60-61
Safety Statements: This material and its container must be disposed of in a safe way. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Dangerous for the environment.
Risk Statements: Danger of cumulative effects. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Safety Statements: This material and its container must be disposed of in a safe way. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.
US Statements: Probable Carcinogen (US). Target organ(s): Nerves. Calif. Prop. 65 carcinogen & developmental hazard.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: Yes
NOTES: This product is subject to SARA section 313 reporting requirements.

UNITED STATES - STATE REGULATORY INFORMATION

CALIFORNIA PROP - 65
California Prop - 65: This product is or contains chemical(s) known to the state of California to cause cancer. This product is or contains chemical(s) known to the state of California to cause developmental toxicity.

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes

NDSL: No

Section 16 - Other Information

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

MSDS Number: **T0767** * * * * * *Effective Date:* ***05/19/08*** * * * * * *Supercedes:* ***08/16/05***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TETRACHLOROETHYLENE

1. Product Identification

Synonyms: ethylene tetrachloride; tetrachloroethene; perchloroethylene; carbon bichloride; carbon dichloride
CAS No.: 127-18-4
Molecular Weight: 165.83
Chemical Formula: Cl2C:CCl2
Product Codes:
J.T. Baker: 9218, 9360, 9453, 9465, 9469
Mallinckrodt: 1933, 8058

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Tetrachloroethylene	127-18-4	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate (Life)
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Irritating to the upper respiratory tract. Giddiness, headache, intoxication, nausea and vomiting may follow the inhalation of large amounts while massive amounts can cause breathing arrest, liver and kidney damage, and death. Concentrations of 600 ppm and more can affect the central nervous system after a few minutes.
Ingestion:
Not highly toxic by this route because of low water solubility. Used as an oral dosage for hookworm (1 to 4 ml). Causes abdominal pain, nausea, diarrhea, headache, and dizziness.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
May cause liver, kidney or central nervous system damage after repeated or prolonged exposures. Suspected cancer risk from animal studies.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance. The use of alcoholic beverages enhances the toxic effects.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Wash skin with soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard but becomes hazardous in a fire situation because of vapor generation and possible degradation to phosgene (highly toxic) and hydrogen chloride (corrosive). Vapors are heavier than air and collect in low-lying areas.
Explosion:
Not considered to be an explosion hazard. Containers may explode when involved in a fire.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Store in a cool, dry, ventilated area away from sources of heat or ignition. Isolate from flammable materials. Protect from direct sunlight. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA), 200 ppm (ceiling),
300 ppm/5min/3-hour (max)

-ACGIH Threshold Limit Value (TLV):
25 ppm (TWA), 100 ppm (STEL); listed as A3, animal carcinogen
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Ethereal odor.
Solubility:
0.015 g in 100 g of water.
Specific Gravity:
1.62 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
121C (250F)
Melting Point:
-19C (-2F)
Vapor Density (Air=1):
5.7
Vapor Pressure (mm Hg):
18 @ 25C (77F)
Evaporation Rate (BuAc=1):
0.33 (trichloroethylene = 1)

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Slowly decomposed by light. Deteriorates rapidly in warm, moist climates.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition. Hydrogen chloride gas and phosgene gas may be formed upon heating. Decomposes with moisture to yield trichloroacetic acid and hydrochloric acid.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong acids, strong oxidizers, strong alkalis, especially NaOH, KOH; finely divided metals, especially zinc, barium, lithium. Slowly corrodes aluminum, iron and zinc.
Conditions to Avoid:
Moisture, light, heat and incompatibles.

11. Toxicological Information

Oral rat LD50: 2629 mg/kg; inhalation rat LC50: 4100 ppm/6H; investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Tetrachloroethylene (127-18-4)	No	Yes	2A

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into water, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals.
Environmental Toxicity:
The LC50/96-hour values for fish are between 1 and 10 mg/l. The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal

disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1897
Packing Group: III
Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1897
Packing Group: III
Information reported for product/size: 4L

International (Air, I.C.A.O.)

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1897
Packing Group: III
Information reported for product/size: 4L

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
Tetrachloroethylene (127-18-4)                 Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                       --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
Tetrachloroethylene (127-18-4)                 Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                      -SARA 302-    ------SARA 313------
Ingredient                            RQ    TPQ     List  Chemical Catg.
--------------------------------------  ---   -----   ----  --------------
Tetrachloroethylene (127-18-4)        No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                    -RCRA-    -TSCA-
Ingredient                            CERCLA     261.33     8(d)
--------------------------------------  ------     ------    ------
Tetrachloroethylene (127-18-4)        100        U210       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2[Z]
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
Label Precautions:

Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **D6936** * * * * * *Effective Date:* ***09/22/09*** * * * * * *Supercedes:* ***08/03/07***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

DIMETHYL PHTHALATE

1. Product Identification

Synonyms: 1,2-Benzenedicarboxylic acid, dimethyl ester; D.M.P.; Phthalic acid, dimethyl ester; Methyl phthalate
CAS No.: 131-11-3
Molecular Weight: 194.19
Chemical Formula: C6H4(CH3OOC)2
Product Codes: K075

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Dimethyl Phthalate	131-11-3	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. VAPOR OR MIST IS IRRITATING TO THE EYES AND UPPER RESPIRATORY TRACT. MAY CAUSE IRRITATION TO SKIN.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 1 - Slight
Reactivity Rating: 0 - None
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Green (General Storage)

Potential Health Effects

Due to low water solubility and relatively high lipid solubility, DMP is able to accumulate in body tissues. As a result, chronic exposure tends to be more important than acute exposure.

Inhalation:
Toxic. Inhalation of vapors irritates the respiratory tract. Symptoms may include coughing, shortness of breath and chest pain. At room temperature the substance has such a low vapor pressure that inhalation of the vapor is unlikely.
Ingestion:
Swallowing can cause burning sensation of lips, tongue, mouth; vomiting and diarrhea may occur. Central nervous system effects, including coma, are possible.
Skin Contact:
May cause irritation with redness and pain.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
May accumulate in body tissues. May affect central nervous system.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention if irritation develops.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: 146C (295F) CC
Autoignition temperature: 490C (914F)
Flammable limits in air % by volume:
lel: 0.9
Slight fire hazard when exposed to heat or flame.
Explosion:
Above the flash point, explosive vapor-air mixtures may be formed.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool. Water or foam may cause frothing.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL): 5 mg/m3 (TWA)

-ACGIH Threshold Limit Value (TLV): 5 mg/m3 (TWA)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face respirator with an organic vapor cartridge and particulate filter (NIOSH type P95 or R95 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an organic vapor cartridge and particulate filter (NIOSH P100 or R100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. Please note that N series filters are not recommended for this material. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. This compound possibly exists in both particulate and vapor phase. A gas/vapor cartridge should be used in addition to the particulate filter (NIOSH type P95 or better filter). If the vapor concentration alone exceeds the exposure limits, use a supplied air respirator, because warning properties are unknown for these compounds. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134).
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear oily liquid.
Odor:
Slight aromatic odor.
Solubility:
0.4% in water @ 32C (90F)
Specific Gravity:
1.19 @ 20C/20C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
282C (540F)
Melting Point:
5.5C (43F)
Vapor Density (Air=1):
6.69
Vapor Pressure (mm Hg):
1 @ 100.3C (212F)
Evaporation Rate (BuAc=1):
ca. 0

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong acids or bases, nitrates, and strong oxidizing agents.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 6800 mg/Kg; skin rabbit LD50: > 20 mL/kg. Investigated as a mutagen, reproductive effector.

--------\Cancer Lists\----------			
	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
----------	-----	-----------	-------------
Dimethyl Phthalate (131-11-3)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material may leach into groundwater. When released into water, this material may biodegrade to a moderate extent. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals.
Environmental Toxicity:
This material is expected to be slightly toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                  TSCA  EC   Japan  Australia
--------------------------------------------  ----  ---  -----  ---------
Dimethyl Phthalate (131-11-3)                Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                      --Canada--
Ingredient                                  Korea  DSL   NDSL  Phil.
--------------------------------------------  -----  ---   ----  -----
Dimethyl Phthalate (131-11-3)                Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                           -SARA 302-    ------SARA 313------
Ingredient                                 RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Dimethyl Phthalate (131-11-3)              No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                      -RCRA-    -TSCA-
Ingredient                                 CERCLA     261.33     8(d)
----------------------------------------  ------     ------    ------
Dimethyl Phthalate (131-11-3)              5000       U102       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED OR INHALED. VAPOR OR MIST IS IRRITATING TO THE EYES AND UPPER RESPIRATORY TRACT. MAY CAUSE IRRITATION TO SKIN.
Label Precautions:
Avoid breathing vapor or mist.
Avoid contact with eyes, skin and clothing.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. In case of contact, immediately flush skin with plenty of water for at least 15 minutes. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet
Dibenzofuran

ACC# 95339

Section 1 - Chemical Product and Company Identification

MSDS Name: Dibenzofuran
Catalog Numbers: AC159300000, AC159300050, AC159300250, AC159300500, AC159301000, AC159302500 AC159302500, AC217030000, AC217030050, AC217030500
Synonyms: Diphenylene oxide; 2,2'-Biphenylene oxide; Dibenzo(b,d)furan; a polynuclear aromatic compound; oxygen heterocyclic PAH.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
132-64-9	Dibenzofuran	> 98	205-071-3

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: white to pale yellow crystalline powder.
Warning! Causes eye irritation. May cause skin and respiratory tract irritation. The toxicological properties of this material have not been fully investigated.
Target Organs: Eyes.

Potential Health Effects
Eye: Causes eye irritation.
Skin: May cause skin irritation.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. The toxicological properties of this substance have not been fully investigated.
Inhalation: May cause respiratory tract irritation.
Chronic: Some polycyclic aromatic hydrocarbons are suspect carcinogens, as well as air and water contaminants.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing

and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.
Ingestion: Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water. Wash mouth out with water.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. This material in sufficient quantity and reduced particle size is capable of creating a dust explosion.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: 130 deg C (266.00 deg F)
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid breathing dust.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Local exhaust may be necessary to control concentrations to acceptable levels.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Dibenzofuran	none listed	none listed	none listed

OSHA Vacated PELs: Dibenzofuran: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear a chemical apron.
Respirators: A NIOSH/MSHA approved air purifying dust or mist respirator or European Standard EN 149.

Section 9 - Physical and Chemical Properties

Physical State: Crystalline powder
Appearance: white to pale yellow
Odor: Not available.
pH: Not available.
Vapor Pressure: 0.0175 mm Hg @ 25 deg C
Vapor Density: 5.8 (air=1)
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 285 deg C @ 760 mm Hg
Freezing/Melting Point:81 - 85 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density: Not available.
Molecular Formula:C12H8O
Molecular Weight:168.19

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid: Dust generation, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 132-64-9: HP4430000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 132-64-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: Mortality studies have demonstrated that exposure to coke oven emissions, which contain a variety of PAHs (Polycyclic aromatic hydrocarbons), caused increased incidences of lung and genitourinary cancer mortality in coke oven workers.
Teratogenicity: No information found
Reproductive Effects: No information found

Mutagenicity: See actual entry in RTECS for complete information.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Fish toxicity : time to produce sickness at 5 ppm : brown trout 4 hr.; bluegill sunfish 6 hr; goldfish 6 hr. All species died within 8 hr. Time to produce sickness at 1 ppm : brown trout 22 hr. Water characteristics for tests were pH7, dissolved oxygen conc. 7.5 ppm, total hardness 300ppm (soap method), methyl orange alkalinity 310ppm, free carbon dioxide 5 ppm, temperature 35øC (USEPA August 1987. Part I : The toxicity of 3400 chemicals to fish EPA 560/6-87-002)
Environmental: Considered to be persistent, bioaccumulative, and toxic. Even when released in very small amounts, can accumulate and cause environmental problems.
Physical: No information available.
Other: Dibenzofuran has been listed as a pollutant of concern to EPA's Great Waters Program due to its persistence in the environment, potential to bioaccumulate, and toxicity to humans and the environment. It is a Persistent Organic Pollutant (POPs).

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.	ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SO
Hazard Class:	9	9
UN Number:	UN3077	UN3077
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 132-64-9 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 132-64-9: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

Section 313

This material contains Dibenzofuran (CAS# 132-64-9, > 98%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 132-64-9 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 132-64-9 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

N

Risk Phrases:

R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 24/25 Avoid contact with skin and eyes.
S 29 Do not empty into drains.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 132-64-9: No information available.

Canada - DSL/NDSL

CAS# 132-64-9 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997

Revision #5 Date: 11/20/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet
sec-Butylbenzene, 99+%

ACC# 73785

Section 1 - Chemical Product and Company Identification

MSDS Name: sec-Butylbenzene, 99+%
Catalog Numbers: AC107860050, AC107860500, AC107861000, AC107862500, AC107865000
Synonyms: 2-Phenylbutane; Benzene, (1-methylpropyl)-; (1-Methylpropyl)benzene; Benzene, sec-butyl-
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
135-98-8	sec-Butylbenzene	99+	205-227-0

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear colorless liquid. Flash Point: 45 deg C.
Warning! Flammable liquid and vapor. Causes eye, skin, and respiratory tract irritation. May cause central nervous system depression.
Target Organs: Central nervous system.

Potential Health Effects

Eye: Causes eye irritation.
Skin: Causes skin irritation.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Ingestion of large amounts may cause CNS depression.
Inhalation: Causes respiratory tract irritation.
Chronic: Prolonged or repeated skin contact may cause dermatitis.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water.

Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Flammable liquid and vapor.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. Use agent most appropriate to extinguish fire. Do NOT use straight streams of water.
Flash Point: 45 deg C (113.00 deg F)
Autoignition Temperature: 415 deg C (779.00 deg F)
Explosion Limits, Lower:0.80 vol %
Upper: 6.90 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 2; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local explosion-proof ventilation to keep

airborne levels to acceptable levels.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
sec-Butylbenzene	none listed	none listed	none listed

OSHA Vacated PELs: sec-Butylbenzene: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance: clear colorless

Odor: None reported.

pH: Not available.

Vapor Pressure: 4 mm Hg @ 37.7 deg C

Vapor Density: 4.62

Evaporation Rate: Not available.

Viscosity: Not available.

Boiling Point: 173 - 174 deg C @ 760 mm Hg

Freezing/Melting Point:-75 deg C

Decomposition Temperature: Not available.

Solubility: 0.015 g/L water

Specific Gravity/Density:0.8630 g/cm3

Molecular Formula:C10H14

Molecular Weight:134.22

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Ignition sources, excess heat.

Incompatibilities with Other Materials: Strong oxidizing agents.

Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:

CAS# 135-98-8: CY9100000

LD50/LC50:

CAS# 135-98-8:

Draize test, rabbit, eye: 500 mg/24H Mild;

Draize test, rabbit, skin: 100 mg/24H Moderate;

Oral, mouse: LD50 = 8700 mg/kg;
Oral, rat: LD50 = 2240 uL/kg;
Oral, rat: LD50 = 6300 mg/kg;
Skin, rabbit: LD50 = >16 mL/kg;

.

Carcinogenicity:
CAS# 135-98-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	BUTYL BENZENES	BUTYLBENZENES
Hazard Class:	3	3
UN Number:	UN2709	UN2709
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 135-98-8 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 135-98-8: Effective 6/1/87, Sunset 12/19/95
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 135-98-8 can be found on the following state right to know lists: Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XI

Risk Phrases:

R 10 Flammable.
R 36/37/38 Irritating to eyes, respiratory system and skin.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 33 Take precautionary measures against static discharges.
S 9 Keep container in a well-ventilated place.

WGK (Water Danger/Protection)

CAS# 135-98-8: 1

Canada - DSL/NDSL

CAS# 135-98-8 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B3, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #7 Date: 2/15/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their

particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

MSDS Number: **E2850** * * * * * *Effective Date:* ***02/25/08*** * * * * * *Supercedes:* ***10/04/07***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ETHYL ACETATE

1. Product Identification

Synonyms: Acetic acid ethyl ester; Acetic ether; Acetoxyethane; Ethyl Acetic Ester; Ethyl ethanoate
CAS No.: 141-78-6
Molecular Weight: 88
Chemical Formula: CH3COOC2H5
Product Codes:
J.T. Baker: 5541, 9260, 9278, 9279, 9280, 9282, 9284, 9828
Mallinckrodt: 3427, 3432, 3442, 4988, 4992, 4996, H078, V553

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Ethyl Acetate	141-78-6	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation can cause severe irritation of mucous membranes and upper respiratory tract. Symptoms may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. High concentrations may cause lung damage. An irritant to the nose, throat, and upper respiratory tract. Exposure to high concentrations have a narcotic effect and may cause liver and kidney damage.
Ingestion:
Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. Repeated or prolonged contact with the skin has a defatting effect and may cause dryness, cracking, and possibly dermatitis.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
Chronic overexposure may cause anemia with leukocytosis (transient increase in the white blood cell count) and damage to the liver and kidneys.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: -4C (25F) CC
Autoignition temperature: 426C (799F)
Flammable limits in air % by volume:
lel: 2.0; uel: 11.5
Flammable Liquid and Vapor! Contact with strong oxidizers may cause fire.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated. Sensitive to static discharge.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Water may be ineffective. Water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures. Vapors can flow along surfaces to distant ignition source and flash back.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802. If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL): 400 ppm (TWA)

-ACGIH Threshold Limit Value (TLV): 400 ppm (TWA), A4 - Not classifiable as a human carcinogen.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece respirator with organic vapor cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in

oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear liquid.
Odor:
Fruity odor.
Solubility:
1 ml/10ml water @ 25C
Specific Gravity:
0.902 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
77C (171F)
Melting Point:
-83C (-117F)
Vapor Density (Air=1):
3.0
Vapor Pressure (mm Hg):
76 @ 20C (68F)
Evaporation Rate (BuAc=1):
6

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Heat will contribute to instability. Slowly decomposed by moisture.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Avoid heat, flame and other sources of ignition. Contact with nitrates, strong oxidizers, strong alkalis, or strong acids may cause fire and explosions. Will attack some forms of plastic, rubber, and coatings.
Conditions to Avoid:
No information found.

11. Toxicological Information

Inhalation rat LC50: 200 gm/m3; oral rat LD50: 5620 mg/kg; Skin rabbit LD50: > 20 ml/kg. Investigated as a mutagen.

```
--------\Cancer Lists\----------------------------------------------------
                                  ---NTP Carcinogen---
Ingredient                        Known    Anticipated    IARC Category
----------------------------------  -----    -----------    -------------
Ethyl Acetate (141-78-6)           No          No            None
```

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life of less than 1 day. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be moderately degraded by photolysis. When released into the air, this material is expected to have a half-life between 1 and 10 days.
Environmental Toxicity:
For Ethyl Acetate:
96 Hr LC50 Pimephales promelas: 230 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 484 mg/L [flow-through];
48 Hr EC50 Daphnia magna (water flea): 717 mg/L;
48 Hr EC50 Scenedesmus subspicatus (algae): 3300 mg/L:

Ethyl Acetate Microtox Data:
5 min EC50 Photobacterium phosphoreum: 1180 mg/L;
15 min EC50 Photobacterium phosphoreum: 5870 mg/L;
2 Hr EC50 Pseudomonas fluorescens: 7400 mg/L;
15 min EC50 Pseudomonas fluorescens: 1500 mg/L

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ETHYL ACETATE
Hazard Class: 3
UN/NA: UN1173
Packing Group: II
Information reported for product/size: 400LB

International (Water, I.M.O.)

Proper Shipping Name: ETHYL ACETATE
Hazard Class: 3
UN/NA: UN1173
Packing Group: II
Information reported for product/size: 400LB

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
Ethyl Acetate (141-78-6)                       Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                      --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
Ethyl Acetate (141-78-6)                       Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Ethyl Acetate (141-78-6)                No    No      No         No

--------\Federal, State & International Regulations - Part 2\----------------
                                                -RCRA-    -TSCA-
Ingredient                              CERCLA     261.33     8(d)
----------------------------------------  ------     ------    ------
Ethyl Acetate (141-78-6)                5000       U112       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: 3[Y]E
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **3** Reactivity: **0**
Label Hazard Warning:

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:

Keep away from heat, sparks and flame.
Avoid breathing vapor.
Keep container closed.
Use only with adequate ventilation.
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 15.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Composition/Information on Ingredient

Cas:
142-28-9
Code:
M
RTECS:
TX9660000
Code:
M
Name:
1,3-DICHLOROPROPANE
Other REC Limits:
N/K
OSHA PEL:
N/K
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
N/K
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
WEAR APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.
Ventilation:
CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.
Protective Gloves:
N/K
Eye Protection:
EYE SHIELDS
Other Protective Equipment:
Equipment N/K
Work Hygienic Practices:
N/K
Supplemental Safety and Health:
N/K

Health Hazards Data

LD50LC50Mixture:
ORAL LD50 (RAT/MOUSE): 3000 MG/KG
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:

INHALATION: HARMFUL/FATAL, MUCOUS MEMBRANE IRRITATION. EYES: IRRITATION, DAMAGE. SKIN: HARMFUL IF ABSORBED,
IRRITATION, ALLERGIC REACTION. INGESTION: HARMFUL/FATAL. EXPOSURE CAN CAUSE LIVER & KIDNEY D AMAGE, NERVOUS SYSTEM
INJURY.

Explanation Of Carcinogenicity:
NONE

Signs And Symptions Of Overexposure:
IRRITATION, NAUSEA, HEADACHE, DIZZINESS.

Medical Cond Aggravated By Exposure:
N/K

First Aid:
EYES: FLUSH CONTINUOUSLY W/WATER FOR 15-20 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NOT BURNED, WASH W/SOAP &
WATER. INHALATION: REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NEEDED. OBTAIN MEDICAL ATTE NTION IN ALL CASES.

Spill Release Procedures:
EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE/SIMILAR MATERIAL.
SWEEP UP & PLACE IN APPROPRIATE CONTAINER/HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACE S TO REMOVE ANY RESIDUES.

Neutralizing Agent:
N/K

Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER IAW/FEDERAL, STATE & LOCAL REGULATIONS.

Handling And Storage Precautions:
STORE IN A COOL DRY PLACE ONLY W/COMPATIBLE CHEMICALS. KEEP TIGHTLY CLOSED. FOR LABORATORY USE ONLY.

Other Precautions:
AVOID CONTACT W/SKIN, EYES & CLOTHING. DON'T BREATH VAPORS. CONTACT LENSES SHOULDN'T BE WORN IN THE LABORATORY. ALL
CHEMICALS SHOULD BE CONSIDERED HAZARDOUS. AVOID DIRECT PHYSICAL CONTACT. 2

Fire and Explosion Hazard Information

Flash Point Method:
N/P

Flash Point:

Flash Point Text:
89.6F

Autoignition Temp:

Autoignition Temp Text:
N/A

Lower Limits:
N/K

Upper Limits:
N/K

Extinguishing Media:
CO2, DRY CHEMICAL POWDER/SPRAY.

Fire Fighting Procedures:
N/K

Unusual Fire/Explosion Hazard:
FLAMMABLE CHEMICAL.

Physical/Chemical Properties

HCC:

NRC/State LIC No:

Net Prop WT For Ammo:

Boiling Point:

B.P. Text:
251.6F 3

Melt/Freeze Pt:

M.P/F.P Text:
-146.2F
Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
INSOLUBLE
Appearance and Odor:
COLORLESS LIQUID W/ETHER LIKE ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
STRONG OXIDIZING AGENTS/BASES/ACIDS, MAGNESIUM, ALUMINUM.
Hazardous Decomposition Products:
TOXIC FUMES. DECOMPOSITION PRODUCTS ARE CORROSIVE.
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

MSDS Number: **H0584** * * * * * *Effective Date:* ***09/08/09*** * * * * * *Supercedes:* ***05/04/07***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

HEPTANE

1. Product Identification

Synonyms: n-Heptane; normal heptane; dipropyl methane; heptyl hydride
CAS No.: 142-82-5
Molecular Weight: 100.20
Chemical Formula: CH3(CH2)5CH3
Product Codes:
J.T. Baker: 9177, 9198, 9338, 9365, M953, M955, M956, V652
Mallinckrodt: 3162, 4830, 5139, 5164, 5166, 5177, V554, V678

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Heptane	142-82-5	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! FLAMMABLE LIQUID AND VAPOR. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 0 - None
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors irritates the respiratory tract. May produce light headedness, dizziness, muscle incoordination, loss of appetite and nausea. Higher concentrations can produce central nervous system depression, narcosis, and unconsciousness.
Ingestion:
May produce abdominal pain, nausea. Aspiration into lungs can produce severe lung damage and is a medical emergency. Other symptoms expected to parallel inhalation.
Skin Contact:
May cause mild irritation, redness, pain.
Eye Contact:
Vapors may irritate the eyes. Splashes may produce redness, pain.
Chronic Exposure:
Repeated or prolonged skin contact may defat the skin and produce irritation and dermatitis.
Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or impaired pulmonary function may be more susceptible to the effects of this substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Aspiration hazard. Do NOT induce vomiting. Give large amounts of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention if irritation develops.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: -4C (25F) CC
Autoignition temperature: 204C (399F)
Flammable limits in air % by volume:
lel: 1.05; uel: 6.7
Flammable Liquid and Vapor!
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water may be ineffective. Water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do Not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
N-Heptane:
- OSHA Permissible Exposure Limit (PEL) -
500 ppm (TWA)
- ACGIH Threshold Limit Value (TLV) -
400 ppm (TWA), 500 ppm (STEL)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For

emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Mild, gasoline-like.

Solubility:
Insoluble in water.

Specific Gravity:
0.684 @ 20C/4C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
98C (208F)

Melting Point:
- 91C (-132F)

Vapor Density (Air=1):
3.5

Vapor Pressure (mm Hg):
40 @ 20C (68F)

Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Heat will contribute to instability.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizers.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

For n-Heptane: Inhalation rat LC50: 103 gm/m3/4H

--------\Cancer Lists\----------			
	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
----------	-----	----------	----------
Heptane (142-82-5)	No	No	None

12. Ecological Information

Environmental Fate:
For n-Heptane: When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material is not expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. This material has an estimated bioconcentration factor (BCF) of greater than 100. This material has a log octanol-water partition coefficient of greater than 3.0. This material may bioaccumulate to some extent. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: HEPTANES
Hazard Class: 3
UN/NA: UN1206
Packing Group: II
Information reported for product/size: 215L

International (Water, I.M.O.)

Proper Shipping Name: HEPTANES
Hazard Class: 3
UN/NA: UN1206
Packing Group: II
Information reported for product/size: 215L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Heptane (142-82-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	Canada-- DSL	Canada-- NDSL	Phil.
Heptane (142-82-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	-SARA 313- List	Chemical Catg.
Heptane (142-82-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Heptane (142-82-5)	No	No	Yes

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 3[Y]E
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
DANGER! FLAMMABLE LIQUID AND VAPOR. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Avoid breathing vapor or mist.
Use only with adequate ventilation.
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.
Label First Aid:

Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. In all cases call a physician.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 156-59-2
Date: 03/09/2001

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: 1,2-DICHLOROETHYLENE (CIS) SYNONYMS: cis-Dichloroethylene

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	**Formula**	**CAS #**	**Concentration**	**ACGIH TLV**	**OSHA PEL**	**MAC**	**Other STEL**
1,2-DICHLOROETHYLENE (CIS)	C2H2CL2	156-59-2	99+%	200	NE	NE	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.
Can form explosive mixtures with air.
Can cause irritation to eyes, skin and respiratory tract.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Ingestion

ACUTE EFFECTS: Vapor or mist is irritating to the eyes, skin, mucous membrane, and upper respiratory tract. Skin and eye irritation may occur. High concentrations may have a narcotic effect.

CHRONIC EFFECTS: Kidney and liver damage.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - No
OSHA REGULATED - No

4. FIRST AID MEASURES

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Never give anything by mouth to an unconscious person. Have conscious and alert person drink 1 to 2 glasses of water. Induce vomiting after victim drinks water.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: 2 deg.C

AUTOIGNITION TEMPERATURE: 460 deg. C

FLAMMABLE LIMITS: Vol.%

LOWER: 5.6
UPPER: 12.80

EXTINGUISHING MEDIA: Carbon dioxide, foam, or dry chemical.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide, hydrogen chloride and phosgene.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Cylinder rupture may occur under fire conditions. Emits toxic fumes under fire conditions. Vapors may travel a considerable distance to the source of ignition and flash back.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Remove leaking cylinder to exhaust hood or safe outdoor area. Shut off source if possible and remove source of heat. Absorb with sand or vermiculite and place in closed containers for disposal.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders. Use only in a well-ventilated area.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use. Store away from oxidizers, combustible materials, and source of ignition or heat.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Goggles. A safety shower and eyewash station should be readily available.

SKIN PROTECTION: Wear suitable protective clothing.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Pleasant aromatic odor

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @41 deg.C: 400 mm Hg

VAPOR DENSITY (AIR=1): 3.34

BOILING POINT (C): 59

SOLUBILITY IN WATER: Insoluble

SPECIFIC GRAVITY (H2O=1): @20 deg.C: 1.284

EVAPORATION RATE: N/Av

ODOR THRESHOLD: N/Av

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: Oxidizing agents, air and moisture. Nitrogen dioxide, sodium, potassium hydroxide.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: HCl gas, phosgene gas, CO and oxides of chlorine.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): None established

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place. Waste can be burned in an approved incinerator equipped with an afterburner and scrubber.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Flammable liquids, n.o.s.
HAZARD CLASS: 3 (flammable), Packing Group I
INDENTIFICATION NUMBER: UN1993
REPORTABLE QUANTITIES: 1000 lb.
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): Class 3, 3(b)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: N/Av

NUMBER IN ANNEX 1 OF DIR 67/548: Material is listed in annex 1.

EU CLASSIFICATION: N/Av

R: 22-33-35-64

S: 15-22-23-27-36-65-71-76-104

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

Material Safety Data Sheet

trans-1,2-Dichloroethylene, 99.7%, stabilized with 950 ppm BLO and 100 ppm MEHQ

ACC# 62420

Section 1 - Chemical Product and Company Identification

MSDS Name: trans-1,2-Dichloroethylene, 99.7%, stabilized with 950 ppm BLO and 100 ppm MEHQ
Catalog Numbers: AC406840000, AC406840250, AC406842500, ACE1128255
Synonyms: trans-Acetylene dichloride.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
156-60-5	trans-1,2-Dichloroethylene	99.7	205-860-2

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Clear liquid. Flash Point: 6 deg C.
Warning! Flammable liquid and vapor. Harmful if inhaled. Unstabilized substance may polymerize. Causes eye and skin irritation. May be harmful if swallowed. May cause respiratory tract irritation.
Target Organs: Central nervous system, respiratory system, eyes, skin.

Potential Health Effects

Eye: Causes moderate eye irritation.
Skin: Causes moderate skin irritation. May cause dermatitis.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed. May cause central nervous system depression.
Inhalation: May cause respiratory tract irritation. May cause narcotic effects in high concentration. Eye irritation, vertigo, and nausea were reported in humans exposed at 2200 ppm.
Chronic: Not available. Some German investigators reported fatty degeneration of the liver upon repeated narcotic doses in rats and

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.

Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Fire or excessive heat may result in violent rupture of the container due to bulk polymerization. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. Hazardous polymerization may occur under fire conditions.
Extinguishing Media: Use water fog, dry chemical, carbon dioxide, or regular foam.
Flash Point: 6 deg C (42.80 deg F)
Autoignition Temperature: 440 deg C (824.00 deg F)
Explosion Limits, Lower:9.70 vol %
Upper: 12.80 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 2

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Pure vapor will be uninhibited and may polymerize in vents or other confined spaces.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Flammables-area. Store protected from light and air.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
trans-1,2-Dichloroethylene	200 ppm TWA	none listed	none listed

OSHA Vacated PELs: trans-1,2-Dichloroethylene: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: Clear
Odor: Pleasant odor
pH: Not available.
Vapor Pressure: 331 mm Hg @ 25 deg C
Vapor Density: 3.34 (air=1)
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 48 deg C @ 760 mm Hg
Freezing/Melting Point:-50 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:1.2600
Molecular Formula:C2H2Cl2
Molecular Weight:96.94

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. This material is a monomer and may polymerize under certain conditions if the stabilizer is lost.
Conditions to Avoid: Light, ignition sources, exposure to air, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents, strong bases, copper.
Hazardous Decomposition Products: Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 156-60-5: KV9400000
LD50/LC50:
CAS# 156-60-5:

Draize test, rabbit, eye: 10 mg Moderate;
Draize test, rabbit, skin: 500 mg/24H Moderate;
Inhalation, rat: LC50 = 24100 ppm;
Oral, mouse: LD50 = 2122 mg/kg;
Oral, rat: LD50 = 1235 mg/kg;
Skin, rabbit: LD50 = >5 gm/kg;
.

Carcinogenicity:
CAS# 156-60-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 156-60-5: waste number U079.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	1,2-DICHLOROETHYLENE	1,2-DICHLOROETHYLENE
Hazard Class:	3	3
UN Number:	UN1150	UN1150
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 156-60-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 156-60-5: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 156-60-5: immediate, delayed, fire.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 156-60-5 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 156-60-5 can be found on the following state right to know lists: California, Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN F

Risk Phrases:

R 11 Highly flammable.
R 20 Harmful by inhalation.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 29 Do not empty into drains.
S 7 Keep container tightly closed.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 156-60-5: No information available.

Canada - DSL/NDSL

CAS# 156-60-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 156-60-5 is not listed on the Canadian Ingredient Disclosure List.

CAS# 100-00-5 is not listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 11/21/1997
Revision #5 Date: 11/20/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

MSDS Number: **B7222** * * * * * *Effective Date:* ***05/26/09*** * * * * * *Supercedes:* ***07/06/06***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

METHYL TERT-BUTYL ETHER

1. Product Identification

Synonyms: 2-Methoxy-2-methylpropane; tert-Butyl methyl ether; Methyl 1,1-dimethyl ethyl ether; MTBE
CAS No.: 1634-04-4
Molecular Weight: 88.15
Chemical Formula: C5H12O
Product Codes:
J.T. Baker: 9034, 9042, 9043
Mallinckrodt: 5398

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl tert-butyl Ether	1634-04-4	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. MAY AFFECT CENTRAL NERVOUS SYSTEM, BLOOD, AND KIDNEYS. A CENTRAL NERVOUS SYSTEM DEPRESSANT. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapor can irritate respiratory tract. Causes central nervous system effects. Breathing high concentrations in air can cause lightheadedness, dizziness, weakness, nausea, headache.
Ingestion:
May cause nausea, vomiting. Other symptoms similar to inhalation may occur. Laryngeal, ocular, and respiratory muscles are affected in severe poisoning.
Skin Contact:
A mild skin irritant which causes loss of natural oils. May be a route of absorption into the body.
Eye Contact:
Vapors can irritate eyes; splashes may cause damage to eye tissue.
Chronic Exposure:
Symptoms noted above may be produced by cumulative exposure.
Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Remove any contaminated clothing. Wash skin with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: -27C (-17F)
Autoignition temperature: 435C (815F)
Flammable limits in air % by volume:
lel: 1.6; uel: 8.4
Extremely Flammable Liquid and Vapor! Vapor may cause flash fire.
Explosion:
Above the flash point, explosive vapor-air mixtures may be formed. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated. Sensitive to static discharge.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-ACGIH Threshold Limit Value (TLV): 50 ppm (TWA), A3 - Confirmed animal carcinogen with unknown relevance to humans
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details. Use explosion-proof equipment.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Characteristic ethereal odor.
Solubility:
4.8 g/100g of water.
Specific Gravity:
0.74
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
55C (131F)
Melting Point:
-110C (-166F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
245 @ 25C (77F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Unstable in acid solutions.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Oxidizers, acids.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Methyl tert butyl ether: Oral rat LD50: 4 gm/kg; inhalation rat LC50: 23576 ppm/4H.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methyl tert-butyl Ether (1634-04-4)	No	No	3

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the air, this material is expected to adversely affect the ozone layer. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. This material has an estimated bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is not expected to be degraded by photolysis. When released into the air, this material is expected to have a half-life between 1 and 10 days.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: METHYL TERT-BUTYL ETHER
Hazard Class: 3
UN/NA: UN2398
Packing Group: II
Information reported for product/size: 215L

International (Water, I.M.O.)

Proper Shipping Name: METHYL BUTYL ETHER
Hazard Class: 3
UN/NA: UN2398
Packing Group: II
Information reported for product/size: 215L

---

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
Methyl tert-butyl Ether (1634-04-4)             Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                      --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
Methyl tert-butyl Ether (1634-04-4)             Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
--------------------------------------  ---   -----   ----  --------------
Methyl tert-butyl Ether (1634-04-4)     No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                 -RCRA-    -TSCA-
Ingredient                              CERCLA     261.33     8(d)
--------------------------------------  ------     ------    ------
Methyl tert-butyl Ether (1634-04-4)     1000       No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: 3[Y]E
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. MAY AFFECT CENTRAL NERVOUS SYSTEM, BLOOD, AND KIDNEYS. A CENTRAL NERVOUS SYSTEM DEPRESSANT. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.
Label Precautions:
Keep away from heat, sparks and flame.
Avoid contact with eyes, skin and clothing.
Avoid breathing vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.
Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Composition/Information on Ingredient

Cas:
309-00-2
Code:
M
RTECS:
IO2100000
Code:
M
Name:
ALDRIN
Other REC Limits:
N/K
OSHA PEL:
0.25 MG/M3;SKIN
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
0.25 MG/M3;SKIN 9394
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
N/K
Ventilation:
N/K
Protective Gloves:
RECOMMENDED
Eye Protection:
RECOMMENDED
Other Protective Equipment:
Equipment USE APPROPRIATE OSHA/MSHA SAFETY EQUIPMENT.
Work Hygienic Practices:
N/K
Supplemental Safety and Health:
N/K

Health Hazards Data

LD50LC50Mixture:
ORAL (RAT) LD50: 5000 MG/KG (TOLUENE)
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
EYES/SKIN/INHALATION/INGESTION: IRRITATION.

Explanation Of Carcinogenicity:
LINDANE, DDT ISOMERS, & DIELDRIN ARE SUSPECTED HUMAN CARCINOGENS. HEPTACHLOR IS AN A2 CARCINOGEN.
Signs And Symptions Of Overexposure:
EYES/SKIN/INGESTION/INHALATION: TOXIC & IRRITATION.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN IF NECESSARY. OBTAIN
MEDICAL ATTENTION IN ALL CASES.
Spill Release Procedures:
DUE TO THE SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. A LEAKING BOTTLE MAY BE
PLACED IN A PLASTIC BAG & NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE OR
SAND.
Neutralizing Agent:
N/K
Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCUBBER. OBSERVE ALL FEDERAL, STATE, & LOCAL LAWS
CONCERNING DISPOSAL.
Handling And Storage Precautions:
AVOID CONTACT W/EYES, SKIN, & CLOTHING. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE.
Other Precautions:
THIS MATERIAL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN THE SAFE HANDLING OF HAZARDOUS CHEMICALS.

Fire and Explosion Hazard Information

Flash Point Method:
N/P 6
Flash Point:
Flash Point Text:
COMBUSTIBLE
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
CO2, DRY CHEMICAL POWDER, OR WATER SPRAY
Fire Fighting Procedures:
N/K
Unusual Fire/Explosion Hazard:
COMBUSTIBLE.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/K
Melt/Freeze Pt:
M.P/F.P Text:
N/K
Decomp Temp:
Decomp Text:

N/K
Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K 7
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
N/K
Appearance and Odor:
LIQUID W/BENZENE-LIKE ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
STRONG OXIDIZERS
Hazardous Decomposition Products:
N/R
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

Composition/Information on Ingredient

Cas:
319-84-6
Code:
M
RTECS:
GV3500000
Code:
M
Name:
ALPHA-BENZENE HEXACHLORIDE (BHC)
Other REC Limits:
N/K
OSHA PEL:
N/K
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
N/K
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
N/K
Ventilation:
N/K
Protective Gloves:
RECOMMENDED
Eye Protection:
RECOMMENDED
Other Protective Equipment:
Equipment USE APPROPRIATE OSHA/MSHA SAFETY EQUIPMENT.
Work Hygienic Practices:
N/K
Supplemental Safety and Health:
N/K

Health Hazards Data

LD50LC50Mixture:
ORAL (RAT) LD50: 5000 MG/KG (TOLUENE)
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
EYES/SKIN/INHALATION/INGESTION: IRRITATION.

Explanation Of Carcinogenicity:
LINDANE, DDT ISOMERS, & DIELDRIN ARE SUSPECTED HUMAN CARCINOGENS. HEPTACHLOR IS AN A2 CARCINOGEN.
Signs And Symptions Of Overexposure:
EYES/SKIN/INGESTION/INHALATION: TOXIC & IRRITATION.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN IF NECESSARY. OBTAIN
MEDICAL ATTENTION IN ALL CASES.
Spill Release Procedures:
DUE TO THE SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. A LEAKING BOTTLE MAY BE
PLACED IN A PLASTIC BAG & NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE OR
SAND.
Neutralizing Agent:
N/K
Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCUBBER. OBSERVE ALL FEDERAL, STATE, & LOCAL LAWS
CONCERNING DISPOSAL.
Handling And Storage Precautions:
AVOID CONTACT W/EYES, SKIN, & CLOTHING. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE.
Other Precautions:
THIS MATERIAL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN THE SAFE HANDLING OF HAZARDOUS CHEMICALS.

Fire and Explosion Hazard Information

Flash Point Method:
N/P 6
Flash Point:
Flash Point Text:
COMBUSTIBLE
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
CO2, DRY CHEMICAL POWDER, OR WATER SPRAY
Fire Fighting Procedures:
N/K
Unusual Fire/Explosion Hazard:
COMBUSTIBLE.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/K
Melt/Freeze Pt:
M.P/F.P Text:
N/K
Decomp Temp:
Decomp Text:

N/K
Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K 7
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
N/K
Appearance and Odor:
LIQUID W/BENZENE-LIKE ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
STRONG OXIDIZERS
Hazardous Decomposition Products:
N/R
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

Composition/Information on Ingredient

Cas:
319-85-7
Code:
M
RTECS:
GV4375000
Code:
M
Name:
BETA BENZENE HEXACHLORIDE (BHC)
Other REC Limits:
N/K
OSHA PEL:
N/K
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
N/K
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
N/K
Ventilation:
N/K
Protective Gloves:
RECOMMENDED
Eye Protection:
RECOMMENDED
Other Protective Equipment:
Equipment USE APPROPRIATE OSHA/MSHA SAFETY EQUIPMENT.
Work Hygienic Practices:
N/K
Supplemental Safety and Health:
N/K

Health Hazards Data

LD50LC50Mixture:
ORAL (RAT) LD50: 5000 MG/KG (TOLUENE)
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
EYES/SKIN/INHALATION/INGESTION: IRRITATION.

Explanation Of Carcinogenicity:
LINDANE, DDT ISOMERS, & DIELDRIN ARE SUSPECTED HUMAN CARCINOGENS. HEPTACHLOR IS AN A2 CARCINOGEN.
Signs And Symptions Of Overexposure:
EYES/SKIN/INGESTION/INHALATION: TOXIC & IRRITATION.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN IF NECESSARY. OBTAIN
MEDICAL ATTENTION IN ALL CASES.
Spill Release Procedures:
DUE TO THE SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. A LEAKING BOTTLE MAY BE
PLACED IN A PLASTIC BAG & NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE OR
SAND.
Neutralizing Agent:
N/K
Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCUBBER. OBSERVE ALL FEDERAL, STATE, & LOCAL LAWS
CONCERNING DISPOSAL.
Handling And Storage Precautions:
AVOID CONTACT W/EYES, SKIN, & CLOTHING. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE.
Other Precautions:
THIS MATERIAL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN THE SAFE HANDLING OF HAZARDOUS CHEMICALS.

Fire and Explosion Hazard Information

Flash Point Method:
N/P 6
Flash Point:
Flash Point Text:
COMBUSTIBLE
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
CO2, DRY CHEMICAL POWDER, OR WATER SPRAY
Fire Fighting Procedures:
N/K
Unusual Fire/Explosion Hazard:
COMBUSTIBLE.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/K
Melt/Freeze Pt:
M.P/F.P Text:
N/K
Decomp Temp:
Decomp Text:

N/K
Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K 7
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
N/K
Appearance and Odor:
LIQUID W/BENZENE-LIKE ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
STRONG OXIDIZERS
Hazardous Decomposition Products:
N/R
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

Composition/Information on Ingredient

Cas:
319-86-8
Code:
M
RTECS:
GV4550000
Code:
M
Name:
D-BHC
Other REC Limits:
N/K 5
OSHA PEL:
N/K
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
N/K
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
N/K
Ventilation:
N/K
Protective Gloves:
RECOMMENDED
Eye Protection:
RECOMMENDED
Other Protective Equipment:
Equipment USE APPROPRIATE OSHA/MSHA SAFETY EQUIPMENT.
Work Hygienic Practices:
N/K
Supplemental Safety and Health:
N/K

Health Hazards Data

LD50LC50Mixture:
ORAL (RAT) LD50: 5000 MG/KG (TOLUENE)
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
EYES/SKIN/INHALATION/INGESTION: IRRITATION.

Explanation Of Carcinogenicity:
LINDANE, DDT ISOMERS, & DIELDRIN ARE SUSPECTED HUMAN CARCINOGENS. HEPTACHLOR IS AN A2 CARCINOGEN.
Signs And Symptions Of Overexposure:
EYES/SKIN/INGESTION/INHALATION: TOXIC & IRRITATION.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN IF NECESSARY. OBTAIN
MEDICAL ATTENTION IN ALL CASES.
Spill Release Procedures:
DUE TO THE SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. A LEAKING BOTTLE MAY BE
PLACED IN A PLASTIC BAG & NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE OR
SAND.
Neutralizing Agent:
N/K
Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCUBBER. OBSERVE ALL FEDERAL, STATE, & LOCAL LAWS
CONCERNING DISPOSAL.
Handling And Storage Precautions:
AVOID CONTACT W/EYES, SKIN, & CLOTHING. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE.
Other Precautions:
THIS MATERIAL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN THE SAFE HANDLING OF HAZARDOUS CHEMICALS.

Fire and Explosion Hazard Information

Flash Point Method:
N/P 6
Flash Point:
Flash Point Text:
COMBUSTIBLE
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
CO2, DRY CHEMICAL POWDER, OR WATER SPRAY
Fire Fighting Procedures:
N/K
Unusual Fire/Explosion Hazard:
COMBUSTIBLE.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/K
Melt/Freeze Pt:
M.P/F.P Text:
N/K
Decomp Temp:
Decomp Text:

N/K
Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K 7
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
N/K
Appearance and Odor:
LIQUID W/BENZENE-LIKE ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
STRONG OXIDIZERS
Hazardous Decomposition Products:
N/R
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

Composition/Information on Ingredient

Cas:
33213-65-9
Code:
M
RTECS:
RB9875200
Code:
M
Name:
ENDOSULFAN II
Other REC Limits:
N/K
OSHA PEL:
N/K
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
N/K
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
N/K
Ventilation:
N/K
Protective Gloves:
RECOMMENDED
Eye Protection:
RECOMMENDED
Other Protective Equipment:
Equipment USE APPROPRIATE OSHA/MSHA SAFETY EQUIPMENT.
Work Hygienic Practices:
N/K
Supplemental Safety and Health:
N/K

Health Hazards Data

LD50LC50Mixture:
ORAL (RAT) LD50: 5000 MG/KG (TOLUENE)
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
EYES/SKIN/INHALATION/INGESTION: IRRITATION.

Explanation Of Carcinogenicity:
LINDANE, DDT ISOMERS, & DIELDRIN ARE SUSPECTED HUMAN CARCINOGENS. HEPTACHLOR IS AN A2 CARCINOGEN.
Signs And Symptions Of Overexposure:
EYES/SKIN/INGESTION/INHALATION: TOXIC & IRRITATION.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN IF NECESSARY. OBTAIN
MEDICAL ATTENTION IN ALL CASES.
Spill Release Procedures:
DUE TO THE SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. A LEAKING BOTTLE MAY BE
PLACED IN A PLASTIC BAG & NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE OR
SAND.
Neutralizing Agent:
N/K
Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCUBBER. OBSERVE ALL FEDERAL, STATE, & LOCAL LAWS
CONCERNING DISPOSAL.
Handling And Storage Precautions:
AVOID CONTACT W/EYES, SKIN, & CLOTHING. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE.
Other Precautions:
THIS MATERIAL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN THE SAFE HANDLING OF HAZARDOUS CHEMICALS.

Fire and Explosion Hazard Information

Flash Point Method:
N/P 6
Flash Point:
Flash Point Text:
COMBUSTIBLE
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
CO2, DRY CHEMICAL POWDER, OR WATER SPRAY
Fire Fighting Procedures:
N/K
Unusual Fire/Explosion Hazard:
COMBUSTIBLE.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/K
Melt/Freeze Pt:
M.P/F.P Text:
N/K
Decomp Temp:
Decomp Text:

N/K
Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K 7
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
N/K
Appearance and Odor:
LIQUID W/BENZENE-LIKE ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
STRONG OXIDIZERS
Hazardous Decomposition Products:
N/R
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

Composition/Information on Ingredient

Cas:
50-29-3
Code:
M
RTECS:
KJ3325000
Code:
M
Name:
DDT (DICHLORODIPHENYLTRICHLOROETHANE) (SARA III)
Other REC Limits:
N/P
OSHA PEL:
S, 1 MG/M3
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
1 MG/M3; 9192
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
N/P
Ventilation:
N/P
Protective Gloves:
N/P
Eye Protection:
N/P
Other Protective Equipment:
Equipment N/P
Work Hygienic Practices:
N/P
Supplemental Safety and Health:
N/P

Health Hazards Data

LD50LC50Mixture:
N/P
Route Of Entry Inds - Inhalation:
N/P

Skin:
N/P
Ingestion:
N/P
Carcinogenicity Inds - NTP:
N/P
IARC:
N/P
OSHA:
N/P
Health Hazards Acute And Chronic:
N/P 2
Explanation Of Carcinogenicity:
N/P
Signs And Symptions Of Overexposure:
N/P
Medical Cond Aggravated By Exposure:
N/P
First Aid:
N/P
Spill Release Procedures:
N/P
Neutralizing Agent:
N/P
Waste Disposal Methods:
N/P
Handling And Storage Precautions:
N/P
Other Precautions:
N/P

Fire and Explosion Hazard Information

Flash Point Method:
N/P
Flash Point:
Flash Point Text:
105F CC
Autoignition Temp:
Autoignition Temp Text:
N/A 3
Lower Limits:
Upper Limits:
Extinguishing Media:
N/P
Fire Fighting Procedures:
N/P
Unusual Fire/Explosion Hazard:
N/P

Physical/Chemical Properties

HCC:
F5
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/A
Melt/Freeze Pt:
M.P/F.P Text:
N/A
Decomp Temp:
Decomp Text:
N/A
Vapor Pres:
N/P
Vapor Density:
N/P
Volatile Org Content %:
Spec Gravity:
N/P
VOC Pounds/Gallon:
PH: N/P
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/P
Solubility in Water:
N/P
Appearance and Odor:
Percent Volatiles by Volume:
N/P
Corrosion Rate:
N/P

Reactivity Data

Stability Indicator:
N/P
Stability Condition To Avoid:
N/P
Materials To Avoid:
N/P
Hazardous Decomposition Products:
N/P
Hazardous Polymerization Indicator:
N/P
Conditions To Avoid Polymerization:
N/P

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Lookchem shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Composition/Information on Ingredient

Cas:
5103-74-2
Code:
M
RTECS:
PC0365000
Code:
M
Name:
TRANS-CHLORDANE (SUSPECTED HUMAN CARCINOGEN BY IA
Other REC Limits:
N/K
OSHA PEL:
N/K
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
N/K
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
USE APPROPRIATE OSHA/MSHA APPROVED EQUIPMENT
Ventilation:
HOOD
Protective Gloves:
REQUIRED
Eye Protection:
EYESHIELD
Other Protective Equipment:
Equipment N/K
Work Hygienic Practices:
REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.
Supplemental Safety and Health:
INFORMATION IF FOR THE COMPONENT. METHYL ALCOHOL.

Health Hazards Data

LD50LC50Mixture:
ORAL LD50 (MOUSE): 5628 MG/KG
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
YES
OSHA:
NO
Health Hazards Acute And Chronic:

SKIN: FATAL IF ABSORBED THROUGH SKIN EYES: REPEATED EXPOSURE TO VAPORS & DUST CAN CAUSE EYE INJURY. INGESTION: IN
INGESTED CAN CAUSE GASTRO-INTESTINAL DISTURBANCES. INHALATION: EXPOSURE CAN CAUSE LIVE R DAMAGE, KIDNEY DAMAGE &
CARDIOVASCULAR SYSTEM INJURY. CAN CAUSE CONVULSIONS.

Explanation Of Carcinogenicity:
SEE INGREDIENTS

Signs And Symptions Of Overexposure:
N/K

Medical Cond Aggravated By Exposure:
N/K

First Aid:
EYES: FLUSH W/WATER FOR 15-20 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NO BURNS HAVE OCCURRED-USE SOAP & WATER
TO CLEANSE SKIN. INHALATION: REMOVE TO FRESH AIR. ADMINISTER OXYGEN IF PATIENT IS HAV EING DIFFICULTY BREATHING. IF
PATIENT HAS SPED BREATHING ADMINISTER ARTIFICIAL RESPIRATIONS. IF PATIENT IS IN CARDIAC ARREST ADMINISTER CPR. OBTAIN
MEDICAL ATTENTION IN ALL CASES. (SEE SUPP).

Spill Release Procedures:
EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE/SIMILAR MATERIAL.
SWEEP UP & PLACE IN AN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SUR FACES TO REMOVE ANY
RESIDUES.

Neutralizing Agent:
N/K

Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER, IAW/LOCAL, STATE, FEDERAL REGULATION.

Handling And Storage Precautions:
KEEP TIGHTLY CLOSED IN A COOL DRY PLACE. STORE ONLY W/COMPATIBLE CHEMICALS.METH ALCOHOL IS HYGROSCOPIC & FLAMMABLE

Other Precautions:
PERONS NOT SPECIFICALLY & PROPERLY TRAINED SHOULD NOT HANDLE THIS CHEMICAL/ITS CONTAINER. FOR LABORATORY USE ONLY.
CONTECT LENSES SHOULDN'T BE WORN IN THE LABORATORY. AVOID DIRECT PHYSICAL CONTACT.

Fire and Explosion Hazard Information

Flash Point Method:
N/P

Flash Point:

Flash Point Text:
51.8F (SUPP)

Autoignition Temp:

Autoignition Temp Text:
N/A

Lower Limits:
36%(SUPP)

Upper Limits:
6.7% (SUPP) 4

Extinguishing Media:
CO2, DRY CHEMICAL POWDER. DON'T USE WATER. (SUPP)

Fire Fighting Procedures:
N/K

Unusual Fire/Explosion Hazard:
FLAMMABLE (METHYL ALCOHOL)

Physical/Chemical Properties

HCC:

NRC/State LIC No:

Net Prop WT For Ammo:

Boiling Point:
B.P. Text:
148.28F SUP
Melt/Freeze Pt:
M.P/F.P Text:
-98C(SUPP)
Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
97(SUPP)
Vapor Density:
1.11 (SUP)
Volatile Org Content %:
Spec Gravity:
N/K
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
MISCIBLE (SUPP)
Appearance and Odor:
COLORLESS LIQUID (SUPP) 5
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
STRONG ACIDS, ACID HALIDES, ANHYDRIDES, STRONG OXIDIZING AGENTS, STRONG REDUCING AGENTS. ACTIVE METALS. (SUPP)
Hazardous Decomposition Products:
TOXIC FUMES. (SUPP)
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Lookchem shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

ScienceLab.com
Chemicals & Laboratory Equipment

Health	3
Fire	3
Reactivity	3
Personal Protection	X

Material Safety Data Sheet
2,4-Dinitrophenol, moist MSDS

Section 1: Chemical Product and Company Identification

Product Name: 2,4-Dinitrophenol, moist

Catalog Codes: SLD3364

CAS#: 51-28-5

RTECS: SL2800000

TSCA: TSCA 8(b) inventory: 2,4-Dinitrophenol, moist

CI#: Not available.

Synonym: 2,4-Dinitrophenol, moist with up to 35% water.

Chemical Name: 2,4-Ditronitrophenol

Chemical Formula: C6-H4-N2-O5

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
{2,4-}Dinitrophenol, moist	51-28-5	100

Toxicological Data on Ingredients: 2,4-Dinitrophenol, moist: ORAL (LD50): Acute: 30 mg/kg [Rat]. 45 mg/kg [Mouse]. 30 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion, of inhalation. Hazardous in case of skin contact (irritant), of eye contact (irritant). Slightly hazardous in case of skin contact (sensitizer). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED]. The substance may be toxic to the reproductive system, heart, cardiovascular system, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2), nitrogen oxides (NO, NO2...).

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat. Flammable in presence of reducing materials, of combustible materials.

Explosion Hazards in Presence of Various Substances: Explosive in presence of open flames and sparks, of shocks, of heat, of alkalis.

Fire Fighting Media and Instructions:
Explosive. Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion. Use absorbent chemicals or DRY sand. Use flooding quantities of water.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:
Explosion is caused by heat, friction or shock. Dinitrophenol forms explosive salts with alkali or ammonia and should not be heated with them in closed vessels.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Explosive, class 1.4. Flammable solid. Poisonous solid. Stop leak if without risk. Do not touch damaged container or spilled material. Do not clean-up or dispose except under supervision of a specialist. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Take precautionary measures against electrostatic discharges. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, combustible materials, alkalis, moisture.

Storage:
Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Do not store above 23°C (73.4°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Sweet, musty

Taste: Bitter.

Molecular Weight: 184.11 g/mole

Color: Yellowish-brown (yellow to brown)

pH (1% soln/water): Not available.

Boiling Point: Not available.

Melting Point: 113°C (235.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.683 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 6.35 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 1.7

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Partially soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: High temperatures, incompatible materials, light, ignition sources, dehydrating agents.

Incompatibility with various substances:
Highly reactive with reducing agents, combustible materials, alkalis, moisture. Reactive with oxidizing agents.

Corrosivity: Not available.

Special Remarks on Reactivity: Incompatible with acid chlorides, and acid anhydrides. Light sensitive

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 30 mg/kg [Rabbit].

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED]. May cause damage to the following organs: the reproductive system, heart, cardiovascular system, central nervous system (CNS).

Other Toxic Effects on Humans:
Very hazardous in case of ingestion, of inhalation. Hazardous in case of skin contact (irritant). Slightly hazardous in case of skin contact (sensitizer).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May affect genetic material and cause adverse reproductive effects based on animal data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation. Eyes: Causes eye irritation. Inhalation: Causes respiratory tract irritation. May cause similar effects to those described for ingestion. Ingestion: May be fatal if swallowed. Causes gastrointestinal (digestive) tract irritation with nausea, vomiting and diarrhea. May affect behavior, central nervous system, cardiovascular system, blood, metabolsim, and sense organs.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification:
CLASS 4.1: Flammable solid. CLASS 6.1: Poisonous material.

Identification: : Dinitrophenol, wetted UNNA: 1320 PG: I

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
New York release reporting list: 2,4-Dinitrophenol, moist Pennsylvania RTK: 2,4-Dinitrophenol, moist Michigan critical material: 2,4-Dinitrophenol, moist Massachusetts RTK: 2,4-Dinitrophenol, moist New Jersey: 2,4-Dinitrophenol, moist California Director's List of Hazardous Substances: 2,4-Dinitrophenol, moist TSCA 8(b) inventory: 2,4-Dinitrophenol, moist TSCA 8(a) PAIR: 2,4-Dinitrophenol, moist TSCA 8(d) H and S data reporting: 2,4-Dinitrophenol, moist: Effective: 9/30/91; Sunset: 12/19/95 SARA 313 toxic chemical notification and release reporting: 2,4-Dinitrophenol, moist CERCLA: Hazardous substances.: 2,4-Dinitrophenol, moist: 10 lbs. (4.536 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-4: Flammable solid. CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).

DSCL (EEC):
R1- Explosive when dry. R11- Highly flammable. R23/24/25- Toxic by inhalation, in contact with skin and if swallowed. R33- Danger of cumulative effects. S28- After contact with skin, wash immediately with plenty of [***] S37- Wear suitable gloves. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 3

Reactivity: 3

Personal Protection: x

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 3

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 05:13 PM

Last Updated: 11/01/2010 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

MSDS : 4,6-Dinitro-o-cresol, 98%, contains about 10% water
CAS : 534-52-1
SYNONYMS : DNOC; 2-Methyl-4,6-dinitrophenol.

Catalog of Chemical Suppliers, Buyers, Custom Synthesis Companies And Equipment Manufacturers
[4,6-Dinitro-o-cresol, 98%, contains about 10% water 534-52-1]

Suppliers:

HBCChem / Honestjoy, Inc.

China: Tel:+86-755-26404303 Fax:+86-755-26404265 Email: sales@feiyang.com.cn

USA: Tel: +1-510-219-6317 Fax: +1-510-675-0318 E-mail: sales@hbcchem-inc.com
Address: 2819 Whipple Road Union City, CA 94587 USA
Website:HBCChem,Inc

Europe: Tel:+31 630 661105 Fax:+31 317 484821 Email:helen@feiyang.com.cn

Buyers:

Not Available

Section 1 - Chemical Product and Company Identification

MSDS Name: 4,6-Dinitro-o-cresol, 98%, contains about 10% water
Catalog Numbers: AC188600000, AC188600010, AC188601000, AC188602500

Synonyms: DNOC; 2-Methyl-4,6-dinitrophenol.
Company Identification:
Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
534-52-1	4,6-Dinitro-o-cresol	98	208-601-1

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: yellow powder.
Danger! May be fatal if inhaled, absorbed through the skin or swallowed. Causes eye irritation and possible injury. Risk of explosion if heated under confinement. May cause allergic skin reaction. Causes skin irritation. Danger of cumulative effects.
Target Organs: Central nervous system, respiratory system, gastrointestinal system, cardiovascular system.

Potential Health Effects
Eye: Causes eye irritation and possible injury. Exposure causes a yellow pigmentation of the sclera and conjunctivae. Bilateral cataracts and blindness have

been observed in individuals chronically exposed to DNOC by ingestion.
Skin: Causes skin irritation. May be fatal if absorbed through the skin. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. May cause skin discoloration. Exposure causes a yellow pigmentation of the skin and hair. Dermal contact may lead to local necrosis.
Ingestion: May be fatal if swallowed. Human fatalities have been reported from acute poisoning. Damage to the liver, kidney, and nervous system have been reported in humans following acute exposure to DNOC.
Inhalation: May be fatal if inhaled. May cause respiratory tract irritation. May cause effects similar to those described for ingestion.
Chronic: Repeated exposure may cause metabolic disturbances. There is a danger of cumulative effects. Possible risk of irreversible effects. DNOC is a cumulative poison in humans but not in animals. DNOC selectively blocks the biosynthesis of some proteins and stimulates that of others. Effects to the respiratory, cardiovascular, gastrointestinal, and central nervous system of chronically exposed workers have been

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid immediately.
Skin: POISON material. In case of contact, get medical aid immediately. Immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion: POISON material. If swallowed, get medical aid immediately. Only induce vomiting if directed to do so by medical personnel. Never give anything by mouth to an unconscious person.
Inhalation: POISON material. If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. This material poses an explosion hazard when dry. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Combustible material; may burn but does not ignite readily.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, or water spray. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 1; Instability: 1

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Use only with adequate ventilation or respiratory protection.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Poison room locked.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
4,6-Dinitro-o-cresol	0.2 mg/m3 TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	0.2 mg/m3 TWA 5 mg/m3 IDLH	0.2 mg/m3 TWA

OSHA Vacated PELs: 4,6-Dinitro-o-cresol: 0.2 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Powder
Appearance: yellow
Odor: odorless
pH: Not available.
Vapor Pressure: 0.00005 mm Hg @ 20 deg C
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 312 deg C
Freezing/Melting Point:83-85 deg C
Decomposition Temperature: Not available.
Solubility: sparingly soluble
Specific Gravity/Density: Not available.
Molecular Formula: C7H6N2O5

Molecular Formula:C7H6N2O5
Molecular Weight:198.13

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Dust generation, excess heat, heating in a confined space.
Incompatibilities with Other Materials: Metals, strong oxidizing agents.
Hazardous Decomposition Products: Nitrogen oxides, carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 534-52-1: GO9625000
LD50/LC50:
CAS# 534-52-1:
Draize test, rabbit, eye: 20 mg/24H Moderate;
Draize test, rabbit, skin: 105 mg/9D (Intermittent) Mild;
Oral, mouse: LD50 = 21 mg/kg;
Oral, rabbit: LD50 = 24600 ug/kg;
Oral, rat: LD50 = 7 mg/kg;
Oral, rat: LD50 = 40 mg/kg;
Skin, rabbit: LD50 = 1 gm/kg;
Skin, rat: LD50 = 200 mg/kg;
.

Carcinogenicity:
CAS# 534-52-1: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: 1.54mg/L; 96H; Flow-throughFish: Bluegill/Sunfish: 360ug/L; 96H; StaticFish: Rainbow trout: 66ug/L; 96H; Static No data available.
Environmental: Terrestrial: Usually disappears from soil within a few weeks to 2 months when applied at normal pesticidal rates. Biodegradation is probably the main removal process from agricultural soils. Aquatic: Aquatic hydrolysis, volatilization, bioconcentration, and adsorption to sediments are not expected to be important fate processes with respect to 4,6-dinitro-o-cresol. Atmospheric: May exist in both the vapor-phase and adsorbed to the particulate phase in the atmosphere. Half life approximately 8 hours.
Physical: Will biodegrade and bioconcentrate.
Other: DNOC was used as a pesticide until 1991. EPA cancelled registration as a pesticide in 1991.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: CAS# 534-52-1: waste number P047.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	DINITRO-O-CRESOL	DINITRO-O-CRESOL
Hazard Class:	6.1	6.1
UN Number:	UN1598	UN1598
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 534-52-1 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 534-52-1: 10 lb final RQ; 4.54 kg final RQ
SARA Section 302 Extremely Hazardous Substances
CAS# 534-52-1: 10 lb lower threshold TPQ; 10000 lb upper threshold TPQ

SARA Codes
CAS # 534-52-1: immediate, delayed, reactive.
Section 313
This material contains 4,6-Dinitro-o-cresol (CAS# 534-52-1, 98%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR
Clean Air Act:
CAS# 534-52-1 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 534-52-1 is listed as a Priority Pollutant under the Clean Water Act. CAS# 534-52-1 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 534-52-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
T+ N
Risk Phrases:
R 26/27/28 Very toxic by inhalation, in contact with skin and if swallowed.
R 38 Irritating to skin.
R 41 Risk of serious damage to eyes.
R 43 May cause sensitization by skin contact.
R 44 Risk of explosion if heated under confinement.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R 68 Possible risk of irreversible effects.

Safety Phrases:
S 36/37 Wear suitable protective clothing and gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 60 This material and its container must be disposed of as hazardous waste.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)
CAS# 534-52-1: No information available.
Canada - DSL/NDSL
CAS# 534-52-1 is listed on Canada's DSL List.
Canada - WHMIS
This product has a WHMIS classification of D1A, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.
Canadian Ingredient Disclosure List
CAS# 534-52-1 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #9 Date: 6/18/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

ALL Chemical Analysis PAGES IN THIS GROUP

NAME	CAS
(6-Piperidinopyrid-2-yl)methanol	869901-07-5
1-[1-(2,3-Dichlorophenyl)-5-methyl-1H-1,2,3-triazol-4-yl]ethan-1-one	519056-56-5
4-[(tert-Butoxycarbonyl)amino]benzoic acid	66493-39-8
1-[4-(Benzyloxy)-2-hydroxy-3-methylphenyl]ethan-1-one	73640-74-1
3,4-Dimethyl-2,5-dihydro-1H-pyrrol-2-one	4030-22-2
N-(3-Chloro-4-methylphenyl)-N'-{2-[({5-[(dimethylamino)methyl]-2-furyl}methyl)sulfanyl]ethyl}urea	Not available
2,5-Bis(trifluoromethyl)furan	56286-72-7
N1-[(Diphenylphosphoryl)(2-furyl)methyl]-2,3-dichloroaniline	Not available
1-(4-Chlorophenyl)-2,5-dimethyl-1H-pyrrole-3-carboxylic acid	60217-76-7
2-[2-(Dimethylamino)ethoxy]benzoic acid	206261-66-7
4-(4-Methylperhydro-1,4-diazepin-1-yl)benzylamine	448934-01-8
(1-Methyl-3-thien-2-yl-1H-pyrazol-5-yl)methylamine	898289-09-3

1-Methyl-1H-indole-6-carbonitrile	20996-87-6
4-(4-Methylperhydro-1,4-diazepin-1-yl)benzaldehyde	166438-86-4
Methyl 5-methylsalicylate, 97%	22717-57-3
5-(Bromoacetyl)-2-oxoindoline	105316-98-1
2-Pyrrolidin-1-ylisonicotinaldehyde	898289-23-1
(6,7-Dihydro-4H-thieno[3,2-c]pyran-4-yl)methylamine	63932-26-3
Acid blue 41	2666-17-3
5-(2-Thienyl)cyclohexane-1,3-dione	23994-65-2
Hydrazine hydrate, 55% (Hydrazine, 35%)	302-01-2
Methyl 3-hydrazino-4-(isopropylsulfonyl)thiophene-2-carboxylate	175201-97-5
Hydrogen chloride, 1.25M solution in methanol	7647-01-0
Methyl 2-[2-(dimethylamino)ethoxy]benzoate	18167-29-8
4,6-Dinitro-o-cresol, 98%, contains about 10% water	534-52-1
Methyl 2-(3-methyl-1,2,4-oxadiazol-5-yl)benzoate	898289-14-0
1-Methyl-4-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)-1H-indole	898289-06-0
(1-Methyl-1H-indol-4-yl)methylamine	864264-02-8
Methyl Red Free Acid	493-52-7
1-Methyl-1H-indole-4-carbonitrile	628711-58-0
[2-(Phenoxymethyl)phenyl]methanol	34904-98-8
4-Bromoveratrole, 97%	2859-78-1
2,5-Dimethyl-4-(morpholinomethyl)-phenol hydrochloride monohydrate, 97%	33625-43-3
Methyl Salicylate	119-36-8
2-(Phenoxymethyl)benzoyl chloride	21733-94-8
[4-(4-Methylperhydro-1,4-diazepin-1-yl)phenyl]methanol	898289-58-2
2-Piperidin-1-ylisonicotinonitrile	127680-89-1
Ethyl 2-(tert-butylamino)acetate	37885-76-0
2-[4-(Methylsulfonyl)piperazino]ethyl methanesulfonate	Not available
6-Chloro-1,1-dioxo-1,2,3,4-tetrahydro-1lambda~6~,2,4-benzothiadiazine-7-sulfonamide	58-93-5
3,4-Hexanedione, 96%	4437-51-8
1-Nitro-3-(trichloromethyl)benzene	709-58-0
Syringic Acid, 97%	530-57-4
2-(4-Methoxyphenyl)-4,4-dimethyl-4,5-dihydro-1,3-oxazole	53416-46-9
Diethyl 3,4-furandicarboxylate	30614-77-8
2',5'-Dimethoxyacetophenone	1201-38-3
2,4,5-Trichlorobenzenesulfonyl chloride	15945-07-0
Methyl 3-(1,3-benzodioxol-5-yl)acrylate	16386-34-8
1-[4-(3-Bromopropoxy)-2-hydroxy-3-propylphenyl]ethan-1-one	40786-20-7
1-(4-Propylphenyl)ethan-1-one oxime	64128-26-3

MATERIAL SAFETY DATA SHEET

Date Printed: 09/03/2008
Date Updated: 02/22/2006
Version 1.4

Section 1 - Product and Company Information

Product Name	AROCLOR 1242, 50MG, NEAT
Product Number	48585
Brand	SUPELCO
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
AROCLOR 1242	53469-21-9	No

Synonyms: Arochlor 1242 * Aroclor 1242 * Chlorierte biphenyle, chlorgehalt 42% (German) * Chlorodiphenyl (42% chlorine) (ACGIH,OSHA) * Chlorodiphenyl (42% Cl) * Clorodifenili, cloro 42% (Italian) * Diphenyle chlore, 42% de chlore (French) * Gechloreerdedifenyl (Dutch) * PCB (OSHA)

RTECS Number: TQ1356000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Dangerous for the environment.
Danger of cumulative effects. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Calif. Prop. 65 carcinogen & developmental hazard.

HMIS RATING

HEALTH: 0
FLAMMABILITY: 0
REACTIVITY: 0

NFPA RATING

HEALTH: 0
FLAMMABILITY: 0
REACTIVITY: 0

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If breathing becomes difficult, call a physician.

DERMAL EXPOSURE
In case of contact, immediately wash skin with soap and copious amounts of water.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Exercise appropriate precautions to minimize direct contact with skin or eyes and prevent inhalation of vapors.

METHODS FOR CLEANING UP
Absorb on sand or vermiculite and place in closed containers for disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Avoid inhalation. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Respiratory protection is not required. Where protection is

desired, use multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges.
Hand: Protective gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	1 MG/M3
Remarks: Skin			
USA	MSHA Standard-air	TWA	1 MG/M3 (SKIN)
USA	OSHA.	PEL	8H TWA 1 MG/M3 (SKIN)
New Zealand OEL			
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	0.001 MG/M3

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	1 MG/M3
Poland		NDSCh	-
Poland		NDSP	-

Section 9 - Physical/Chemical Properties

Appearance Physical State: Liquid

Property	Value	At Temperature or Pressure
Molecular Weight	N/A	
pH	N/A	
BP/BP Range	N/A	
MP/MP Range	N/A	
Freezing Point	N/A	
Vapor Pressure	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	N/A	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	N/A	
Explosion Limits	N/A	
Flammability	N/A	
Autoignition Temp	N/A	
Refractive Index	N/A	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Hydrogen chloride gas.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: May cause eye irritation.
Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed.

SIGNS AND SYMPTOMS OF EXPOSURE
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

TOXICITY DATA

Oral
Rat
4250 mg/kg
LD50
Remarks: Gastrointestinal:Hypermotility, diarrhea. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Chromodacryorrhea. Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

Oral
Mammal
> 3000 mg/kg
LD50

Intraperitoneal
Mammal
>1 GM/KG
LD50

CHRONIC EXPOSURE - MUTAGEN

Species: Mouse
Dose: 25 PPM
Exposure Time: 4H
Cell Type: Other cell types
Mutation test: Other mutation test systems

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD
Result: Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Species: Rat
Dose: 945 MG/KG
Route of Application: Oral

Exposure Time: (36W PRE)
Result: Maternal Effects: Other effects. Endocrine:Estrogenic.

Species: Rat
Dose: 1890 MG/KG
Route of Application: Oral
Exposure Time: (36W PRE)
Result: Effects on Fertility: Female fertility index (e.g., # females pregnant per # sperm positive females; # females pregnant per # females mated).

Species: Rat
Dose: 1250 MG/KG
Route of Application: Oral
Exposure Time: (5D MALE)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Pig
Dose: 93 MG/KG
Route of Application: Oral
Exposure Time: (1-16W PREG)
Result: Effects on Newborn: Live birth index (# fetuses per litter; measured after birth).

Species: Mammal
Dose: 188 MG/KG
Route of Application: Oral
Exposure Time: (17W PRE-28D POST)
Result: Effects on Fertility: Other measures of fertility

Section 12 - Ecological Information

No data available.

ADDITIONAL RESULTS/DATA FROM RELEVENT SCIENTIFIC EXPERIMENTS
Avoid contamination of the environment

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Caution: contains PCB's (polychlorinated biphenyls). For proper disposal information contact the US Environmental Protection Agency. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Polychlorinated biphenyls, liquid
UN#: 2315
Class: 9
Packing Group: Packing Group II
Hazard Label: Class 9
PIH: Not PIH

IATA
Proper Shipping Name: Polychlorinated biphenyls, liquid
IATA UN Number: 2315
Hazard Class: 9
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: N
Indication of Danger: Dangerous for the environment.
R: 33-50/53
Risk Statements: Danger of cumulative effects. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S: 35-60-61
Safety Statements: This material and its container must be disposed of in a safe way. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Dangerous for the environment.
Risk Statements: Danger of cumulative effects. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Safety Statements: This material and its container must be disposed of in a safe way. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.
US Statements: Calif. Prop. 65 carcinogen & developmental hazard.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: No
NOTES: These products are subject to SARA section 313 reporting requirements. These products are subject to SARA section 313 reporting requirements.

UNITED STATES - STATE REGULATORY INFORMATION

CALIFORNIA PROP - 65
California Prop - 65: This product is or contains chemical(s) known to the state of California to cause cancer. This product is or contains chemical(s) known to the state of California to cause developmental toxicity.

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Composition/Information on Ingredient

Cas:
53494-70-5
Code:
M
RTECS:
PC8600000
Code:
M
Name:
ENDRIN KETONE
Other REC Limits:
N/K 3
OSHA PEL:
N/K
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
N/K
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
USE APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.
Ventilation:
N/K
Protective Gloves:
CHEMICAL RESISTANT
Eye Protection:
CHEMICAL GOGGLES/FACE SHIELD
Other Protective Equipment:
Equipment CHEMICAL RESISTANT CLOTHING SUCH AS LAB COAT/RUBBER APRON.
Work Hygienic Practices:
N/K
Supplemental Safety and Health:
N/K

Health Hazards Data

LD50LC50Mixture:
ORAL LD50 (RAT): 6000 MG/KG METHOXYCHLOR
Route Of Entry Inds - Inhalation:
NO
Skin:
NO
Ingestion:
NO
Carcinogenicity Inds - NTP:
NO
IARC:
YES
OSHA:
NO
Health Hazards Acute And Chronic:
TOXIC, IRRITANT

Explanation Of Carcinogenicity:
SEE INGREDIENTS
Signs And Symptions Of Overexposure:
IRRITATION
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN IF NEEDED. OBTAIN MEDICAL
ATTENTION IN ALL CASES.
Spill Release Procedures:
A LEAKING BOTTLE MAY BE PLACED IN A PLASTIC BAG & NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE
ABSORBED ON VERMICULITE/SAND.
Neutralizing Agent:
N/K
Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AFTERBURNER & SCRUBBER IAW/FEDERAL, STATE & LOCAL REGULATIONS.
Handling And Storage Precautions:
KEEP TIGHTLY CLOSED & STORE IN A COOL, DRY PLACE.
Other Precautions:
THIS MATERIAL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN SAFE HANDLING OF HAZARDOUS CHEMICALS. ALL CHEMICALS
SHOULD BE CONSIDERED HAZARDOUS. DIRECT PHYSICAL CONTACT SHOULD BE AVOIDED.

Fire and Explosion Hazard Information

Flash Point Method:
N/P 4
Flash Point:
Flash Point Text:
N/K
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
CO2, DRY CHEMICAL POWDER/WATER SPRAY
Fire Fighting Procedures:
N/K
Unusual Fire/Explosion Hazard:
N/K

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/K
Melt/Freeze Pt:
M.P/F.P Text:
N/K
Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
N/K
Vapor Density:

N/K
Volatile Org Content %:
Spec Gravity:
N/K 5
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
N/K
Appearance and Odor:
LIQUID
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
N/K
Hazardous Decomposition Products:
N/K
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 541-73-1
Date: 03/09/2001

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: 1,3-DICHLOROBENZENE

SYNONYMS: M-Dichlorobenzene, M-Dichlorobenzol, M-Phenylenedichloride

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	OSHA PEL	MAC	Other STEL
1,3-DICHLOROBENZENE	C6H4CL2	541-73-1	99+%	NE	NE	NE	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.
Can form explosive mixtures in air.
May cause severe irritation or burns to the eyes and skin.
May cause irritation to the respiratory tract.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Eye , Ingestion

ACUTE EFFECTS: Acts as a central nervous system depressant. High concentrations may have a narcotic effect. Irritation to the eyes, mucous membranes, and upper respiratory tract. Symptoms include dizziness, drowsiness, cyanosis, pallor, spastic contration of extremities, and loss of consciousness.

CHRONIC EFFECTS: Irritation to the eyes, mucous membranes, and upper respiratory tract. Inhalation at high concentrations may be fatal due to spasm, inflammation and edema of the lungs, chemical pneumonitis and pulmonary edema. Kidney and liver damage. Can cause lung damage.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Kidney and liver damage. Central nervous system diseases.

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - No
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes.

SKIN CONTACT: Rinse the affected area with flooding amounts of water and then wash it with soap and water.

INGESTION: Never give anything by mouth to an unconscious person. Have conscious and alert person drink 1 to 2 glasses of water.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: If patient is conscious, attempt to induce vomiting with Ipecac Syrup. Consider activated charcoal cathartic. Administer charcoal slurry with saline, water, or sorbitol. In an unconscious patient, do gastric lavage with suction.

5. FIRE FIGHTING MEASURES

FLASH POINT: 63 deg. celsius

AUTOIGNITION TEMPERATURE: N/Av

FLAMMABLE LIMITS: N/Av

LOWER:
UPPER:

EXTINGUISHING MEDIA: Use water spray to keep fire exposed cylinders cool. Extinguish with water spray, water fog, dry chemical, or carbon dioxide. Use water in flooding quantities as fog since solid streams of water may spread fire.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. If possible, stop the product flow. Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide, hydrogen chloride and phosgene.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Cylinder rupture may occur under fire conditions. Severe when exposed to heat or flame. Vapors may travel a considerable distance to the source of ignition and flash back.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Remove all sources of ignition. Prevent release of material to surface water or sewers. Absorb with sand or vermiculite and place in closed containers for disposal. Place waste into a clean, dry container for disposal.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation.

EYE / FACE PROTECTION: Safety glasses

SKIN PROTECTION: Impervious gloves, coveralls, boots, and/or other resistant protective clothing.

RESPIRATORY PROTECTION: In case of leakage, use self-contained breathing apparatus.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Odorless

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @25 deg. celsius: 2.3 mm Hg

VAPOR DENSITY (AIR=1): 5.08

BOILING POINT (C): 173

SOLUBILITY IN WATER: Insoluble

SPECIFIC GRAVITY (H2O=1): @20 deg. celsius: 1.288

EVAPORATION RATE: N/Av

ODOR THRESHOLD: None

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: Oxidizing agents.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide, hydrogen chloride and phosgene.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): None Established

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Combustible Liquid, N.O.S.
HAZARD CLASS: Combustible Liquid, Packing Group III
INDENTIFICATION NUMBER: NA1993
REPORTABLE QUANTITIES: 100 lbs.

LABELING: None

ADR / RID (EU Only): Class 3, 31(c)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 208-792-1

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: 10-20-22

S: 24/25

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

Material Safety Data Sheet
Carbon tetrachloride

ACC# 90116

Section 1 - Chemical Product and Company Identification

MSDS Name: Carbon tetrachloride
Catalog Numbers: AC148170000, AC148170250, AC167720000, AC167720010, AC167720025, AC167720100, AC167721000, AC258530000, AC269370000, AC269370010, AC269371000, AC326580000, AC326580010, AC326580025, AC600220000, AC600220010, AC600220025, AC600230000, AC600230010, AC600230025, 14817-0010, 14817-0025, 16772-5000, 25853-0010, 25853-0025, C1874, C1994, NC9267677, NC9472507, NC9596627
Synonyms: Tetrachloromethane; Carbon tet; Carbona; Carbon chloride; Methane tetrachloride.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
56-23-5	Carbon tetrachloride	99-100	200-262-8

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid.
Danger! May be fatal if inhaled, absorbed through the skin or swallowed. Causes eye, skin, and respiratory tract irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. Cancer suspect agent. May cause liver and kidney damage. May cause central nervous system effects. This is a CFC substance which destroys ozone in the upper atmosphere. Destruction of the ozone layer can lead to increased ultraviolet radiation which, with excess exposure to sunlight, can lead to an increase in skin cancer and eye cataracts. Marine pollutant.
Target Organs: Kidneys, central nervous system, liver.

Potential Health Effects

Eye: Causes eye irritation. Vapors cause eye irritation.
Skin: Causes skin irritation. May be absorbed through the skin in harmful amounts. Contact with the skin defats the skin.
Ingestion: May cause liver and kidney damage. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. Substance is a hepatotoxin and is capable of producing a toxic effect on the liver.

Inhalation: Causes respiratory tract irritation. May cause liver and kidney damage. Exposure produces central nervous system depression. May be harmful if inhaled.
Chronic: Prolonged or repeated skin contact may cause dermatitis. Chronic ingestion may cause effects similar to those of acute ingestion. May cause liver and kidney damage. May cause cancer according to animal studies. Chronic exposure may cause visual disturbances. Carbon tetrachloride is a CNS depressant.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.
Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.
Inhalation: POISON material. If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Material will not burn. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.
Extinguishing Media: Use extinguishing media most appropriate for the surrounding fire.
Flash Point: Not applicable.
Autoignition Temperature: > 982 deg C (> 1,799.60 deg F)
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Isolate area and deny entry. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Do not breathe vapor. Use only with adequate ventilation.

Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Use only under a chemical fume hood.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Carbon tetrachloride	5 ppm TWA; 10 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous r oute	200 ppm IDLH	10 ppm TWA; 25 ppm Ceiling

OSHA Vacated PELs: Carbon tetrachloride: 2 ppm TWA; 12.6 mg/m3 TWA

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: chloroform-like
pH: Not available.
Vapor Pressure: 91 mm Hg @ 20 deg C
Vapor Density: 5.31 (air=1)
Evaporation Rate:12.8 (butyl acetate=1)
Viscosity: 0.97 PAS 20 deg C
Boiling Point: 76 deg C @ 760 mm Hg
Freezing/Melting Point:-23 deg C
Decomposition Temperature:> 100 deg C
Solubility: Insoluble.
Specific Gravity/Density:1.5900 g/cm3
Molecular Formula:CCl4
Molecular Weight:153.82

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Light, excess heat.
Incompatibilities with Other Materials: Alkali metals, powdered aluminum, powdered magnesium,

zinc powder, ethylene, allyl alcohol, barium, fluorine, dimethylformamide, powered beryllium, decaborane, potassium tert-butoxide.
Hazardous Decomposition Products: Hydrogen chloride, chlorine, phosgene, carbon monoxide, carbon dioxide, chlorine dioxide, which may be spontaneously explosive.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 56-23-5: FG4900000
LD50/LC50:
CAS# 56-23-5:
Dermal, guinea pig: LD50 = >9400 uL/kg;
Draize test, rabbit, eye: 2200 ug/30S Mild;
Draize test, rabbit, eye: 500 mg/24H Mild;
Draize test, rabbit, skin: 4 mg Mild;
Draize test, rabbit, skin: 500 mg/24H Mild;
Inhalation, mouse: LC50 = 9526 ppm/8H;
Inhalation, mouse: LC50 = 34500 mg/m3/2H;
Inhalation, rat: LC50 = 8000 ppm/4H;
Inhalation, rat: LC50 = 46000 mg/m3/6H;
Oral, mouse: LD50 = 7749 mg/kg;
Oral, rabbit: LD50 = 5760 mg/kg;
Oral, rat: LD50 = 2350 mg/kg;
Skin, rabbit: LD50 = >20 Carbon tetrachloride is harmful to the liver and a CNS depressant following short-term inhalation, skin contact or ingestion. The liver effects have been observed at concentrations lower than those required to produce CNS effects. Two reviews indicate that ingestion of 14-20 ml or 50-150 ml could be fatal. Although, 1.5 ml (34 mg/kg) has caused death in a few cases.
Carcinogenicity:
CAS# 56-23-5:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 10/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

Epidemiology: No data available.
Teratogenicity: Animal studies have only shown harmful effects in the offspring of animals exposed to doses which also produced significant maternal toxicity.
Reproductive Effects: There is no human information available. There is insufficient animal information available to draw any conclusions about potential reproductive toxicity.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: LC50 = 20.8-41.4 mg/L; 96 Hr.; Flow-through; 21.7 degrees CFish: Bluegill/Sunfish: LC50 = 27-125 mg/L; 96 Hr.; Static Conditions; 23 degrees CBacteria: Phytobacterium phosphoreum: EC50 = 6.0 mg/L; Not available; Microtox testBacteria:

Phytobacterium phosphoreum: EC50 = 33.0 mg/L; 30 minutes; Microtox test No data available.
Environmental: Terrestrial: Evaporates rapidly and migrates into groundwater. Aquatic: Rapidly evaporates, biodegradation an important fate process.
Physical: Atmospheric:Very stable in troposphere with a residence time of 30-50 years.
Other: Carbon tetrachloride has a low potential to bioconcentrate. Log of the bioconcentration factor in trout is 1.24, in bluegill sunfish - 1.48. Bioconcentration factor predicted from water solubility = 14.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 56-23-5: waste number U211.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	CARBON TETRACHLORIDE	CARBON TETRACHLORIDE
Hazard Class:	6.1	6.1(9.2)
UN Number:	UN1846	UN1846
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 56-23-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 56-23-5: 10 lb final RQ; 4.54 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 56-23-5: immediate, delayed.
Section 313
This material contains Carbon tetrachloride (CAS# 56-23-5, 99-100%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR
Clean Air Act:

CAS# 56-23-5 is listed as a hazardous air pollutant (HAP). CAS# 56-23-5 is listed as a Class 1 ozone depletor with an 1.1 ODP

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 56-23-5 is listed as a Hazardous Substance under the CWA. CAS# 56-23-5 is listed as a Priority Pollutant under the Clean Water Act. CAS# 56-23-5 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 56-23-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Carbon tetrachloride, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 56-23-5: 5 æg/day NSRL

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T N

Risk Phrases:

R 23/24/25 Toxic by inhalation, in contact with skin and if swallowed.
R 40 Limited evidence of a carcinogenic effect.
R 59 Dangerous for the ozone layer.
R 48/23 Toxic : danger of serious damage to health by prolonged exposure through inhalation.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 23 Do not inhale gas/fumes/vapour/spray.
S 36/37 Wear suitable protective clothing and gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 59 Refer to manufacturer/supplier for information on recovery/recy cling.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger / Protection)

CAS# 56-23-5: 3

Canada - DSL / NDSL

CAS# 56-23-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1A, D2A.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 56-23-5 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/20/1999
Revision #7 Date: 2/06/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Composition/Information on Ingredient

Cas:
563-58-6
Code:
M
RTECS:
UC8290000
Code:
M
Name:
1,1-DICHLOROPROPYLENE
Other REC Limits:
N/K
OSHA PEL:
N/K
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
N/K
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
WEAR FACE MASK W/ORGANIC VAPOR CANISTER.
Ventilation:
ADEQUATE
Protective Gloves:
RUBBER
Eye Protection:
PROTECTIVE GLASSES
Other Protective Equipment:
Equipment N/K
Work Hygienic Practices:
REMOVE &WASH CONTAMINATED CLOTHES BEFORE REUSE. WASH HANDS THOROUGHLY AFTER HANDLING.
Supplemental Safety and Health:
PRODUCT SHOULD BE HANDLED ONLY BY QUALIFIED PERSONS TRAINED IN LABORATORY PROCEDURES & GOOD
SAFETY PRACTICES.

Health Hazards Data

LD50LC50Mixture:
LD50 ORAL (RAT): 5628 MG/KG METHANOL
Route Of Entry Inds - Inhalation:
YES
Skin:
NO
Ingestion:
YES
Carcinogenicity Inds - NTP:
YES
IARC:
YES
OSHA:

YES
Health Hazards Acute And Chronic:
INHALATION: HARMFUL, HEADACHE, NAUSEA & GASTROINTESTINAL DISTURBANCES. INGESTION: FATAL, BLINDNESS.
Explanation Of Carcinogenicity:
SEE INGREDIENTS
Signs And Symptions Of Overexposure:
INGESTION: MAY CAUSE CANCER.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES: FLUSH W/WATER FOR AT LEAST 15 MINS. SKIN: WASH W/LARGE AMOUNTS OF WATER. INHALATION: REMOVE TO FRESH AIR. IF
BREATHING SS, GIVE ARTIFICIAL RESPIRATION. INGESTION: NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. NEVER
TRY TOMAKE AN UNCONSCIOUS PERSON VOMIT. GIVE 2 TABLESPOONS OF BAKING SODA IN A GLASS OF WATER, PRESS FINGERS BACK
OF TONGUE TO INDUCE VOMIT. OBTAIN MEDICAL ATTENTION.
Spill Release Procedures:
TAKE UP W ABSORBENT MATERIAL. VENTILATE AREA. ELIMINATE ALL IGNITION SOURCES.
Neutralizing Agent:
N/K
Waste Disposal Methods:
DISPOSE OF IN ACCORDANCE W/FEDERAL, STATE & LOCAL REGULATIONS.
Handling And Storage Precautions:
STORE IN SEALED CONTAINERS IN COOL, DRY LOCATION. KEEP AWAY FROM OXIDIZERS. KEEP AWAY FROM IGNITION SOURCES.
Other Precautions:
AVOID EYE/SKIN CONTACT. AVOID BREATHING VAPORS.

Fire and Explosion Hazard Information

Flash Point Method:
N/P 4
Flash Point:
Flash Point Text:
50F
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
6.0%
Upper Limits:
36.5%
Extinguishing Media:
CO2, DRY CHEMICAL, ALCOHOL FOAM
Fire Fighting Procedures:
WEAR SELF-CONTAINED BREATHING APPARATUS WHEN FIGHTING A CHEMICAL FIRE.
Unusual Fire/Explosion Hazard:
THE FOLLOWING TOXIC VAPORS ARE FORMED WHEN THIS MATERIAL IS HEATED TO DECOMPOSITION. HYDROCHLORIC ACID, HYDROGEN
BROMIDE.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
65C
Melt/Freeze Pt:
M.P/F.P Text:
-98C

Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
100
Vapor Density:
1.1 5
Volatile Org Content %:
Spec Gravity:
0.79
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
(ETHER = 1) >1
Solubility in Water:
COMPLETE
Appearance and Odor:
CLEAR COLORLESS LIQUID
Percent Volatiles by Volume:
100
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
ALL IGNITION SOURCES.
Materials To Avoid:
OXIDIZING AGENTS, CHROMIC ANHYDRIDE, LEAD PERCHLORATE, PERCHLORIC ACIDS.
Hazardous Decomposition Products:
HYDROCHLORIC ACID, HYDROGEN BROMIDE
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

Composition/Information on Ingredient

Cas:
57-74-9
Code:
M
RTECS:
PB9800000
Code:
M
Name:
CHLORDANE (SARA III)
Other REC Limits:
N/P
OSHA PEL:
S, 0.5 MG/M3
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
S, 0.5 MG/M3; 9192
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
NIOSH/MSHA APPRVD RESP PROTECTN FOR EXPOSURE OR CONCERN
Ventilation:
LOCAL EXHAUST-YES
Protective Gloves:
4 RUBBER
Eye Protection:
CHEMICAL GOGGLES
Other Protective Equipment:
Equipment RUBBER APRON OR EQUIVALENT,SHOWERS,DAILY CLOTHING CHANGE
Work Hygienic Practices:
N/P
Supplemental Safety and Health:
EVENING EMERGENCY PHONE:815-685-2676. FIRE PROCEDURES (CONT):IF CNTNR BROKEN.USE FOAM OIL
CO*2,SOLUTN WATER DISPERSIBLE.OPA REGISTRATION NO. 6720-67

Health Hazards Data

LD50LC50Mixture:
N/P
Route Of Entry Inds - Inhalation:
N/P
Skin:
N/P
Ingestion:
N/P
Carcinogenicity Inds - NTP:
N/P
IARC:
N/P
OSHA:
N/P

Health Hazards Acute And Chronic:
N/P
Explanation Of Carcinogenicity:
N/P
Signs And Symptions Of Overexposure:
ACTS ON THE CNS; NAUSEA AND/OR DIARRHEA,WEAKNESS,CONVULSIONS.
Medical Cond Aggravated By Exposure:
N/P
First Aid:
IMMEDIATELY FLUSH W/WATER AT LEAST 15 MINUTES.REMOVE FROM SKIN IMMEDIATELY W/SOAP & WATER
ONLY.INHALATION:REMOVE TO FRESH AIR.
Spill Release Procedures:
CLEAN UP W/SHOVEL FOR REUSE OR DISPOSAL. WASH AREA W/DETERGENT & WATER. DO NOT ALLOW IN SEWERS. KEEP AWAY FROM
SPARKS OR OPEN FLAME.
Neutralizing Agent:
N/P
Waste Disposal Methods:
3 DO NOT REUSE EMPTY CONTAINERS.DESTROY BY BURIAL AWAY FROM WATER SUPPLIES OR BURN,KEEPING AWAY FROM SMOKE OR
FUMES. DISPOSAL MUST BE DONE IN ACCORDANCE W/LOCAL,STATE & FEDERAL REGULATIONS.
Handling And Storage Precautions:
STORE IN WELL VENTILATED AREAS, AWAY FROM SPARK & OPEN FLAME.
Other Precautions:
SELF-CONTAINED BREATHING APPARATUS & PROTECTIVE CLOTHING SHOULD BE AVAILABLE IN CASE OF SEVERE FIRES.

Fire and Explosion Hazard Information

Flash Point Method:
N/P
Flash Point:
Flash Point Text:
N/A
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
Upper Limits:
Extinguishing Media:
FOG,FOAM,CARBON DIOXIDE
Fire Fighting Procedures:
INTACT CNTNR-WET W/H2O TO PREVENT OVERHEATNG.SEE SUPP DATA
Unusual Fire/Explosion Hazard:
DECOMPOSES ON EXCESSIVE HEAT-FORMS HCL,ORGANOCHLORIDE PRODUCTS,CO*2,CO

Physical/Chemical Properties

HCC:
NRC/State LIC No:
N/A
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/A
Melt/Freeze Pt:
M.P/F.P Text:
N/A
Decomp Temp:
Decomp Text:
N/A
Vapor Pres:
N/P

Vapor Density:
N/P
Volatile Org Content %:
Spec Gravity:
N/P
VOC Pounds/Gallon:
PH: N/P
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/A
Solubility in Water:
NEGLIGIBLE 5
Appearance and Odor:
TAN POWDER-SLIGHTLY PUNGENT ODOR
Percent Volatiles by Volume:
N/P
Corrosion Rate:
N/P

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
STABLE UNDER NORMAL CONDITIONS OF STORAGE
Materials To Avoid:
N/P
Hazardous Decomposition Products:
HCL,ORGANOCHLORIDE PRODUCTS,CO*2,CO
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/P

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

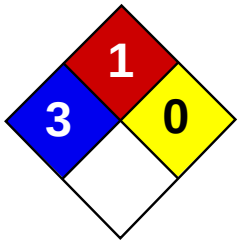
Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com



Material Safety Data Sheet
1,2,3,4,5,6-Hexachlorocyclohexane,gamma- Isomer MSDS

Section 1: Chemical Product and Company Identification

Product Name: 1,2,3,4,5,6-Hexachlorocyclohexane,gamma- Isomer

Catalog Codes: SLH1075

CAS#: 58-89-9

RTECS: GV4900000

TSCA: TSCA 8(b) inventory: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer

CI#: Not available.

Synonym: gamma-Benzene Hexachloride; Aalindan; Hexicide; Viton; Lindane; gamma-BHC

Chemical Name: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma-Isomer

Chemical Formula: Not available.

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
{1,2,3,4,5,6}-Hexachlorocyclohexane, gamma-	58-89-9	100

Toxicological Data on Ingredients: Isomer 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer: ORAL (LD50): Acute: 76 mg/kg [Rat]. 44 mg/kg [Mouse]. DERMAL (LD50): Acute: 50 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation (lung irritant). Hazardous in case of skin contact (permeator). Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified + (Proven.) by OSHA. Classified A3 (Proven for animal.) by ACGIH. Classified SUSPECTED by NTP. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Development toxin [SUSPECTED]. The substance may be toxic to

blood, kidneys, liver, upper respiratory tract, skin, eyes, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: CLOSED CUP: Higher than 93.3°C (200°F).

Flammable Limits: Not available.

Products of Combustion: Corrosive and toxic fumes (toxic fumes of halides, hydrogen chloride, and phosgene)

Fire Hazards in Presence of Various Substances: Slightly flammable to flammable in presence of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
May decompose on heating to produce corrosive and/or toxic fumes. Very toxic fumes of chlorides, hydrogen chloride, and phosgene are released when lindane is heated to decomposition.

Special Remarks on Explosion Hazards: Containers may explode when heated.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Poisonous solid. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, metals, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 23°C (73.4°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.5 (mg/m3) from ACGIH (TLV) [United States] [1999] Inhalation TWA: 0.5 STEL: 1.5 (mg/m3) [Canada] Inhalation TWA: 0.5 (mg/m3) from NIOSH SKIN TWA: 0.5 (mg/m3) from NIOSH Inhalation TWA: 0.1 (mg/m3) [United Kingdom (UK)] Inhalation3 Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Powdered solid.)

Odor:
Odorless to slight musty odor. Pure Lindane is odorless

Taste: Not available.

Molecular Weight: 290.83 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: 323.4°C (614.1°F)

Melting Point: 113°C (235.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.85 (Water = 1)

Vapor Pressure: 0.0000094 mm Hg @ 20 C.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: 1 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.6

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, acetone.

Solubility:
Soluble in acetone. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, excess heat.

Incompatibility with various substances: Reactive with oxidizing agents, metals, acids, alkalis.

Corrosivity: Corrosive in presence of aluminum.

Special Remarks on Reactivity:
It decomposes in the presence of alkalies at ambient temperature, forming trichlorobenzenes. It is decomposed by powdered iron, aluminum, and zinc Lidane is incompatible with lime, sulfur, calciu arsenate, and other strong alkaline materials.

Special Remarks on Corrosivity: Lindane is corrosive to aluminum and other metals.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
Acute oral toxicity (LD50): 44 mg/kg [Mouse]. Acute dermal toxicity (LD50): 50 mg/kg [Rabbit].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified + (Proven.) by OSHA. Classified A3 (Proven for animal.) by ACGIH. Classified SUSPECTED by NTP. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. DEVELOPMENTAL TOXICITY: Classified Development toxin [SUSPECTED]. May cause damage to the following organs: blood, kidneys, liver, upper respiratory tract, skin, eyes, central nervous system (CNS).

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant), of ingestion, of inhalation (lung irritant). Hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
Can cause adverse reproductive effects and birth defects. May cause cancer based on animal data. May affect genetic material based on animal data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Heath Effects: Skin: May cause skin irritation; can be absorbed through skin. May be fatal if absorb pure product through skin. May affect behavior and cardiovascular system Inhalation: May cause respiratory tract irritation, cyanosis, and breathing difficulty. Eyes: Can cause eye irritation. It may be absorbed through the eyes. Ingestion: Harmful

(toxic) if swallowed. Can affect the gastrointestional system (nausea, vomiting, malaise), behavior (headaches, excitability, unconciousness, tremor, dizziness, loss of coordination, clonic/tonic seizures, muscle spasm, sleeplessness, CNS depression), and the respiratory system (cyanosis breathing difficulty). May affect metabolism. Chronic Potential Health Effects: May affect blood, liver, kidneys, metabolism

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 0.1 ppm 96 hours [Fathead minnow]. 0.1 ppm 96 hours [Bluegill]. 0.1 ppm 96 hours [rainbow trout]. 0.1 ppm any hours [lake trout]. 0.1 ppm any hours [goldfish].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: Not available.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Toxic Solid, Organic, n.o.s. (Lindane) UNNA: 2810 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer California prop. 65 (no significant risk level): 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer: 6 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer New York release reporting list: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer Rhode Island RTK hazardous substances: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer Pennsylvania RTK: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma-Isomer Florida: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer Minnesota: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer Massachusetts RTK: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer New Jersey: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer Tennessee: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer California Director's List of Hazardous Substances (8 CCR 339): 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer TSCA 8(b) inventory: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer SARA 302/304/311/312 extremely hazardous substances: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer SARA 313 toxic chemical notification and release reporting: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma- Isomer CERCLA: Hazardous substances.: 1,2,3,4,5,6-Hexachlorocyclohexane, gamma-Isomer: 1 lbs. (0.4536 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R25- Toxic if swallowed. R27- Very toxic in contact with skin. R37/38- Irritating to respiratory system and skin. R41- Risk of serious damage to eyes. R45- May cause cancer. R61- May cause harm to the unborn child. S1/2- Keep locked up and out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S28- After contact with skin, wash immediately with plenty of [***] S36/37- Wear suitable protective clothing and gloves. S39- Wear eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S46- If swallowed, seek medical advice immediately and show this container or label. S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

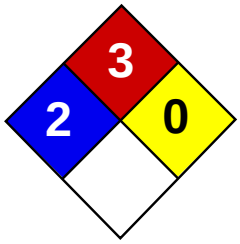
References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 05:42 PM

Last Updated: 11/06/2008 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.



Material Safety Data Sheet
2-Hexanone MSDS

Section 1: Chemical Product and Company Identification

Product Name: 2-Hexanone

Catalog Codes: SLH2950

CAS#: 591-78-6

RTECS: MP1400000

TSCA: TSCA 8(b) inventory: 2-Hexanone

CI#: Not available.

Synonym: Methyl butyl ketone

Chemical Formula: C6H12O

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
{2-}Hexanone	591-78-6	100

Toxicological Data on Ingredients: 2-Hexanone: ORAL (LD50): Acute: 2590 mg/kg [Rat]. 2430 mg/kg [Mouse]. DERMAL (LD50): Acute: 4860 mg/kg [Rabbit]. VAPOR (LC50): Acute: 8000 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of inhalation (lung irritant). Hazardous in case of skin contact (irritant), of ingestion, . Slightly hazardous in case of skin contact (permeator). Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 533°C (991.4°F)

Flash Points: CLOSED CUP: 23°C (73.4°F). OPEN CUP: 28°C (82.4°F) (TAG).

Flammable Limits: LOWER: 1.2% UPPER: 8%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 25 CEIL: 40 (ppm) TWA: 100 CEIL: 165 (mg/m3) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 100.16 g/mole

Color: Colorless to light yellow.

pH (1% soln/water): Not available.

Boiling Point: 127.5°C (261.5°F)

Melting Point: -56.9°C (-70.4°F)

Critical Temperature: Not available.

Specific Gravity: 0.8113 (Water = 1)

Vapor Pressure: 12 mm of Hg (@ 20°C)

Vapor Density: 3.45 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.18 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, acetone.

Solubility:

Easily soluble in acetone. Partially soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2430 mg/kg [Mouse]. Acute dermal toxicity (LD50): 4860 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 8000 ppm 4 hour(s) [Rat].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:
Very hazardous in case of inhalation (lung irritant). Hazardous in case of skin contact (irritant), of ingestion, . Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in animal. Testicular damage in animal.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Ketone Liquid, n.o.s.(2-Hexanone) : UN1224 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Rhode Island RTK hazardous substances: 2-Hexanone Pennsylvania RTK: 2-Hexanone Florida: 2-Hexanone Massachusetts RTK: 2-Hexanone New Jersey: 2-Hexanone TSCA 8(b) inventory: 2-Hexanone

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).

DSCL (EEC):
R10- Flammable. R37/38- Irritating to respiratory system and skin. R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 05:43 PM

Last Updated: 11/01/2010 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

MATERIAL SAFETY DATA SHEET

For R&D use only. Not for drug, household or other use.

Click https://www.lookchem.com/cas-894/894-30-1.html for supplier of this product.

Composition/Information on Ingredient

Name
894-30-7
Codes
N

Weight

Codes
K

Names
PHOSPHINE, (1,4-DIOXIDO)BIS-(1,4-DIOXIDOPROPYL)PHENYL

Effective Date Limits
NIL

Codes
N

Codes

Codes

Codes
N

Codes

Control Measures

Respiratory Protection
WEAR FACE MASK WHEN HANDLING VAPOR CONTENT.

Ventilation
VENTILATE

Protective Gloves
RUBBER.

Eye Protection
PROTECTIVE GLASSES!

Other Protective Equipment
Equipment:NIL

Work Hygienic Practices
REMOVE DAMPEN CONTAMINATED CLOTHES BEFORE REUSE. WASH HANDS THOROUGHLY AFTER HANDLING.

Supplemental Safety and Health
PRODUCT SHOULD BE HANDLED ONLY BY QUALIFIED PERSONS TRAINED IN LABORATORY PROCEDURES & GOOD HYGIENE PRACTICES.

Health Hazards Data

LD50/LC50 Information
ORL RBT LD(50): 2020 MG/KG RECORDED.

Symptoms Of Short Term - Inhalation
NIL

Eyes
NO

Ingestion
NIL

Carcinogenicity Data - IARC
NIL

Skin
NIL

Mutagen
NIL

Health Hazards Acute And Chronic
IRRITATION MINIMAL, REACHES, BULKS & DESTRUCTIVES. DETERGENTS. PRACTICE FATAL, BLENDED.

Explanation Of Carcinogenicity
NO INFORMATION

Signs And Symptoms Of Overexposure
REDNESS. MAY CAUSE CANCER.

Medical Cond. Aggravated By Exposure
NIL

Risk Mitig
SKIN: FLUSH SURFACES FOR AT LEAST 15 MINS, then WASH RELEASE AMOUNTS OF WASTE, INHALATION: EXPOSE TO FRESH AIR, IF NOT FIXED TO, TAKE ARTIFICIAL RESPIRATOR, RESPIRATOR: WHEN USE ANYTHING BY MEANS TO AN UNCONSCIOUS PERSON, NEVER TO PERSONS AN UNCONSCIOUS PERSON NOTIFY, CALL 1 PHILIPPINES OF SMOKE SICK IN A CLASS OF WASTE, PRESS PRESSED BACK OF TISSUE TO SOURCE NOTIFY, COOKS RESCUE...AFTERWARDS.

Spill Methods Precautions
CALL UP W ASSESSMENT SERVICE. VENTILATE AREA. ELIMINATE ALL IGNITION SOURCES.

Neutralizing Agents
NIL

Waste Disposal Methods
DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE & FEDERAL REGULATIONS.

Handling And Storage Precautions
STORE IN SEALED CONTAINERS IN COOL, DRY LOCATION. KEEP AWAY FROM OXIDIZERS. KEEP AWAY FROM IGNITION SOURCES.

Other Precautions
AVOID PROLONG CONTACT. AVOID BREATHING VAPORS.

Fire and Explosion Hazard Information

Flash Point Method
NF-1

Flash Points

Flash Point Texts
NF

Autoignition Temps

Autoignition Temp Text
NIL

Lower Limits
Info

Upper Limits
NLDN

Extinguishing Media
CO2, DRY CHEMICAL, ALCOHOL FOAM

Fire Fighting Procedures
AVOID BREATHING DECOMPOSING AMMONIA AS WHEN FIGHTING A CHEMICAL FIRE.

Unusual Fire/Explosion Hazards
THE FOLLOWING TOXIC VAPORS ARE FORMED WHEN THIS MATERIAL IS HEATED TO DECOMPOSITION. HYDROCHLORIC ACID, PHOSGENE MONOXIDE.

Physical/Chemical Properties

mCCs

Solubility Mol Sec

Sol Temp Wgt Per Ammon

Boiling Points

Bulk Texts
NC

Boiling Temp Pts

Bulk Temp Texts
NPC

Freezing Temps

Recovery Text
NA

Vapor Press
NIL

Vapor Density
LT 1

Volatile Org Chemicals Voc

Spec Gravity
1.01

Odor Threshold Values

Odor Threshold
NIL

Evaporation Rate & Reference
[Plant = 1] >1

Solubility In Water
SOLUBLE

Appearance and Odour
CLEAR COLOURLESS LIQUID

Percent Volatiles by Volume
NIL

Formulae Notes
NIL

Reactivity Data

Stability Indicators
NIL

Stability Conditions To Avoid
NO SPECIAL HAZARDS.

Materials To Avoid
OXIDIZING AGENTS, CHLORIC AND ACIDS, LEAD PEROXIDES, PERCHLORIC ACID.

Hazardous Decomposition Products
HYDROCHLORIC ACID, PHOSGENE GASEOUS

Hazardous Polymerization Indicators
NO

Conditions To Avoid Polymerization
NIL

Toxicological Information

Information Found?

MSDS Transport Information

Transportation?

Regulatory Information

Sara Title III Information NIF

Federal Regulatory Information NIF

State Regulatory Information NIF

Other Information

Other Information?

4-CHLORO-3-METHYLPHENOL, 99%

Analytyka ®
REACTIVOS Y MATERIAS PRIMAS ESPECIALES

PROFEPA:	01-800-770-3372
SETIQ:	01-800-002-1400
PROTECCION CIVIL:	01-800-004-1300

AMPEX CHEMICALS, S.A. DE C.V., SANTA ANA 577, ESCOBEDO, N.L., MEX. 66055, TEL: (81) 8307-2043

4-CHLORO-3-METHYLPHENOL, 99%

1. Product Identification

Synonyms: 4-Chloro-M-Cresol; 6-Chloro-3-Hydroxytoluene
CAS No.: 59-50-7
Molecular Weight: 142.5014
Chemical Formula: C7H7ClO
Product Codes: C0209, C0210

2. Composition/Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
59-50-7	4-Chloro-3-Methylphenol	99	200-431-6

3. Hazards Identification

EMERGENCY OVERVIEW

Appearance: white to pale pink.
Caution! Causes eye and skin irritation. May cause allergic skin reaction. May be harmful if swallowed. Causes digestive and respiratory tract irritation. May cause liver and kidney damage. May cause dermatitis.
Target Organs: Kidneys, liver.

Potential Health Effects

Eye: Causes eye irritation.
Skin: Causes skin irritation. Prolonged and/or repeated contact may cause irritation and/or dermatitis. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material.
Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed.
Inhalation: Causes respiratory tract irritation.
Chronic: May cause liver and kidney damage.

4. First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically.

---

5. Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.
Extinguishing Media: In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam.
Flash Point: Not applicable.
Autoignition Temperature: 590 deg C (1,094.00 deg F)
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: ; Flammability: ; Instability:

---

6. Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Reduce airborne dust and prevent scattering by moistening with water. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

---

7. Handling and Storage

Handling: Wash thoroughly after handling. Wash hands before eating. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Avoid contact with skin and eyes. Avoid ingestion and inhalation.
Storage: Store in a cool, dry place. Keep container closed when not in use.

---

8. Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
4-Chloro-3-Methylphenol	none listed	none listed	none listed

OSHA Vacated PELs: 4-Chloro-3-Methylphenol: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

---

9. Physical and Chemical Properties

Physical State: Solid
Appearance: white to pale pink
Odor: Odorless.
pH: Not available.
Vapor Pressure: 0.08 mm Hg @ 20C
Vapor Density: 4.9
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 235 deg C
Freezing/Melting Point:66 deg C
Decomposition Temperature: Not available.
Solubility: Slightly soluble in water.
Specific Gravity/Density: Not available.
Molecular Formula:C7H7ClO
Molecular Weight:142.5014

---

10. Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, dust generation.
Incompatibilities with Other Materials: Bases, acid chlorides, acid anhydrides, sodium hydroxide, oxidizing agents, steel, brass, copper, and copper alloys.
Hazardous Decomposition Products: Hydrogen chloride, chlorine, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

---

11. Toxicological Information

RTECS#:

CAS# 59-50-7: GO7100000
LD50/LC50:
CAS# 59-50-7:
Oral, mouse: LD50 = 600 mg/kg;
Oral, rat: LD50 = 1830 mg/kg;
Carcinogenicity:
CAS# 59-50-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

12. Ecological Information

No information available.

13. Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 59-50-7: waste number U039.

14. Transport Information

	US DOT	Canada TDG
Shipping Name:	CHLOROCRESOLS	CHLOROCRESOLS, SOLID
Hazard Class:	6.1	6.1
UN Number:	UN2669	UN2669
Packing Group:	II	II

15. Regulatory Information

US FEDERAL

TSCA
CAS# 59-50-7 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 59-50-7: 5000 lb final RQ; 2270 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 59-50-7: acute.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 59-50-7 is listed as a Priority Pollutant under the Clean Water Act.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 59-50-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN N

Risk Phrases:

R 21/22 Harmful in contact with skin and if swallowed.
R 41 Risk of serious damage to eyes.
R 43 May cause sensitization by skin contact.
R 50 Very toxic to aquatic organisms.

Safety Phrases:

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 59-50-7: 2

Canada - DSL/NDSL

CAS# 59-50-7 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1A, D2B.

Canadian Ingredient Disclosure List

CAS# 59-50-7 is not listed on the Canadian Ingredient Disclosure List.

---

16. Other Information

Product Use:

Laboratory Reagent.

Revision Information:

Jan. 2008.

Disclaimer:

****

ANALYTYKA provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. ANALYTYKA MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, ANALYTYKA WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Material Safety Data Sheet
d-Limonene

ACC# 54537

Section 1 - Chemical Product and Company Identification

MSDS Name: d-Limonene
Catalog Numbers: AC179390000, AC179390050, AC179395000, AC413170000, AC413171000, AC413180000, AC413180010, AC413180030, AC413180050, 15182507A, 15182507C, 22143975, 22143976, BN08170011, BP2696-1G, BP2696-4, 23245686
Synonyms: Hemo-De; Carvene; (+)-4-Isopropenyl-1-methylcyclohexene; (+)-R-Limonene; (R)-1-Methyl-4-(1-methylethenyl)cyclohexene; D-(+)-Limonene; d-Limonene; d-p-Mentha-1,8-diene; optically active terpene; (The racemic mixture of d-limonene and l-limonene isomers is known as dipentene).
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
5989-27-5	d-Limonene	>95	227-813-5

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear almost colorless. Flash Point: 48 deg C.
Warning! Flammable liquid and vapor. May cause allergic skin reaction. Causes eye and skin irritation. May cause respiratory tract irritation. Marine pollutant.
Target Organs: Skin.

Potential Health Effects

Eye: Causes eye irritation.
Skin: Causes skin irritation. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis.
Ingestion: May cause digestive tract disturbances.
Inhalation: May cause respiratory tract irritation.
Chronic: In 2-year gavage studies, there was clear evidence of carcinogenic activity of d-limonene for male rats, as shown by increased incidences of tubular cell hyperplasia, adenomas, and adenocarcinomas of the kidney. There was NO evidence of carcinogenic activity of d-limonene for female rats, for male mice, or for female mice.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, immediately flush skin with soap and plenty of water. Remove contaminated clothing and shoes. Get medical aid if symptoms occur. Wash clothing before reuse.
Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Containers may explode in the heat of a fire. Flammable liquid and vapor. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. This liquid floats on water and may travel to a source of ignition and spread fire.
Extinguishing Media: Use water fog, dry chemical, carbon dioxide or alcohol type foam.
Flash Point: 48 deg C (118.40 deg F)
Autoignition Temperature: 255 deg C (491.00 deg F)
Explosion Limits, Lower:.70 vol %
Upper: 6.10 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 2; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Forms smooth, slippery surfaces on floors, posing an accident risk. Remove all sources of ignition. Provide ventilation.

Section 7 - Handling and Storage

Handling: Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep away from heat, sparks and flame. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Avoid breathing vapor or mist.
Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area. Separate from oxidizing materials. Partially filled containers should be blanketed with nitrogen.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
d-Limonene	none listed	none listed	none listed

OSHA Vacated PELs: d-Limonene: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use. Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance: clear almost colorless

Odor: citrus-like odor

pH: Not available.

Vapor Pressure: 1.98 mm Hg @ 25 deg C

Vapor Density: 4.7 (air=1)

Evaporation Rate: Not available.

Viscosity: Not available.

Boiling Point: 175 - 176 deg C @ 760 mmHg

Freezing/Melting Point:-74 deg C

Decomposition Temperature: Not available.

Solubility: Insoluble.

Specific Gravity/Density:.8400 g/ml

Molecular Formula:C10H16

Molecular Weight:136.24

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. Oxidizes to a film in air, oxidation behavior similar to that of rubber or drying oils.

Conditions to Avoid: Ignition sources, excess heat, prolonged exposure to air.

Incompatibilities with Other Materials: Strong oxidizing agents.

Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:

CAS# 5989-27-5: GW6360000

LD50/LC50:
CAS# 5989-27-5:
Draize test, rabbit, skin: 10%/24H Mild;
Oral, mouse: LD50 = 5600 mg/kg;
Oral, rat: LD50 = 4400 mg/kg;
Skin, rabbit: LD50 = >5 gm/kg;
.

Carcinogenicity:
CAS# 5989-27-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: Not known to be teratogenic.
Reproductive Effects: See actual entry in RTECS for complete information.
Mutagenicity: d-Limonene was not mutagenic in 4 strains of S. typhimurium, did not significantly increase the number of Tft-resistant cells in the mouse L5178Y/TK+/- assay, and did not induce chromosomal aberrations or SCEs in cultured CHO cells.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: May bioconcentrate in aquatic organisms and fish. Has low mobility in soil and may rapidly volatilize in the atmosphere. Limonene can be readily degraded in soil.
Physical: No information available.
Other: Dipentene, which is optically inactive limonene, is a marine pollutant.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	DIPENTENE	Dipentene
Hazard Class:	3	3
UN Number:	UN2052	UN2052
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 5989-27-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 5989-27-5: immediate, fire.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 5989-27-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
XI N
Risk Phrases:
R 10 Flammable.
R 38 Irritating to skin.
R 43 May cause sensitization by skin contact.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
S 24 Avoid contact with skin.
S 37 Wear suitable gloves.
S 60 This material and its container must be disposed of as hazardou s waste.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)
CAS# 5989-27-5: No information available.
Canada - DSL/NDSL

CAS# 5989-27-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B3, D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 5989-27-5 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 1/09/1998
Revision #7 Date: 6/06/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

MSDS Number: **E2340** * * * * * *Effective Date:* ***09/09/09*** * * * * * *Supercedes:* ***05/11/07***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ETHYL ETHER

1. Product Identification

Synonyms: Ether; ether,anhydrous; Diethyl ether; 1,1'Oxybisethane;ethyl oxide; diethyl oxide; Ethyl ether anhydrous;
CAS No.: 60-29-7
Molecular Weight: 74.12
Chemical Formula: C2H5OC2H5
Product Codes:
J.T. Baker: 9238, 9244, 9246, 9248, 9250
Mallinckrodt: 0848

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Diethyl Ether	60-29-7	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 4 - Extreme (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 2 - Moderate (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Irritant. General anesthesia by inhalation can occur. Continued exposure may lead to respiratory failure or death. Early symptoms include irritation of nose and throat, vomiting, and irregular respiration, followed by dizziness, drowsiness, and unconsciousness.
Ingestion:
Irritating to the mucous membranes. Ingestion of 1 or 2 ounces may be fatal. Because of volatility the stomach becomes distended, which may cause belching. Other symptoms can include vomiting, unconsciousness, and coma.
Skin Contact:
Irritating to the skin and mucous membranes by drying effect. Can cause dermatitis on prolonged exposure. May be absorbed through skin.
Eye Contact:
May cause irritation, redness and pain. Prolonged exposures to high concentrations of vapor can cause eye damage.
Chronic Exposure:
Repeated exposures may be habit forming. Prolonged exposures may result in headache, drowsiness, excitation, and psychic disturbances. Teratogenic effects are possible.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired liver, kidney or respiratory function may be more susceptible to the effects of this substance. Alcoholic beverage consumption can enhance the toxic effects of this substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
Remove any contaminated clothing. Wash skin with soap or mild detergent and water for at least 15 minutes. Call a physician.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: -45C (-49F) CC
Autoignition temperature: 160C (320F)
Flammable limits in air % by volume:
lel: 1.9; uel: 36.0
Dangerous highly flammable liquid.
Explosion:
Containers may explode when involved in a fire. Above flash point, vapor-air mixtures are explosive within flammable limits noted above. May form explosive peroxides on long standing or after exposure to air or light. May explode when brought in contact with nitric acid. Sensitivity to mechanical impact: Yes, if peroxides are formed. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Treat as a flammable gas in a fire situation. Water spray may be used to keep fire exposed containers cool. Water is ineffective as an extinguishing agent.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. This highly flammable liquid must be kept from sparks, open flame, hot surfaces, and all sources of heat and ignition. Vapors can flow along surfaces to distant ignition source and flash back.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials. Storage and use areas should be No Smoking areas. Bond and ground containers when transferring liquid. Isolate from other combustible material. Protect from direct sunlight. Protect against static electricity and lightning for large quantity storage rooms, protect with automatic sprinkler systems and total flooding carbon dioxide systems. The reactivity hazard may be increased on longstanding due to peroxide formation. Ether is subject to peroxide formation in opened containers and should be protected from exposure to air. When low peroxide ether is required, use only material from an unopened can. Do not allow to evaporate to near dryness. Addition of water or appropriate reducing agents will lessen peroxide formation. Any ether remaining in opened containers that has not been consumed/used after 2-3 days, should be discarded. Store At A Temperature Not Exceeding 30C (86F).
DO NOT OPEN Unless Contents Are At Room Temperature (72F) or Below For At Least 24 Hours. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
400 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
400 ppm (TWA), 500 ppm STEL

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. An organic vapor respirator is predicted to have a short service life (less than 30 minutes at concentrations of ten times the TLV/PEL) when used with this material.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.
Other Control Measures:
Shoes should be conductive and nonsparking.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Sweet, ethereal odor.
Solubility:
8.43% by wt in H2O @ 15C; 6.05% by wt in H2O @ 25C.
Specific Gravity:
0.71 at 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
No information found.
Boiling Point:
35C (95F)
Melting Point:
-123C (-189F)
Vapor Density (Air=1):
2.6
Vapor Pressure (mm Hg):
440 @ 20C (68F) (ether)
Evaporation Rate (BuAc=1):
37.5

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Heat, light, and long standing contribute to instability. Reacts with air to form explosive peroxides.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Can react dangerously with acetyl peroxide, liquid oxygen, bromoazide, chlorine, and strong oxidizers such as nitrates. Avoid heat, flame, other sources of ignition, and exposure to light, air.
Conditions to Avoid:
Heat, flame, ignition sources, incompatibles, light, and air.

---

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 1215 mg/kg; investigated as a tumorigen and mutagen; irritation eye rabbit: 100 mg moderate; skin rabbit 360 mg open mild
Reproductive Toxicity:
See Chronic Health Hazards.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Diethyl Ether (60-29-7)	No	No	None

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is not expected to biodegrade. When released into water, this material is not expected to biodegrade. When released into the water, this material is expected to have a half-life of less than 1 day. When released to water, this material is expected to quickly evaporate. This material is not expected to significantly bioaccumulate. This material has a log octanol-water partition coefficient of less than 3.0. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is not expected to be degraded by photolysis. When released into the air, this material is expected to have a half-life between 1 and 10 days.
Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, DIETHYL ETHER
Hazard Class: 3
UN/NA: UN1155
Packing Group: I
Information reported for product/size: 215L

International (Water, I.M.O.)

Proper Shipping Name: DIETHYL ETHER
Hazard Class: 3
UN/NA: UN1155
Packing Group: I
Information reported for product/size: 215L

International (Air, I.C.A.O.)

Proper Shipping Name: RQ, DIETHYL ETHER
Hazard Class: 3
UN/NA: UN1155
Packing Group: I
Information reported for product/size: 215L

---

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Diethyl Ether (60-29-7)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

		--Canada--		
Ingredient	Korea	DSL	NDSL	Phil.
Diethyl Ether (60-29-7)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

	-SARA 302-		------SARA 313------	
Ingredient	RQ	TPQ	List	Chemical Catg.
Diethyl Ether (60-29-7)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

		-RCRA-	-TSCA-
Ingredient	CERCLA	261.33	8(d)
Diethyl Ether (60-29-7)	100	U117	Yes

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: Yes (Pure / Liquid)

Australian Hazchem Code: 3YE
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **4** Reactivity: **1**
Label Hazard Warning:
DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.
Label Precautions:
May form explosive peroxides.
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Avoid breathing vapor.
Do not get in eyes, on skin, or on clothing.
Wash thoroughly after handling.
Store At A Temperature Not Exceeding 30C (86F).DO NOT OPEN Unless Contents Are At Room Temperature (72F) or Below For At Least 24 Hours.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases call a physician.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet

Version 4.0
Revision Date 08/05/2010
Print Date 08/18/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Dieldrin
Product Number	:	49024
Brand	:	Supelco
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+18003255832
Fax	:	+18003255052
Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Target Organ Effect, Highly toxic by inhalation, Highly toxic by ingestion, Toxic by skin absorption, Carcinogen

Target Organs

Central nervous system, Liver, BloodCentral nervous system, Liver, Blood

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H300 + H330	Fatal if swallowed or if inhaled.
H311	Toxic in contact with skin.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.
H400	Very toxic to aquatic life.

Precautionary statement(s)

P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash hands thoroughly after handling.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P284	Wear respiratory protection.
P310	Immediately call a POISON CENTER or doctor/ physician.

HMIS Classification

Health hazard:	4
Chronic Health Hazard:	*
Flammability:	0
Physical hazards:	0

NFPA Rating

Health hazard:	3
Fire:	0
Reactivity Hazard:	0

Health hazard:	4
Fire:	0
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be fatal if inhaled. May cause respiratory tract irritation.
Skin	Toxic if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	May be fatal if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : 1,2,3,4,10,10-Hexachloro-1,4,4a,5,6,7,8,8a-octahydro-6,7-epoxy-1,4:5,8-dimethanonaphthalene

Formula : $C_{12}H_8Cl_6O$

Molecular Weight : 380.91 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Dieldrin			
60-57-1	200-484-5	602-049-00-9	-

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis
Dieldrin	60-57-1	TWA	0.25 mg/m3	2009-01-01	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Liver damage Central Nervous System convulsion Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Not classifiable as a human carcinogen: Agents which cause concern that they could be carcinogenic for humans but which cannot be assessed conclusively because of a lack of data. In vitro or animal studies do not provide indications of carcinogenicity which are sufficient to classify the agent into one of the other categories. Danger of cutaneous absorption				
		TWA	0.25 mg/m3	1989-01-19	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin notation				
		TWA	0.25 mg/m3	2007-01-01	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Skin designation				

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	solid

Safety data

pH	no data available

Melting point	143 - 144 °C (289 - 291 °F)
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Water solubility	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - mouse - 38.0 mg/kg

LD50 Oral - dog - 65.0 mg/kg

LD50 Oral - Monkey - 3.0 mg/kg

LD50 Oral - rabbit - 45.0 mg/kg

LD50 Oral - Pig - 38.0 mg/kg

LD50 Oral - guinea pig - 49.0 mg/kg

LD50 Oral - Hamster - 60.0 mg/kg

LD50 Oral - Pigeon - 23.7 mg/kg

LD50 Oral - Chicken - 20.0 mg/kg
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Miosis (pupilliary constriction). Behavioral:Excitement. Behavioral:Food intake (animal).

LD50 Oral - Quail - 10.8 mg/kg
Remarks: Behavioral:Altered sleep time (including change in righting reflex). Behavioral:Somnolence (general depressed activity). Behavioral:Irritability.

LD50 Oral - Duck - 381.0 mg/kg

LD50 Oral - Mammal - 94.0 mg/kg
Remarks: Peripheral Nerve and Sensation:Flaccid paralysis without anesthesia (usually neuromuscular blockage). Behavioral:Tremor. Behavioral:Convulsions or effect on seizure threshold.

LD50 Oral - Bird (wild) - 13.3 mg/kg

LDLO Oral - rat - 30.0 mg/kg
Remarks: Liver:Other changes.

LDLO Oral - Human - male - 65.0 mg/kg

LDLO Oral - cat - 500 mg/kg
Remarks: Lungs, Thorax, or Respiration:Chronic pulmonary edema. Liver:Fatty liver degeneration. Kidney, Ureter, Bladder:Other changes.

TDLo Oral - rat - 140 mg/kg

Remarks: Liver:Other changes. Blood:Other changes. Biochemical:Enzyme inhibition, induction, or change in blood or tissue levels: Other esterases.

TDLo Oral - rat - 109 mg/kg
Remarks: Liver:Changes in liver weight.

TDLo Oral - rat - 88 mg/kg
Remarks: Behavioral:Food intake (animal). Nutritional and Gross Metabolic:Weight loss or decreased weight gain. Biochemical:Enzyme inhibition, induction, or change in blood or tissue levels: Phosphatases.

LC50 Inhalation - rat - 4 h - 13 mg/m3

LD50 Dermal - rabbit - 250.0 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (Dieldrin)
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
Ingestion - Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
no data available

Potential health effects

Inhalation	May be fatal if inhaled. May cause respiratory tract irritation.
Ingestion	May be fatal if swallowed.
Skin	Toxic if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure

Discomfort, Headache, Nausea, Vomiting, Dizziness, Tremors, tonic convulsions, clonic spasms, Coma., respiratory failure, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: IO1750000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	mortality LC50 - Carassius auratus (goldfish) - 1.6 µg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates.	Immobilization EC50 - Daphnia magna (Water flea) - 79.5 µg/l - 48 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 2811 Class: 6.1 Packing group: I
Proper shipping name: Toxic solids, organic, n.o.s. (Dieldrin)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 2811 Class: 6.1 Packing group: I EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (Dieldrin)
Marine pollutant: No

IATA
UN-Number: 2811 Class: 6.1 Packing group: I
Proper shipping name: Toxic solid, organic, n.o.s. (Dieldrin)
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

OSHA Hazards
Target Organ Effect, Highly toxic by inhalation, Highly toxic by ingestion, Toxic by skin absorption, Carcinogen

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

	CAS-No.
Dieldrin	60-57-1

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Dieldrin	60-57-1	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Dieldrin	60-57-1	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Dieldrin	60-57-1	2007-03-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Dieldrin	60-57-1	1990-06-15

16. OTHER INFORMATION

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet
2,6-Dinitrotoluene, 99%

ACC# 71341

Section 1 - Chemical Product and Company Identification

MSDS Name: 2,6-Dinitrotoluene, 99%
Catalog Numbers: AC117070000, AC117070250, AC117071000
Synonyms: 2,6-DNT.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
606-20-2	2,6-Dinitrotoluene	99	210-106-0

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: slightly yellow needles.
Danger! Explosive hazard if confined and heated. Organic contaminants lower decomposition temperature and increase risk of explosion. May be fatal if inhaled. Causes eye, skin, and respiratory tract irritation. Harmful if swallowed or absorbed through the skin. Methemoglobin former - can cause cyanosis. Possible risk of impaired fertility.
Target Organs: Cardiovascular system, reproductive system.

Potential Health Effects

Eye: Causes eye irritation.
Skin: Causes skin irritation.
Ingestion: Harmful if swallowed. Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause methemoglobinemia, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), convulsions, and death. Methemoglobinemia is characterized by dizziness, drowsiness, headache, shortness of breath, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), rapid heart rate and chocolate-brown colored blood. May cause allergic reaction.
Inhalation: Causes respiratory tract irritation. Methemoglobinemia is characterized by dizziness, drowsiness, headache, shortness of breath, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), rapid heart rate and chocolate-brown blood.
Chronic: Prolonged exposure may cause anemia and methemoglobinemia, characterized by dizziness, drowsiness, headache, breath shortness, cyanosis (bluish skin due to deficient oxygenation of the blood), rapid heart rate and chocolate-brown colored blood. May cause cancer according to animal studies.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.
Skin: Get medical aid immediately. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.
Extinguishing Media: Use water fog, dry chemical, carbon dioxide, or regular foam.
Flash Point: 207 deg C (404.60 deg F)
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 1; Instability: 3

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use only in a well-ventilated area. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from reducing agents. Separate from oxidizing materials.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
	0.2 mg/m3 TWA (listed		

2,6-Dinitrotoluene	under Dinitrotoluene (mixed isomers)).Skin - potential significant contribution to overall exposure by the cutaneous r oute (listed under Dinitrotoluene (mixed isomers)).	1.5 mg/m3 TWA (listed under Dinitrotoluene (mixed isomers)).50 mg/m3 IDLH (listed under Dinitrotoluene (mixed isomers)).	1.5 mg/m3 TWA (listed under Dinitrotoluene (mixed isomers)).
Dinitrotoluene (mixed isomers)	0.2 mg/m3 TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	1.5 mg/m3 TWA 50 mg/m3 IDLH	1.5 mg/m3 TWA

OSHA Vacated PELs: 2,6-Dinitrotoluene: No OSHA Vacated PELs are listed for this chemical. Dinitrotoluene (mixed isomers): 1.5 mg/m3 TWA

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Needles

Appearance: slightly yellow

Odor: None reported.

pH: Not available.

Vapor Pressure: 1 mm Hg @ 20 deg C

Vapor Density: Not available.

Evaporation Rate: Not available.

Viscosity: Not available.

Boiling Point: 250 deg C

Freezing / Melting Point:64-70 deg C

Decomposition Temperature: Not available.

Solubility: practically insoluble

Specific Gravity / Density: Not available.

Molecular Formula:C7H6N2O4

Molecular Weight:182.14

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. There are instances of explosion during manufacture or storage. May explode when heated.

Conditions to Avoid: Excess heat.

Incompatibilities with Other Materials: Oxidizing agents, reducing agents, strong bases, mixture with nitric acid is highly explosive, ignites on contact with sodium oxide.

Hazardous Decomposition Products: Nitrogen oxides, carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 606-20-2: XT1925000
CAS# 25321-14-6: XT1300000
LD50/LC50:
CAS# 606-20-2:
Draize test, rabbit, skin: 500 mg/24H Mild;
Inhalation, rat: LC50 = 240 mg/m3/6H;
Oral, mouse: LD50 = 621 mg/kg;
Oral, rat: LD50 = 177 mg/kg;
.

CAS# 25321-14-6:
Oral, mouse: LD50 = 750 mg/kg;
.

Carcinogenicity:
CAS# 606-20-2:

- **ACGIH:** A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans (listed as 'Dinitrotoluene (mixed isomers)').
- **California:** carcinogen, initial date 7/1/95
- **NTP:** Not listed.
- **IARC:** Group 2B carcinogen

CAS# 25321-14-6:

- **ACGIH:** A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
- **California:** carcinogen, initial date 5/1/96
- **NTP:** Not listed.
- **IARC:** Not listed.

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.
Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.

RCRA U-Series:
CAS# 606-20-2: waste number U106.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	DINITROTOLUENES	DINITROTOLUENES, SOLID
Hazard Class:	6.1	6.1
UN Number:	UN2038	UN2038
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 606-20-2 is listed on the TSCA inventory.
CAS# 25321-14-6 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 606-20-2: 100 lb final RQ; 45.4 kg final RQ CAS# 25321-14-6: 10 lb final RQ; 4.54 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
Section 313
This material contains 2,6-Dinitrotoluene (CAS# 606-20-2, 99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR
This material contains Dinitrotoluene (mixed isomers) (CAS# 25321-14-6, -%),which is subject to the reporting requirements of Section 313 of SARA Title
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 606-20-2 is listed as a Hazardous Substance under the CWA. CAS# 25321-14-6 is listed as a Hazardous Substance under the CWA. CAS# 606-20-2 is listed as a Priority Pollutant under the Clean Water Act. CAS# 606-20-2 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 25321-14-6 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 606-20-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Dinitrotoluene (mixed isomers)), Massachusetts.
CAS# 25321-14-6 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains 2,6-Dinitrotoluene, a chemical known to the state of California to cause cancer. WARNING: This product contains 2,6-Dinitrotoluene, a chemical known to the state of California to cause male reproductive toxicity. WARNING: This product contains Dinitrotoluene (mixed isomers), a chemical known to the state of California to cause cancer. WARNING: This product contains Dinitrotoluene (mixed isomers), a chemical known to the state of California to cause male reproductive toxicity.

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T

Risk Phrases:

R 23/24/25 Toxic by inhalation, in contact with skin and if swallowed.

R 45 May cause cancer.

R 48/22 Harmful : danger of serious damage to health by prolonged exposure if swallowed.

R 62 Possible risk of impaired fertility.

R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 53 Avoid exposure - obtain special instructions before use.

S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 606-20-2: 3

CAS# 25321-14-6: No information available.

Canada - DSL/NDSL

CAS# 606-20-2 is listed on Canada's DSL List.

CAS# 25321-14-6 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2A, D1B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 606-20-2 (listed as Dinitrotoluene (mixed isomers)) is listed on the Canadian Ingredient Disclosure List.

CAS# 25321-14-6 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 4/13/1998

Revision #5 Date: 11/20/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their

particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet

Version 4.0
Revision Date 08/09/2010
Print Date 02/12/2011

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	N-Nitrosodi-*n*-propylamine
Product Number	:	48554
Brand	:	Supelco
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+18003255832
Fax	:	+18003255052
Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Toxic by ingestion, Carcinogen

Target Organs

Liver, Kidney, Throat., Lungs

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H302	Harmful if swallowed.
H350	May cause cancer.
H401	Toxic to aquatic life.
H413	May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

P201	Obtain special instructions before use.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.

HMIS Classification

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical hazards:	0

NFPA Rating

Health hazard:	2
Fire:	0
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C6H14N2O
Molecular Weight : 130.22 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
N-Nitroso dipropylamine			
621-64-7	210-698-0	612-098-00-8	-

4. FIRST AID MEASURES

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid

Safety data

pH	no data available
Melting point	no data available
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Density	0.92 g/cm3
Water solubility	no data available
Partition coefficient: n-octanol/water	log Pow: 1.36

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
no data available

Materials to avoid
copper salts, mercury salts, Strong mineral acids, Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, nitrogen oxides (NOx)

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 480.0 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity
no data available

Carcinogenicity

Possible human carcinogen

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	Toxic if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: JL9700000

12. ECOLOGICAL INFORMATION

Toxicity

no data available

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, liquid, n.o.s. (N-Nitroso dipropylamine)
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 3082 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (N-Nitroso dipropylamine)
Marine pollutant: No

IATA
UN-Number: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (N-Nitroso dipropylamine)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

OSHA Hazards
Toxic by ingestion, Carcinogen

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

	CAS-No.
N-Nitroso dipropylamine	621-64-7

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
N-Nitroso dipropylamine	621-64-7	

New Jersey Right To Know Components

	CAS-No.	Revision Date
N-Nitroso dipropylamine	621-64-7	

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet
p-Ethyltoluene, 98%

ACC# 35092

Section 1 - Chemical Product and Company Identification

MSDS Name: p-Ethyltoluene, 98%
Catalog Numbers: AC119010000, AC119010050, AC119010100, AC119010250, AC119010500
Synonyms: 4-Ethyltoluene; 1-Ethyl-4-methylbenzene; 1-Methyl-4-ethylbenzene; p-Ethyltoluene.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
622-96-8	p-Ethyltoluene	98	210-761-2

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear very slight yellow liquid. Flash Point: 36 deg C.
Warning! Flammable liquid and vapor. May cause eye and skin irritation. May cause respiratory tract irritation. May cause central nervous system depression. May cause lung damage. The toxicological properties of this material have not been fully investigated.
Target Organs: Central nervous system, lungs.

Potential Health Effects

Eye: May cause chemical conjunctivitis and corneal damage.
Skin: May be harmful if absorbed through the skin. May cause irritation and dermatitis. May cause cyanosis of the extremities.
Ingestion: Aspiration hazard. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Ingestion of large amounts may cause CNS depression. May cause lung damage.
Inhalation: May cause respiratory tract irritation. Aspiration may lead to pulmonary edema. May be harmful if inhaled. Vapors may cause dizziness or suffocation. May cause burning sensation in the chest.
Chronic: Effects may be delayed.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Water may be ineffective. Material is lighter than water and a fire may be spread by the use of water. Flammable liquid and vapor. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Water may be ineffective. Do NOT use straight streams of water.
Flash Point: 36 deg C (96.80 deg F)
Autoignition Temperature: 475 deg C (887.00 deg F)
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 1; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame. Avoid breathing vapor or mist.
Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local explosion-proof ventilation to keep airborne levels to acceptable levels.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
p-Ethyltoluene	none listed	none listed	none listed

OSHA Vacated PELs: p-Ethyltoluene: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear very slight yellow
Odor: Toluene-like
pH: Not available.
Vapor Pressure: 3 mm Hg @ 25 deg C
Vapor Density: 4.15 (air=1)
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 162 deg C @ 760 mm Hg
Freezing/Melting Point:-62 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:.8600 g/cm3
Molecular Formula:C9H12
Molecular Weight:120.19

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Ignition sources, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:

CAS# 622-96-8: XT2550000
LD50/LC50:
CAS# 622-96-8:
Inhalation, mouse: LC50 = 54000 mg/m3/4H;
Oral, rat: LD50 = 4850 mg/kg;
.

Carcinogenicity:
CAS# 622-96-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: See actual entry in RTECS for complete information.
Mutagenicity: See actual entry in RTECS for complete information.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	FLAMMABLE LIQUIDS, N.O.S.	FLAMMABLE LIQUID NOS (P-ETHYLTOLUENE)
Hazard Class:	3	3
UN Number:	UN1993	UN1993
Packing Group:	III	III
Additional Info:		FP 36 C

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 622-96-8 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 622-96-8: Effective 4/29/83, Sunset 4/29/93
Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 622-96-8 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN

Risk Phrases:

R 10 Flammable.
R 65 Harmful: may cause lung damage if swallowed.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.

WGK (Water Danger/Protection)

CAS# 622-96-8: No information available.

Canada - DSL/NDSL

CAS# 622-96-8 is listed on Canada's NDSL List.

Canada - WHMIS

This product has a WHMIS classification of B2.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 622-96-8 is not listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #8 Date: 9/26/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no

liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Composition/Information on Ingredient

Cas:
630-20-6
Code:
M
RTECS:
KI8450000
Code:
M
Name:
ETHANE, 1,1,1,2-TETRACHLORO- (SARA 313) (CERCLA)
Other REC Limits:
NONE RECOMMENDED
OSHA PEL:
NOT ESTABLISHED
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
NOT ESTABLISHED
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
NONE REQUIRED FOR NORMAL USE W/ADEQUATE VENTILATION. IN POORLY VENTILATED AREAS, USE NIOSH/MSHA
APPROVED ORGANIC VAPOR RESPIRATOR.
Ventilation:
LOCAL EXHAUST IS RECOMMENDED FOR CONFINED AREAS. GENERAL MECHANICAL VENTILATION IS ADEQUATE FOR
NORMAL USE. 7
Protective Gloves:
CHEMICAL RESIST GLOVES, (PVC).
Eye Protection:
SAFETY GLASSES. SPLASH PROOF GOGGLES.
Other Protective Equipment:
Equipment EYE BATH AND SAFETY SHOWER.
Work Hygienic Practices:
FOLLOW CURRENT H.M.I.S. REGULATIONS.
Supplemental Safety and Health:
NONE

Health Hazards Data

LD50LC50Mixture:
ORAL LD50 (RAT) IS UNKNOWN
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
YES
IARC:
YES

OSHA:
NO
Health Hazards Acute And Chronic:
ACUTE: EYES-MODERATE IRRITNAT. SKIN-MODERATE IRRITANT. INHALATION-HIGH CONCENTRATIONS OF VAPORS MAY PRODUCE
IRRITATION OF THE RESPIRATORY TRACT, HEADACHE, DIZZINESS, AND NAUSEA. INGESTION-SIMILIAR TO INHALATION.
CHRONIC:PROLONGED REPEATED OVEREXPOSURE TO THIS PRODUCT MAY LEAD TO SKIN SENSITIZATION OR DERMATITIS.
Explanation Of Carcinogenicity:
CHROMIUM:IARC MONOGRAPHS, VOL 49, PG 49, 1990:GRP 1. NTP 6TH ANNUAL RPT ON CARCINS, 1991:KNOWN TO BE CARCIN. (SUPP
DATA)
Signs And Symptions Of Overexposure:
INHALATION-HIGH CONCENTRATIONS OF VAPORS MAY PRODUCE IRRITATION OF THE RESPIRATORY TRACT, HEADACHE, DIZZINESS, &
NAUSEA. SKIN-MODERATE IRRITATION. INGESTION-NAUSEA AND VOMITING.
Medical Cond Aggravated By Exposure:
SKIN DISORDERS, RESPIRATORY DISORDERS.
First Aid:
EYES: FLUSH WELL W/WATER FOR AT LEAST 15 MINUTES. CONTACT A PHYSICIAN IF IRRITATION PERSISTS. SKIN: WASH W/SOAP &
WATER. INHALE: REMOVE PATIENT TO FRESH AIR. IF BREATHING IS DIFFICULT, ADMINISTER OXYG EN. INGEST: DO NOT INDUCE
VOMITING. CONTACT A PHYSICIAN. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO PREVENT ASPIRATION OF LIQUID INTO LUNGS.
Spill Release Procedures:
PREVENT SKIN & EYE CONTACT. USE NON-COMBUSTIBLE MATERIAL TO CONFINE &/OR ABSORB. ELIMINATE IGNITION SOURCES.
VENTILATE AREA.
Neutralizing Agent:
NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods:
6 REMOVE TO A WASTE DISPOSAL FACILITY OPERATING IN COMPLIANCE W/FEDERAL, STATE & LOCAL REGULATIONS. HAZ WASTE
CODES: D001 (IGNITABLITY); U031 (BUTYL ALCOHOL). RQ: 100 LBS.
Handling And Storage Precautions:
"EMPTY" CONTAINER RETAIN RESIDUE (LIQUID AND/OR VAPOR) AND CAN BE DANGEROUS.
Other Precautions:
DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND/EXPOSE SUCH CONTAINERS TO HEAT, SPARKS, FLAMES, STATIC
ELECTRICITY OR OTHER SOURCES OF IGNIT.

Fire and Explosion Hazard Information

Flash Point Method:
OC
Flash Point:
Flash Point Text:
-156F,-104C
Autoignition Temp:
Autoignition Temp Text:
N/K
Lower Limits:
1.38%
Upper Limits:
36.5%
Extinguishing Media:
CARBON DIOXIDE, DRY CHEMICAL, FOAM.
Fire Fighting Procedures:
FIRE FIGHTERS SHOULD WEAR SELF-CONTAINED BREATHING APPARATUS IN CONFINED AREAS.
Unusual Fire/Explosion Hazard:

VAPORS ARE HEAVIER THAN AIR & MAY TRAVEL ALONG GROUND, OR BE MOVED BY VENTILATION & BE IGNITED BY IGNITION SOURCE.

Physical/Chemical Properties

HCC:
V3
NRC/State LIC No:
N/R
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
10F-275F
Melt/Freeze Pt:
M.P/F.P Text:
N/K
Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
N/K
Vapor Density:
>1
Volatile Org Content %:
Spec Gravity:
0.86 (H2O=1)
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/R
Evaporation Rate & Reference:
>1 (BUTYL ACETATE=1)
Solubility in Water:
APPRECIABLE 8
Appearance and Odor:
BLUE OPAQUE LOW VISCOSITY LIQUID W/SWEET SOLVENT ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
HEAT, SPARKS OPEN FLAMES.
Materials To Avoid:
STRONG OXIDIZING AGENTS.
Hazardous Decomposition Products:
OXIDES OF CARBON.
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
NOT RELEVANT

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

For R&D use only. Not for drug, household or other uses.

Material Safety Data Sheet
Ethanol, Absolute

ACC# 89308

Section 1 - Chemical Product and Company Identification

MSDS Name: Ethanol, Absolute
Catalog Numbers: NC9602322
Synonyms: Ethyl Alcohol; Ethyl Alcohol Anhydrous; Ethyl Hydrate; Ethyl Hydroxide; Fermentation Alcohol; Grain Alcohol; Methylcarbinol; Molasses Alcohol; Spirits of Wine.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
64-17-5	Ethanol	ca.100	200-578-6

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless clear liquid. Flash Point: 16.6 deg C.
Warning! Causes severe eye irritation. **Flammable liquid and vapor.** Causes respiratory tract irritation. This substance has caused adverse reproductive and fetal effects in humans. May cause central nervous system depression. May cause liver, kidney and heart damage. Causes moderate skin irritation.
Target Organs: Kidneys, heart, central nervous system, liver.

Potential Health Effects
Eye: Causes severe eye irritation. May cause painful sensitization to light. May cause chemical conjunctivitis and corneal damage.
Skin: Causes moderate skin irritation. May cause cyanosis of the extremities.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause systemic toxicity with acidosis. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause narcotic effects in high concentration. Vapors may cause dizziness or suffocation.
Chronic: May cause reproductive and fetal effects. Laboratory experiments have resulted in

mutagenic effects. Animal studies have reported the development of tumors. Prolonged exposure may cause liver, kidney, and heart damage.

Section 4 - First Aid Measures

Eyes: Get medical aid. Gently lift eyelids and flush continuously with wate r.
Skin: Get medical aid. Wash clothing before reuse. Flush skin with plenty of soap and water.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation.
Notes to Physician: Treat symptomatically and supportively. Persons with skin or eye disorders or liver, kidney, chronic respiratory diseases, or central and peripheral nervous sytem diseases may be at increased risk from exposure to this substance.
Antidote: None reported.

Section 5 - Fire Fighting Measures

General Information: Containers can build up pressure if exposed to heat and/or fire. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Flammable Liquid. Can release vapors that form explosive mixtures at temperatures above the flashpoint. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. Do NOT use straight streams of water.
Flash Point: 16.6 deg C (61.88 deg F)
Autoignition Temperature: 363 deg C (685.40 deg F)
Explosion Limits, Lower:3.3 vol %
Upper: 19.0 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use only in a well-ventilated area. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Avoid

ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area. Do not store near perchlorates, peroxides, chromic acid or nitric acid.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Ethanol	1000 ppm TWA	1000 ppm TWA; 1900 mg/m3 TWA 3300 ppm IDLH	1000 ppm TWA; 1900 mg/m3 TWA

OSHA Vacated PELs: Ethanol: 1000 ppm TWA; 1900 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Clear liquid
Appearance: colorless
Odor: Mild, rather pleasant, like wine or whis
pH: Not available.
Vapor Pressure: 59.3 mm Hg @ 20 deg C
Vapor Density: 1.59
Evaporation Rate: Not available.
Viscosity: 1.200 cP @ 20 deg C
Boiling Point: 78 deg C
Freezing/Melting Point:-114.1 deg C
Decomposition Temperature: Not available.
Solubility: Miscible.
Specific Gravity/Density:0.790 @ 20°C
Molecular Formula:C2H5OH
Molecular Weight:46.0414

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, ignition sources, excess heat, oxidizers.

Incompatibilities with Other Materials: Strong oxidizing agents, acids, alkali metals, ammonia, hydrazine, peroxides, sodium, acid anhydrides, calcium hypochlorite, chromyl chloride, nitrosyl perchlorate, bromine pentafluoride, perchloric acid, silver nitrate, mercuric nitrate, potassium-tert-butoxide, magnesium perchlorate, acid chlorides, platinum, uranium hexafluoride, silver oxide, iodine heptafluoride, acetyl bromide, disulfuryl difluoride, tetrachlorosilane + water, acetyl chloride, permanganic acid, ruthenium (VIII) oxide, uranyl perchlorate, potassium dioxide.
Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 64-17-5: KQ6300000
LD50/LC50:
CAS# 64-17-5:
Draize test, rabbit, eye: 500 mg Severe;
Draize test, rabbit, eye: 500 mg/24H Mild;
Draize test, rabbit, skin: 20 mg/24H Moderate;
Inhalation, mouse: LC50 = 39 gm/m3/4H;
Inhalation, rat: LC50 = 20000 ppm/10H;
Oral, mouse: LD50 = 3450 mg/kg;
Oral, rabbit: LD50 = 6300 mg/kg;
Oral, rat: LD50 = 7060 mg/kg;
Oral, rat: LD50 = 9000 mg/kg;
Carcinogenicity:
CAS# 64-17-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: Ethanol has been shown to produce fetotoxicity in the embryo or fetus of laboratory animals. Prenatal exposure to ethanol is associated with a distinct pattern of congenital malformations that have collecetively been termed the "fetal alcohol syndrome".
Teratogenicity: Oral, Human - woman: TDLo = 41 gm/kg (female 41 week(s) after conception) Effects on Newborn - Apgar score (human only) and Effects on Newborn - other neonatal measures or effects and Effects on Newborn - drug dependence.
Reproductive Effects: Intrauterine, Human - woman: TDLo = 200 mg/kg (female 5 day(s) pre-mating) Fertility - female fertility index (e.g. # females pregnant per # sperm positive females; # females pregnant per # females mated).
Neurotoxicity: No information available.
Mutagenicity: DNA Inhibition: Human, Lymphocyte = 220 mmol/L.; Cytogenetic Analysis: Human, Lymphocyte = 1160 gm/L.; Cytogenetic Analysis: Human, Fibroblast = 12000 ppm.; Cytogenetic Analysis: Human, Leukocyte = 1 pph/72H (Continuous).; Sister Chromatid Exchange: Human, Lymphocyte = 500 ppm/72H (Continuous).
Other Studies: Standard Draize Test(Skin, rabbit) = 20 mg/24H (Moderate) Standard Draize Test: Administration into the eye (rabbit) = 500 mg (Severe).

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 12900-15300 mg/L; 96 Hr; Flow-through @ 24-24.3°CFish: Rainbow trout: LC50 = 11200 mg/L; 24 Hr; Fingerling (Unspecified)Bacteria: Phytobacterium phosphoreum: EC50 = 34900 mg/L; 5-30 min; Microtox test When spilled on land it is apt to volatilize, biodegrade, and leach into the ground water, but no data on the rates of these processes could be found. Its fate in ground water is unknown. When released into water it will volatilize and probably

biodegrade. It would not be expected to adsorb to sediment or bioconcentrate in fish.
Environmental: When released to the atmosphere it will photodegrade in hours (polluted urban atmosphere) to an estimated range of 4 to 6 days in less polluted areas. Rainout should be significant.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not reviewed.	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 64-17-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 64-17-5: acute, chronic, flammable.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 64-17-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

WARNING: This product contains Ethanol, a chemical known to the state of California to cause developmental reproductive toxicity.
California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

F

Risk Phrases:

R 11 Highly flammable.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 33 Take precautionary measures against static discharges.
S 7 Keep container tightly closed.
S 9 Keep container in a well-ventilated place.

WGK (Water Danger/Protection)

CAS# 64-17-5: 0

Canada - DSL/NDSL

CAS# 64-17-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2, D2A.

Canadian Ingredient Disclosure List

CAS# 64-17-5 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/27/1999
Revision #4 Date: 3/18/2003

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

MSDS Number: **B1356** * * * * * *Effective Date:* ***05/19/08*** * * * * * *Supercedes:* ***08/24/05***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

BENZOIC ACID

1. Product Identification

Synonyms: Benzenecarboxylic acid; benzeneformic acid; phenyl carboxylic acid, phenyl formic acid, dracylic acid.
CAS No.: 65-85-0
Molecular Weight: 122.12
Chemical Formula: C6H5COOH
Product Codes:
J.T. Baker: 0076, 0080, 0081
Mallinckrodt: 0108

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Benzoic Acid	65-85-0	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! CAUSES EYE IRRITATION. MAY CAUSE IRRITATION TO SKIN AND RESPIRATORY TRACT. MAY FORM COMBUSTIBLE DUST CONCENTRATIONS IN AIR.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 2 - Moderate
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Green (General Storage)

Potential Health Effects

Inhalation:
May cause irritation to the respiratory tract, (nose and throat); symptoms may include coughing and sore throat.
Ingestion:
Large oral doses may cause abdominal pain, sore throat, nausea, and vomiting.
Skin Contact:
If allowed to remain on skin, may cause irritation with redness and pain.
Eye Contact:
Causes irritation with redness and pain.
Chronic Exposure:
No information found.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Remove to fresh air. Get medical attention for any breathing difficulty.
Ingestion:
Give several glasses of water to drink to dilute. If large amounts were swallowed, get medical advice.
Skin Contact:
Wash exposed area with soap and water. Get medical advice if irritation develops.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Flash point: 121C (250F) CC
Autoignition temperature: 570C (1058F)
Explosion:
Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Minimum explosible concentration 0.011 g/l. Vapor may explode if ignited in an enclosed area. Vapor from molten benzoic acid may form explosive mixture with air.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Keep in a well closed container stored under cold to warm conditions, 2 to 40 C, (36 to 104F). Protect against physical damage. Isolate from any source of heat or ignition. Isolate from oxidizing materials. Isolate from flammable materials.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear protective gloves and clean body-covering clothing.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
White, needle-like crystals.
Odor:
Faint pleasant odor.
Solubility:
0.29 g / 100 ml. water; sinks in water.
Density:

1.32
pH:
2.8 (saturated solution @ 25 0C)
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
249C (480F)
Melting Point:
122C (252F)
Vapor Density (Air=1):
4.2
Vapor Pressure (mm Hg):
1 @ 96C (205F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Emits toxic vapors and gas including phenol, benzene, and carbon monoxide when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Oxidizing agents, bases, and metals. Water solutions can react with metals to produce hydrogen gas.
Conditions to Avoid:
Heat, flame, ignition sources, dusting and incompatibles.

11. Toxicological Information

Oral rat LD50: 1700 mg/kg; LC50 rat > 26,000mg/L/Hr.; irritation skin rabbit: 500 mg/24H mild; eye rabbit: 100 mg severe; investigated as a mutagen.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Benzoic Acid (65-85-0)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to have a half-life between 1 and 10 days. When released into water, this material is expected to readily biodegrade. When released into the water, this material is expected to have a half-life between 1 and 10 days. When released into water, this material is not expected to evaporate significantly. This material has a log octanol-water partition coefficient of less than 3.0. This material may bioaccumulate to some extent. When released into the air, this material is expected to be moderately removed from the atmosphere by wet deposition. When released to the air, this material is subject to removal from the atmosphere by gravitational settling.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Benzoic Acid (65-85-0)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Benzoic Acid (65-85-0)	Yes	Yes	No	No

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Benzoic Acid (65-85-0)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Benzoic Acid (65-85-0)	5000	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: Yes Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! CAUSES EYE IRRITATION. MAY CAUSE IRRITATION TO SKIN AND RESPIRATORY TRACT. MAY FORM COMBUSTIBLE DUST CONCENTRATIONS IN AIR.
Label Precautions:
Avoid contact with eyes, skin and clothing.
Avoid breathing dust.
Wash thoroughly after handling.
Keep container closed.
Avoid dust cloud in presence of an ignition source.
Maintain adequate ventilation.
Label First Aid:
In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet
Isopropanol

ACC# 95533

Section 1 - Chemical Product and Company Identification

MSDS Name: Isopropanol
Catalog Numbers: AC149320000, AC149320050, AC149320100, AC149320200, AC167880000, AC184130000, AC184130025, AC184130051, AC184130250, AC326960000, AC326960010, AC326961000, AC326962500, AC327270000, AC327270010, AC327930000, AC327930010, AC364400000, AC364400010, AC364401000, AC383910000, AC383910010, AC383910025, AC383920000, AC383920025, AC389710000, AC389710025, AC389710100, AC389710250, AC412790000, AC412790040, AC423830000, AC611110040, 14932-0010, 14932-0025, 14932-0250, 16788-0010, 18413-0010, 41279-5000, 42383-0010, 42383-0040, 42383-0200, 42383-5000, 61008-0040, 61043-1000, A415-20, A415-4, A416-1, A416-20, A416-200, A416-200LC, A416-4, A416-4LC, A416-500, A416FB-115, A416FB-19, A416FB-200, A416FB-50, A416J-500, A416P-4, A416RB-115, A416RB-200, A416RB-50, A416RS-115, A416RS-200, A416RS-28, A416RS-50, A416S-4, A416SK-4, A416SS-115, A416SS-200, A416SS-28, A416SS-50, A417-1, A417-4, A419-1, A419-4, A419RS-115, A419RS-200, A419RS-28, A419SS-115, A419SS-200, A419SS-28, A419SS-50, A426P-4, A426PJ4, A426S-20, A426S-200, A426S-4, A451-1, A451-4, A451CU50, A451J1, A451N219, A451POP19, A451RS-115, A451RS-19, A451RS-200, A451RS-50, A451SK-1, A451SK-4, A451SS-200, A464-4, A464-4LC, A464J4, A464RS-200, A464SK-4, A516-20, A516-200, A516-4, A516-500, A519-4, A520-4, A520RS-200, A520SS-115, A520SS-200, A520SS-28, A520SS-50, A522-20, A522-4, A522SAM1, A522SAM2, A522SAM3, BP2621100, BP2632-4, NC9135800, NC9284977, NC9349372, NC9386241, NC9445090, NC9535770, NC9535771, NC9557098, NC9562752, NC9670945, NC9846796, S77795HPLC, S77795SPEC
Synonyms: Isopropanol; Dimethylcarbinol; sec-Propyl alcohol; Rubbing alcohol; Petrohol; 1-Methylethanol; 1-Methylethyl alcohol; 2-Hydroxypropane; 2-Propyl alcohol; Isopropyl alcohol; Propan-2-ol; IPA; 2-Propanol.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
67-63-0	2-Propanol	>= 99.5	200-661-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless liquid. Flash Point: 11.7 deg C.
Warning! Flammable liquid and vapor. Causes respiratory tract irritation. Breathing vapors may

cause drowsiness and dizziness. Causes eye irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. Prolonged or repeated contact causes defatting of the skin with irritation, dryness, and cracking. This material has been reported to be susceptible to autoxidation and therefore should be classified as peroxidizable. May cause central nervous system depression. May form explosive peroxides. Hygroscopic (absorbs moisture from the air).
Target Organs: Central nervous system, respiratory system, eyes, skin.

Potential Health Effects

Eye: Produces irritation, characterized by a burning sensation, redness, tearing, inflammation, and possible corneal injury. May cause transient corneal injury. In the eyes of a rabbit, 0.1 ml of 70% isopropyl alcohol caused conjunctivitis, iritis, and corneal opacity.
Skin: May cause irritation with pain and stinging, especially if the skin is abraded. Isopropanol has a low potential to cause allergic skin reactions; however, rare cases of allergic contact dermatitis have been reported. May be absorbed through intact skin. Dermal absorption has been considered toxicologically insignificant. The cases of deep coma associated with skin contact are thought to be a consequence of gross isopropanol vapor inhalation in rooms with inadequate ventilation, rather than being attributable to percutaneous absorption of isopropanol per se.
Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause kidney damage. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal. The probable oral lethal dose in humans is 240 ml (2696 mg/kg), but ingestion of only 20 ml (224 mg/kg) has caused poisoning.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. May cause narcotic effects in high concentration. Causes upper respiratory tract irritation. Inhalation of vapors may cause drowsiness and dizziness.
Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Urine acetone test may be helpful in diagnosis. Hemodialysis should be considered in severe intoxication. Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. May form explosive peroxides. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.
Extinguishing Media: Water may be ineffective. Do NOT use straight streams of water. For large

fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray. For small fires, use carbon dioxide, dry chemical, dry sand, or alcohol-resistant foam. Cool containers with flooding quantities of water until well after fire is out.
Flash Point: 11.7 deg C (53.06 deg F)
Autoignition Temperature: > 350 deg C (> 662.00 deg F)
Explosion Limits, Lower:2.0 vol %
Upper: 12.7 @ 93°C
NFPA Rating: (estimated) Health: 1; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Use water spray to dilute spill to a non-flammable mixture. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Take precautionary measures against static discharges. Keep container tightly closed. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Avoid breathing vapor or mist. Do not allow to evaporate to near dryness.
Storage: Keep away from heat, sparks, and flame. Do not store in direct sunlight. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area. After opening, purge container with nitrogen before reclosing. Periodically test for peroxide formation on long-term storage. Addition of water or appropriate reducing materials will lessen peroxide formation. Store protected from moisture. Containers should be dated when opened and tested periodically for the presence of peroxides. Should crystals form in a peroxidizable liquid, peroxidation may have occurred and the product should be considered extremely dangerous. In this instance, the container should only be opened remotely by professionals. All peroxidizable substances should be stored away from heat and light and be protected from ignition sources.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
2-Propanol	200 ppm TWA; 400 ppm STEL	400 ppm TWA; 980 mg/m3 TWA 2000 ppm IDLH (10% LEL)	400 ppm TWA; 980 mg/m3 TWA

OSHA Vacated PELs: 2-Propanol: 400 ppm TWA; 980 mg/m3 TWA
Personal Protective Equipment

Eyes: Wear chemical splash goggles.
Skin: Wear appropriate gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colorless
Odor: alcohol-like
pH: Not available.
Vapor Pressure: 33 mm Hg @ 20 deg C
Vapor Density: 2.1 (Air=1)
Evaporation Rate:1.7 (n-butyl acetate=1)
Viscosity: 2.27 mPas @ 20C
Boiling Point: 82 deg C @ 760 mmHg
Freezing/Melting Point:-88 deg C
Decomposition Temperature: Not available.
Solubility: Miscible.
Specific Gravity/Density:0.7850 (water=1)
Molecular Formula:C3H8O
Molecular Weight:60.1

Section 10 - Stability and Reactivity

Chemical Stability: Under normal storage conditions, peroxidizable compounds can form and accumulate peroxides which may explode when subjected to heat or shock. This material is most hazardous when peroxide levels are concentrated by distillation or evaporation. Isopropanol is susceptible to autoxidation and therefore should be classified as peroxidizable.
Conditions to Avoid: Light, ignition sources, excess heat, exposure to moist air or water.
Incompatibilities with Other Materials: Strong oxidizing agents, strong acids, strong bases, amines, ammonia, ethylene oxide, isocyanates, acetaldehyde, chlorine, phosgene, Attacks some forms of plastics, rubbers, and coatings., aluminum at high temperatures.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 67-63-0: NT8050000
LD50/LC50:
CAS# 67-63-0:
Draize test, rabbit, eye: 100 mg Severe;
Draize test, rabbit, eye: 10 mg Moderate;
Draize test, rabbit, eye: 100 mg/24H Moderate;
Draize test, rabbit, skin: 500 mg Mild;
Inhalation, mouse: LC50 = 53000 mg/m3;
Inhalation, rat: LC50 = 16000 ppm/8H;

Inhalation, rat: LC50 = 72600 mg/m3;
Oral, mouse: LD50 = 3600 mg/kg;
Oral, mouse: LD50 = 3600 mg/kg;
Oral, rabbit: LD50 = 6410 mg/kg;
Oral, rat: LD50 = 5045 mg/kg;
Oral, rat: LD50 = 5000 mg/kg;
Skin, rabbit: LD50 = 12800

Carcinogenicity:
CAS# 67-63-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: A rat & rabbit developmental toxicity study showed no teratogenic effects at doses that were clearly maternally toxic. In a separate rat study, no evidence of developmental neurotoxicity was associated with gestational exposures to IPA up to 1200 mg/kg/d.
Reproductive Effects: See actual entry in RTECS for complete information.
Mutagenicity: See actual entry in RTECS for complete information.
Neurotoxicity: In rats exposed to isopropanol by inhalation, acute neurotoxicity was noted at 1 and 6 hours at 5000 ppm, but only minimal effects were seen at 1500 ppm and the animals recovered within 5 hours. No toxicity was noted at 500 ppm.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: >1000 ppm; 96h; LC50Daphnia: >1000 ppm; 96h; LC50Fish: Gold orfe: 8970-9280 ppm; 48h; LC50 IPA has a high biochemical oxygen demand and a potential to cause oxygen depletion in aqueous systems, a low potential to affect aquatic organisms, a low potential to affect secondary waste treatment microbial metabolism, a low potential to affect the germination of some plants, a high potential to biodegrade (low persistence) with unacclimated microorganisms from activated sludge.
Environmental: No information available.
Physical: THOD: 2.40 g oxygen/gCOD: 2.23 g oxygen/gBOD-5: 1.19-1.72 g oxygen/g
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	ISOPROPANOL	ISOPROPANOL
Hazard Class:	3	3
UN Number:	UN1219	UN1219
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 67-63-0 is listed on the TSCA inventory.

Health & Safety Reporting List

CAS# 67-63-0: Effective 12/15/86, Sunset 12/15/96

Chemical Test Rules

CAS# 67-63-0: 40 CFR 799.2325

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 67-63-0: immediate, delayed, fire.

Section 313

This material contains 2-Propanol (CAS# 67-63-0, >= 99.5%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 67-63-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XI F

Risk Phrases:

R 11 Highly flammable.
R 36 Irritating to eyes.
R 67 Vapours may cause drowsiness and dizziness.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 24/25 Avoid contact with skin and eyes.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 7 Keep container tightly closed

S 7 Keep container tightly closed.

WGK (Water Danger/Protection)

CAS# 67-63-0: 1

Canada - DSL/NDSL

CAS# 67-63-0 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2, D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 67-63-0 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/27/1999
Revision #17 Date: 2/18/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet
Acetone

ACC# 00140

Section 1 - Chemical Product and Company Identification

MSDS Name: Acetone
Catalog Numbers: AC167645000, AC176800000, AC176800026, AC176800050, AC176800051, AC176800250, AC176805000, AC177170000, AC177170050, AC177170100, AC177170250, AC177179090, AC268310000, AC268310010, AC296780000, AC296782500, AC326570000, AC326570010, AC326570025, AC326700000, AC326700010, AC326700025, AC326740000, AC326740010, AC326740025, AC326800000, AC326800010, AC326801000, AC326802500, AC327840000, AC327840010, AC400100000, AC400100010, AC400100040, AC400105000, AC423240000, AC611010040, AC9642971, 16764-0000, 16764-0025, 17680-0010, 17680-0025, 17717-0010, 17717-0025, 26831-0025, 26831-0040, 32784-0040, 40010-0025, 42324-0010, 42324-0040, 42324-5000, A11-1, A11-20, A11-200, A11-4, A11S-4, A16F-1GAL, A16P-1GAL, A16P-4, A16S-20, A16S-4, A18-1, A18-20, A18-200, A18-200LC, A18-4, A18-500, A18FB-115, A18FB-19, A18FB-200, A18FB-50, A18J-500, A18P-4, A18POP-19, A18POP-200, A18POP-50, A18POPB-19, A18POPB-200, A18POPB-50, A18RB-115, A18RB-19, A18RB-200, A18RB-50, A18RS-115, A18RS-200, A18RS-28, A18RS-50, A18S-4, A18SK-4, A18SS-115, A18SS-19, A18SS-200, A18SS-28, A18SS-50, A19-1, A19-4, A19RS-115, A19RS-200, A40-4, A40-4LC, A9-20, A9-200, A9-4, A928-4, A929-1, A929-4, A929J4, A929RS-19, A929RS-200, A929RS-50, A929SK-4, A929SS-115, A929SS-200, A929SS-50, A929SS28, A946-4, A9464LC, A946FB19, A946FB200, A946FB50, A946POPB19, A946POPB200, A946POPB50, A946RB115, A946RB19, A946RB200, A946RB50, A949-1, A949-4, A9491LC, A949CU50, A949J1, A949J4, A949N-119, A949N-219, A949POP-19, A949POP-200, A949POP-50, A949POPN-19, A949RS-115, A949RS-28, A949RS-50, A949SK-1, A949SK-4, A949SK4LC, A949SS-115, A949SS-19, A949SS-200, A949SS-28, A949SS-50, BP2401-1, BP2403-1, BP2403-20, BP2403-4, BP2403-500, BP2404-1, BP2404-4, BP2404SK-1, BP2404SK-4, HC3001GAL, NC9060899, NC9120377, NC9173151, NC9410335, NC9410661, NC9614315, NC9651790, NC9670953, PS03488, PS03489, S70091, S70091HPLC, S70091SPEC
Synonyms: Dimethylketone; 2-Propanone.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
67-64-1	Acetone	>99	200-662-2

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: -20 deg C.
Danger! Extremely flammable liquid and vapor. Vapor may cause flash fire. Causes eye irritation. Breathing vapors may cause drowsiness and dizziness. Causes respiratory tract irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. Prolonged or repeated contact may dry the skin and cause irritation.
Target Organs: Central nervous system, respiratory system, eyes, skin.

Potential Health Effects

Eye: Produces irritation, characterized by a burning sensation, redness, tearing, inflammation, and possible corneal injury. Vapors cause eye irritation.
Skin: May be absorbed through the skin. Repeated or prolonged exposure may cause drying and cracking of the skin.
Ingestion: May cause irritation of the digestive tract. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause motor incoordination and speech abnormalities.
Chronic: Prolonged or repeated skin contact may cause dermatitis. Chronic inhalation may cause effects similar to those of acute inhalation. Matsushita et al. exposed human volunteers 6 hours/day for 6 days at 500 ppm acetone and found hematologic changes including significantly increased leukocyte and eosinophil counts and decreased neutrophil phagocytic activity.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Extremely flammable liquid and vapor. Vapor may cause flash fire. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.
Extinguishing Media: Use dry chemical, carbon dioxide, or appropriate foam. Water may be ineffective because it will not cool material below its flash point.
Flash Point: -20 deg C (-4.00 deg F)
Autoignition Temperature: 465 deg C (869.00 deg F)
Explosion Limits, Lower:2.5%

Upper: 12.8%
NFPA Rating: (estimated) Health: 1; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Wear appropriate protective clothing to minimize contact with skin. Remove all sources of ignition. Provide ventilation. A vapor suppressing foam may be used to reduce vapors. Water spray may reduce vapor but may not prevent ignition in closed spaces. Use only non-sparking tools and equipment.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame. Avoid breathing vapor.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Ventilation fans and other electrical service must be non-sparking and have an explosion-proof design.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Acetone	500 ppm TWA; 750 ppm STEL	250 ppm TWA; 590 mg/m3 TWA 2500 ppm IDLH (10% LEL)	1000 ppm TWA; 2400 mg/m3 TWA

OSHA Vacated PELs: Acetone: 750 ppm TWA; 1800 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear butyl rubber gloves, apron, and/or clothing.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A NIOSH/MSHA approved or European Standard EN 149 air purifying respirator with an organic vapor cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance: clear, colorless
Odor: sweetish odor
pH: 7
Vapor Pressure: 231 mm Hg @ 25 deg C
Vapor Density: 2.0 (Air=1)
Evaporation Rate:5.6 (n-Butyl acetate=1)
Viscosity: 0.32 cps @ 20 deg C
Boiling Point: 56.5 deg C
Freezing/Melting Point:-94 deg C
Decomposition Temperature: Not available.
Solubility: Soluble.
Specific Gravity/Density:0.788 @ 25°C
Molecular Formula:C3H6O
Molecular Weight:58.08

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid: High temperatures, ignition sources, confined spaces.
Incompatibilities with Other Materials: Strong oxidizing agents, strong reducing agents, strong bases, nitric acid, hexachloromelamine, sulfur dichloride, potassium tert-butoxide.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 67-64-1: AL3150000
LD50/LC50:
CAS# 67-64-1:

Dermal, guinea pig: LD50 = >9400 uL/kg;
Draize test, rabbit, eye: 20 mg Severe;
Draize test, rabbit, eye: 20 mg/24H Moderate;
Draize test, rabbit, eye: 10 uL Mild;
Draize test, rabbit, skin: 500 mg/24H Mild;
Inhalation, mouse: LC50 = 44 gm/m3/4H;
Inhalation, rat: LC50 = 50100 mg/m3/8H;
Oral, mouse: LD50 = 3 gm/kg;
Oral, rabbit: LD50 = 5340 mg/kg;
Oral, rat: LD50 = 5800 mg/kg;

.

Carcinogenicity:
CAS# 67-64-1: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: In a series of studies, no statistically significant differences in causes of death or clinical laboratory results were observed in 948 employees exposed to up to 1070 ppm acetone over 23 years.
Teratogenicity: Animal studies have only shown harmful effects in the offspring of animals exposed to doses which also produced significant maternal toxicity.
Reproductive Effects: During the Stewart et al. study, four adult female volunteers were exposed

7.5 hours to acetone vapor at a nominal concentration of 1000 ppm.Three of the four women experienced premature menstrual periods which were attributed to the acetone exposure.
Mutagenicity: Sex chromosome loss and nondisjunction(Yeast - Saccharomyces cerevisiae) = 47600 ppm; Cytogenetic analysis(Rodent - hamster Fibroblast)= 40 gm/L.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: 5540 mg/l; 96-hr; LC50Fish: Bluegill/Sunfish: 8300 mg/l; 96-hr; LC50 No data available.
Environmental: Volatilizes, leeches, and biodegrades when released to soil. TERRESTRIAL FATE: If released on soil, acetone will both volatilize and leach into the ground. Acetone readily biodegrades and there is evidence suggesting that it biodegrades fairly rapidly in soils. AQUATIC FATE: If released into water, acetone will probably biodegrade. It is readily biodegradable in screening tests, although data from natural water are lacking. It will also be lost due to volatilization (estimated half-life 20 hr from a model river). Adsorption to sediment should not be significant.
Physical: ATMOSPHERIC FATE: In the atmosphere, acetone will be lost by photolysis and reaction with photochemically produced hydroxyl radicals. Half-life estimates from these combined processes are 79 and 13 days in January and June, respectively, for an overall annual average of 22 days. Therefore considerable dispersion should occur. Being miscible in water, wash out by rain should be an important removal process. This process has been confirmed around Lake Shinsei-ko in Japan. There acetone was found in the air and rain as well as the lake.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 67-64-1: waste number U002 (Ignitable waste).

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	ACETONE	ACETONE
Hazard Class:	3	3
UN Number:	UN1090	UN1090
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 67-64-1 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

CAS# 67-64-1: 40 CFR 799.5000

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 67-64-1: 5000 lb final RQ; 2270 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 67-64-1: immediate, fire.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 67-64-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XI F

Risk Phrases:

R 11 Highly flammable.
R 36 Irritating to eyes.
R 66 Repeated exposure may cause skin dryness or cracking.
R 67 Vapours may cause drowsiness and dizziness.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 9 Keep container in a well-ventilated place.

WGK (Water Danger / Protection)

CAS# 67-64-1: 0

Canada - DSL / NDSL

CAS# 67-64-1 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 67-64-1 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/26/1999
Revision #22 Date: 2/28/2008

SPI Supplies Division
Structure Probe, Inc.
P.O. Box 656 West Chester, PA 19381-0656 USA
Phone: *1-(610)-436-5400* ***Fax:*** *1-(610)-436-5755*
E-mail: *spi3spi@2spi.com*
WWW: http://www.2spi.com
Manufacturer's CAGE: 1P573

Material Safety Data Sheet

SPI #02520-AA and 02520-AB Chloroform

Section 1: Identification

Date Effective..... January 8, 2009
(most recent revision)

Chemical Name/Synonyms... Chloroform

Emergencies
Contacting CHEMTREC:

24 Hour Emergency Use Only #'s...
Worldwide phone: 1-(703)-527-3887
Worldwide FAX: 1-(703)-741-6090
Toll-free phone: 1-(800)-424-9300 USA only

Product or Trade Name.... SPI # 02520-AA and 02520-AB Chloroform

Synonyms..... Methenyl chloride, Refrigerant 20, trichloroform, trichloromethane, methane trichloride

Hazardous Material Information System USA	**Health**	**2**	**National Fire Protection Association USA**	
	Fire Hazard	**0**		
	Reactivity	**0**		
	Personal Protection			

NFPA Rating:
Health=2, Flammability=0, Reactivity=0

Section 2 Composition

Component Name	CAS #	Percent	EINECS/ELINCS
Chloroform	67-66-3	>99	200-663-8

Section 3: Hazard Identification

Emergency overview:

Appearance: clear, colorless.

Warning!

Light sensitive. Cancer suspect agent. May cause central nervous system depression.

Aspiration hazard.
May cause eye and skin irritation.
May cause respiratory and digestive tract irritation.
May cause cardiac disturbances.
May cause reproductive and fetal effects.
May cause cancer based on animal studies.

Target Organs: Kidneys, heart, central nervous system, liver, gastrointestinal system, excretory system.

Potential Health Effects

Eye:
Contact with liquid or vapor causes severe burns and possible irreversible eye damage. Vapors may cause eye irritation. Contact produces irritation, tearing, and burning pain. May cause conjunctivitis. Causes redness and pain.

Skin:

Causes irritation with burning pain, itching, and redness.

Ingestion:
Aspiration hazard. May cause central nervous system depression, kidney damage, and liver damage. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause cardiac disturbances. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.

Inhalation:
Inhalation of high concentrations may cause central nervous system effects characterized by headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause liver and kidney damage. May cause cardiac sensitization and possible failure.

Chronic:

Over-exposure may cause delayed kidney injury. Possible cancer hazard based on tests with laboratory animals. Chronic ingestion may cause liver damage. Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated exposure may cause adverse reproductive effects. May cause fetal effects. Chronic exposure has been associated with an increased incidence of kidney, liver, rectal, bladder, colon, brain, and lymph node cancer. Toxicity may be increased by exposure to alcohol, steroids, and ketones.

Section 4: First Aid Measures

Eyes:
Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately. Do *not* allow victim to rub or keep eyes closed.

Skin:
Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Discard contaminated clothing in a manner which limits further exposure.

Ingestion:

Do *not* induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Possible aspiration hazard. Get medical aid immediately.

Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen.

Notes to Physician:
Causes cardiac sensitization to endogenous catecholamines which may lead to cardiac arrhythmias. Do *not* use adrenaline-derivative agents such as

epinephrine or pseudoepinephrine.

Section 5: Fire Fighting Measures

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Substance is noncombustible.

Extinguishing Media:
In case of fire, use water fog, dry chemical, carbon dioxide, or regular foam.

Autoignition Temperature:
Not available.

Flash Point:
Not available.

Explosion Limits:
Lower: Not available.
Upper: Not available.

Section 6: Accidental Release Measures

General Information:
Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container.

Section 7: Handling and Storage

Handling:

Wash thoroughly after handling. Use only in a well ventilated area. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.

Storage:

Do not store in direct sunlight. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8: Exposure Controls and Personal Protection

Engineering Controls:

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits:

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Chloroform	10 ppm; 49 mg/m^3	500 ppm IDHL	500 ppm Ceiling 240 mg/m^3 Ceiling

OSHA Vacated PELs:
Chloroform: 2 ppm TWA; 9.78 mg/m3 TWA

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Section 9: Physical and Chemical Properties

Physical State: Liquid
Appearance: Clear, colorless
Odor: Sweet.
pH: Not available.
Vapor Pressure: 160 mm Hg
Vapor Density: 4.12 (Air=1)

Evaporation Rate: Not known
Viscosity: 0.58 @ 20 °C (68°F)
Boiling Point: 61° C/142° F
Freezing/Melting Point: -63°C (-81.4°F)
Decomposition Temperature: Not available.
Solubility in water: Slightly soluble.

Specific Gravity/Density: 1.50 g/cm^3
Molecular Formula: $CHCl_3$
pH: Not applicable

Section 10: Stability and Reactivity

Chemical Stability:
Stable at room temperature in closed containers under normal storage and handling conditions.

Conditions to Avoid:
High temperatures, light.

Incompatibility with Other Materials:
Acetone, alkalis, aluminum, disilane, lithium, magnesium, dinitrogen dioxide, nitrogen tetroxide, perchloric acid, phosphorus pentoxide, potassium, potassium hydroxide, methyl alcohol, potassium tert-butoxide, sodium, sodium hydroxide, sodium methylate, sodium-potassium alloy, triisopropylphosphine, calcium hydroxide, fluorine, and any strong oxidizers.

Hazardous Decomposition of Products:
Hydrogen chloride, carbon monoxide, carbon dioxide, chlorine, phosgene gas.

Hazardous Polymerization: Has not been reported.

Section 11: Toxicological Information

CAS #: 67-66-3

LD_{50}/LC_{50} Information:
CAS #: 67-66-3
Inhalation, rat: LC_{50}=47702 mg/m^3/4H
Oral, mouse: LD_{50} = 36 mg/kg
Oral, rat: LD_{50} = 908 mg/kg
Skin, rabbit: LD_{50} = >20 gm/kg

Carcinogenicity:
CAS #67-66-3:
ACGIH: A3 - Animal Carcinogen
California: carcinogen - initial date 10/1/87
NIOSH: occupational carcinogen
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen

IARC: Group 2B carcinogen
Epidemiology: Please see IARC volume 20 for a detailed discussion.

Teratogenicity:

Effects on newborn: Biochemical and Metabolic, Growth statistics (reduced weight gain), Oral-mouse, TDLo=2177 mg/kg
(male 3W pre) Embryo or Fetus: Death, Ihl-rat, TCLo=20100 ug/m3/1H (female 7-14D post); Stunted fetus, Oral-rat, TDLo=1260 mg/kg (6-15D preg)

Developmental abnormalities: Craniofacial, Ihl-mouse, TCLo=100 ppm/7H (female 6-15D post); Musculoskeletal, Oral-rat, TDLo=1260 mg/kg (6-15D preg)

Reproductive Effects:
Fertility: Female index, Ihl-mouse, TCLo=100 ppm/7H (female 1-7D post)

Neurotoxicity: No information available.

Mutagenicity:
DNA Damage: Mammal lymphocyte, 1 mmol/L Sister
Chromatid Exchange: Human lymphocyte, 10 mmol/L

Other Studies: None known.

Section 12: Ecological Information

Exotoxicity:
Rainbow trout, LC50=2030 ug/L
Bluegill, LC50=100,000 ug/L/96H
Large mouth bass, LC50=51 ppm/96H
Fish: 10 mg/l

Fish-toxicity:
LC50: 162 mg/l
Pseudomonas putida: 125 mg/l
Scenedesmus quadricanda: 1100 mg/l
Microcystis aeruginosa: 185 mg/l
Entosiphonsulcatum: 6560 mg/l

Environmental Fate:
If released to land, most evaporates rapidly while some leaches to ground-water. If released to water, substance evaporates rapidly.

Bioaccumulation:
Substance photodegrades with $T_{1/2}$ of 80 days.

Section 13: Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

RCRA D-Series Maximum Concentration of Contaminants:
CAS# 67-66-3: waste number D022; regulatory level = 6.0 mg/L.
RCRA D-Series Chronic Toxicity References Levels:
CAS# 67-66-3: chronic toxicity reference level = 0.06 mg/L.
RCRA F-Series: None listed.
RCRA P-Series: None listed.

RCRA U-Series: CAS# 67-66-3: waste numberU044.

Section 14: Transport Information

US DOT Hazard Class:
Shipping Name: Chloroform
Hazard Class: 6.1
UN Number: UN1888
Packing Group: III

IATA (for international shipments)
Shipping Name: Chloroform
Hazard Class: 6.1
UN Number: UN1888
Packing Group: III

RID/ADR

RID/ADR
Shipping Name: Chloroform
Hazard Class: 6.1 (15C)
UN Number: UN1888
Packing Group: N/A

IMO
Shipping Name: Chloroform
Hazard Class: 6.1
UN Number: UN1888
Packing Group: III

Canada TDG
Shipping Name: Chloroform
Hazard Class: 6.1 (9.2)
UN Number: UN1888
Packing Group: II

Section 15: Regulatory Information

US FEDERAL

TSCA
CAS# 67-66-3 is listed on the TSCA inventory.

Health & Safety Reporting List
CAS# 67-66-3: Effective Date: June 1, 1987; Sunset Date: June 1, 1997

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

SARA

Section 302 (RQ)

CAS #67-66-3: final RQ = 10 pounds (4.54 kg)

Section 302 (TPQ)
CAS# 67-66-3: TPQ = 10,000 pounds; RQ = 10 pounds (does not meet toxicity criteria but because of high production volume and recognized toxicity is considered a chemical of concern)

SARA Codes
CAS #67-66-3: acute, chronic.

Section 313
This material contains Chloroform (CAS# 67-66-3, 99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:
CAS #67-66-3 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS #67-66-3 is listed as a Hazardous Substance under the CWA.
CAS #67-66-3 is listed as a Priority Pollutant under the Clean Water Act.
CAS #67-66-3 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE BY STATE IN THE USA:
CAS #67-66-3 can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
The following statement(s) is(are) made in order to comply with the
California Safe Drinking Water Act:

WARNING: This product contains Chloroform, a chemical known to the state of California to cause cancer.

California No Significant Risk Level:
CAS #67-66-3:
ingestion: no significant risk level = 20 ug/day;
inhalation: no significant risk level = 40 ug/day

European/International Regulations
European Labeling in Accordance with EC Directives

Hazard Symbols: XN

Risk Phrases:
R 22 Harmful if swallowed.
R 38 Irritating to skin.
R 40 Possible risks of irreversible effects.
R 48/20/22 Harmful: danger of serious damage to health by prolonged exposure through inhalation and if swallowed.

Safety Phrases:
S 36/37 Wear suitable protective clothing and gloves.

WGK (Water Danger/Protection)
CAS #67-66-3: 3

Canada

CAS #67-66-3 is listed on Canada's DSL/NDSL List.
This product does not have a WHMIS classification.
CAS #67-66-3 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS #67-66-3: OEL-ARAB Republic of Egypt: TWA 10 ppm (50 mg/m3) OEL- AUSTRALIA: TWA 10 ppm (50 mg/m3); Carcinogen OEL-AUSTRIA: TWA 10 ppm (50 mg/m3) OEL-BELGIUM: TWA 10 ppm (49 mg/m3); Carcinogen JAN9 OEL-CZECHO SLOVAKIA: TWA 10 mg/m3; STEL 20 mg/m3 OEL-DENMARK: TWA 2 ppm (10 mg/m3); Carcinogen OEL-FINLAND: TWA 10 ppm (50 mg/m3); STEL 20 ppm; Skin; CAR OE L-FRANCE: TWA 5 ppm (25 mg/m3); STEL 50 ppm (250 mg/m3); CAR OEL-GERMANY: TWA 10 ppm (50 mg/m3); Carcinogen JAN9 OEL-HUNGARY: STEL 10 mg/m3 OEL - INDIA: TWA 10 ppm (50 mg/m3); Carcinogen OEL-JAPAN:TWA 50 ppm (240 mg/m3); Carcinogen OEL-THE NETHERLANDS: TWA 10 ppm (50 mg/m3) OEL-THE PHI LIPPINES: TWA 50 ppm (240 mg/m3) OEL-POLAND: TWA 50 mg/m3 OEL-RUSSIA: T WA 50 ppm OEL-SWEDEN: TWA 2 ppm (10 mg/m3); STEL 5 ppm (25 mg/m3); CAR OEL-SWITZERLAND: TWA 10 ppm (50 mg/m3); STEL 20 ppm (100 mg/m3) OEL-THA ILAND: TWA 50 ppm (240 mg/m3) OEL-TURKEY: TWA 50 ppm (240 mg/m3) OEL-U NITED KINGDOM: TWA 10 ppm (50 mg/m3); STEL 50 ppm (225 mg/m3) OEL IN BU LGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, S INGAPORE, VIETNAM check ACGI TLV

California Prop. 65:

Proposition 65 requires manufacturers or distributors of consumer products into the State of California to provide a warning statement if the product contains ingredients for which the State has found to cause cancer, birth defects or other reproductive harm. If this product contains an ingredient listed by the State of California to cause cancer or reproductive toxicity, it will be listed below:

Chloroform CAS #67-66-3

Section 16: Other Information

Disclaimer of Liability:

Caution! Do not use SPI Supplies products or materials in applications involving implantation within the body; direct or indirect contact with the blood pathway; contact with bone, tissue, tissue fluid, or blood; or prolonged contact with mucous membranes. Products offered by SPI Supplies are not designed or manufactured for use in implantation in the human body or in contact with internal body fluids or tissues. SPI Supplies will not provide to customers making devices for such applications any notice, certification, or information necessary for such medical device use required by US FDA (Food and Drug Administration) regulation or any other statute. SPI Supplies and Structure Probe, Inc. make no representation, promise,

express warranty or implied warranty concerning the suitability of these materials for use in implantation in the human body or in contact with internal body tissues of fluids.

****

The information and recommendations set forth above are taken from sources believed to be accurate as of the date hereof, however SPI Supplies and Structure Probe, Inc. make no warranty with respect to the accuracy of the information or the suitability of the recommendations, and assume no liability to any user thereof. The information contained in this sheet does not constitute a hazard assessment and should not be used in place of the user's own assessment of work place risks as required by other health and safety legislation. Be aware of the Structure Probe, Inc. Copyright Policy. Structure Probe, Inc. grants a nonexclusive license to make unlimited copies of this safety sheet for internal use only. Quite obviously, this information would pertain only to this material when purchased from SPI Supplies as product from other sources, with other ingredients and impurity levels could have substantially different properties.

ON-LINE To Ask a Question or Make a Comment

ON-LINE To Place an Order or Request a Quote

Search SPI Navigator Index

Return to:

- SPI Supplies MSDS Safety Sheets Table of Contents
- SPI Supplies Catalog Table of Contents
- SPI Supplies Home Page

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
7005-72-3	4-Chlorodiphenyl ether	99	230-281-7

Hazard Symbols: None Listed.
Risk Phrases: None Listed.

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW
The toxicological properties of this material have not been fully investigated.

Potential Health Effects
Eye:
May cause eye irritation. The toxicological properties of this material have not been fully investigated.
Skin:
May cause skin irritation. The toxicological properties of this material have not been fully investigated.
Ingestion:
May cause irritation of the digestive tract. The toxicological properties of this substance have not been fully investigated.
Inhalation:
May cause respiratory tract irritation. The toxicological properties of this substance have not been fully investigated.
Chronic:
No information found.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin:
Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion:
Never give anything by mouth to an unconscious person. Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water. Wash mouth out with water.
Inhalation:
Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician:

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.
Extinguishing Media:
Use agent most appropriate to extinguish fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Provide ventilation.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.
Storage:
Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate ventilation to keep airborne concentrations low.
Exposure Limits
CAS# 7005-72-3:

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin:
Wear appropriate protective gloves to prevent skin exposure.
Clothing:
Wear appropriate protective clothing to prevent skin exposure.
Respirators:
Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Liquid
Color: pale yellow
Odor: ethereal odor
pH: Not available.
Vapor Pressure: Not available.
Viscosity: Not available.
Boiling Point: 284 deg C
Freezing/Melting Point: -8 deg C
Autoignition Temperature: Not available.
Flash Point: > 110 deg C (> 230.00 deg F)
Explosion Limits, lower: N/A
Explosion Limits, upper: N/A
Decomposition Temperature:
Solubility in water: Slightly soluble.
Specific Gravity/Density: 1.1930g/cm3

Molecular Formula: ClC6H4OC6H5
Molecular Weight: 204.66

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid:
Incompatible materials, excess heat, oxidizers.
Incompatibilities with Other Materials:
Oxidizing agents.
Hazardous Decomposition Products:
Hydrogen chloride, carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Has not been reported

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 7005-72-3 unlisted.
LD50/LC50:
Not available.
Carcinogenicity:
4-Chlorodiphenyl ether -
Not listed by ACGIH, IARC, or NTP.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Other
No information available.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.

**** SECTION 14 - TRANSPORT INFORMATION ****

IATA
Not regulated as a hazardous material.
IMO
Not regulated as a hazardous material.
RID/ADR
Not regulated as a hazardous material.
USA RQ: CAS# 7005-72-3: 5000 lb final RQ; 2270 kg final RQ

**** SECTION 15 - REGULATORY INFORMATION ****

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: Not available.
Risk Phrases:
Safety Phrases:
S 24/25 Avoid contact with skin and eyes.
S 28A After contact with skin, wash immediately with plenty of water.
S 37 Wear suitable gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
WGK (Water Danger/Protection)
CAS# 7005-72-3: No information available.
Canada
CAS# 7005-72-3 is listed on Canada's NDSL List.
CAS# 7005-72-3 is not listed on Canada's Ingredient Disclosure List.

US FEDERAL
TSCA
CAS# 7005-72-3 is listed on the TSCA inventory.

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 11/10/1998 Revision #3 Date: 2/02/2004

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

Material Safety Data Sheet
Benzene

ACC# 02610

Section 1 - Chemical Product and Company Identification

MSDS Name: Benzene
Catalog Numbers: AC167660000, AC167660010, AC167660025, AC167660250, AC167665000, AC168650250, AC295330000, AC295330010, AC295330025, AC295330250, AC296880000, AC296880010, AC296880025, AC296880250, AC610230010, AC610231000, AC611001000, B243-4, B245-4, B245-500, B411-1, B411-4, B412-1, S79920ACS
Synonyms: Benzol; Cyclohexatriene; Phenyl hydride.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
71-43-2	Benzene	> 99	200-753-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear colorless liquid. Flash Point: -11 deg C.
Danger! Extremely flammable liquid and vapor. Vapor may cause flash fire. Harmful if swallowed, inhaled, or absorbed through the skin. Causes eye, skin, and respiratory tract irritation. Contains benzene. Benzene can cause cancer. Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause blood abnormalities. May cause central nervous system effects.
Target Organs: Blood, central nervous system, respiratory system, eyes, bone marrow, immune system, skin.

Potential Health Effects

Eye: Causes eye irritation.
Skin: Causes skin irritation. Harmful if absorbed through the skin. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis.
Ingestion: May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. May cause effects similar to those for inhalation exposure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation: Causes respiratory tract irritation. May cause drowsiness, unconsciousness, and central

nervous system depression. Exposure may lead to irreversible bone marrow injury. Exposure may lead to aplastic anemia. Potential symptoms of overexposure by inhalation are dizziness, headache, vomiting, visual disturbances, staggering gait, hilarity, fatigue, and other symptoms of CNS depression.
Chronic: May cause bone marrow abnormalities with damage to blood forming tissues. May cause anemia and other blood cell abnormalities. Chronic exposure to benzene has been associated with an increased incidence of leukemia and multiple myeloma (tumor composed of cells of the type normally found in the bone marrow). Immunodepressive effects have been reported. This substance has caused adverse reproductive and fetal effects in laboratory animals.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Extremely flammable liquid and vapor. Vapor may cause flash fire. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. This liquid floats on water and may travel to a source of ignition and spread fire. May accumulate static electricity.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or appropriate foam.
Flash Point: -11 deg C (12.20 deg F)
Autoignition Temperature: 498 deg C (928.40 deg F)
Explosion Limits, Lower:1.3 vol %
Upper: 7.1 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Remove all sources of ignition. Provide ventilation. Approach spill from upwind. Use water spray to cool and disperse vapors, protect personnel, and dilute spills to form nonflammable mixtures.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Take precautionary measures against static discharges. Keep container tightly closed. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame. Avoid breathing vapor.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. See 29CFR 1910.1028 for the regulatory requirements for the control of employee exposure to benzene.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Benzene	0.5 ppm TWA; 2.5 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous r oute	0.1 ppm TWA 500 ppm IDLH	1 ppm TWA; 10 ppm TWA (applies to industry segments exempt from the benzene stan dard at 29 CFR 1910.1028); 25 ppm Ceiling (applies to industry segments exempt from the 1 ppm TWA and 5 ppm STEL of th e benzene standard); 0.5 ppm Action Level; 1 ppm TWA; 5 ppm STEL (Cancer hazard, Flammable - see 29 C FR 1910.1028)

OSHA Vacated PELs: Benzene: 10 ppm TWA (unless specified in 1910.1028)
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear colorless
Odor: sweetish odor - aromatic odor
pH: Not applicable.
Vapor Pressure: 75 mm Hg @ 20 deg C

Vapor Density: 2.8 (air=1)
Evaporation Rate: Not available.
Viscosity: 0.647mPa @ 20 deg C
Boiling Point: 80.1 deg C
Freezing/Melting Point:5.5 deg C
Decomposition Temperature: Not available.
Solubility: 0.180 g/100 ml @ 25°C
Specific Gravity/Density:0.8765 @ 20°C
Molecular Formula:C6H6
Molecular Weight:78.11

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Ignition sources, excess heat, confined spaces.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 71-43-2: CY1400000
LD50/LC50:
CAS# 71-43-2:

Dermal, guinea pig: LD50 = >9400 uL/kg;
Draize test, rabbit, eye: 88 mg Moderate;
Draize test, rabbit, eye: 2 mg/24H Severe;
Draize test, rabbit, skin: 20 mg/24H Moderate;
Inhalation, mouse: LC50 = 9980 ppm;
Inhalation, mouse: LC50 = 24 mL/kg/2H;
Inhalation, rat: LC50 = 10000 ppm/7H;
Inhalation, rat: LC50 = 34 mL/kg/2H;
Inhalation, rat: LC50 = 6.5 mL/kg/4H;
Oral, mouse: LD50 = 4700 mg/kg;
Oral, rat: LD50 = 930 mg/kg;
Oral, rat: LD50 = 1 mL/kg;
Oral, rat: LD50 = 1800 Benzene is considered very toxic; probable human oral lethal dose would be 50-500 mg/kg. Human inhalation of approximately 20,000 ppm (2% in air) was fatal in 5-10 minutes.While percutaneous absorption of liquid benzene through intact human skin can be limited (e.g., 0.05% of the applied dose), the absorbed dose via direct dermal contact combined with that received from body surface exposure to benzene in workplace air is such that a substantial fraction (20-40%) of the total exposure is due to skin absorption.

Carcinogenicity:
CAS# 71-43-2:

- **ACGIH:** A1 - Confirmed Human Carcinogen
- **California:** carcinogen, initial date 2/27/87
- **NTP:** Known carcinogen
- **IARC:** Group 1 carcinogen

Epidemiology: IARC has concluded that epidemiological studies have established the relationship between benzene exposure and the development of acute myelogenous leukemia, and that there is sufficient evidence that benzene is carcinogenic to humans.
Teratogenicity: Inhalation, rat: TCLO = 50 ppm/24H (female 7-14 day(s) after conception) Effects on Embryo or Fetus - extra-embryonic structures (e.g., placenta, umbilical cord) and Effects on Embryo or Fetus - fetotoxicity (except death, e.g., stunted fetus).; Inhalation,mouse: TCLo = 5 ppm (female 6-15 day(s) after conception) Effects on Embryo or Fetus - cytological changes (including somatic cell genetic material) and Specific Developmental Abnormalities - blood and lymphatic systems (including spleen and marrow).
Reproductive Effects: Inhalation, rat: TCLO = 670 mg/m3/24H (female 15 day(s) pre-mating and female 1-22 day(s) after conception) female fertility index (e.g. # females pregnant per # sperm positive females; # females pregnant per # females mated).; Oral, mouse: TDLo = 12 gm/kg (female 6-15 day(s) after conception) Fertility - post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants).
Mutagenicity: DNA Inhibition: Human, Leukocyte = 2200 umol/L.; DNA Inhibition: Human, HeLa cell = 2200 umol/L.; Mutation Test Systems - not otherwise specified: Human, Lymphocyte = 5 umol/L.; Cytogenetic Analysis: Inhalation, Human = 125 ppm/1Y.; Cytogenetic Analysis: Human, Leukocyte = 1 mmol/L/72H.; Cytogenetic Analysis: Human, Lymphocyte = 1 mg/L.
Neurotoxicity: See actual entry in RTECS for complete information.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Mosquito Fish: TLm = 395 mg/L; 24 Hr; UnspecifiedFish: Goldfish: LC50 =46 mg/L; 24 Hr; Modified ASTM D 1345Fish: Fathead Minnow: LC50 = 15.1 mg/L; 96 Hr; Flow-through at 25°C (pH 7.9-8.0)Fish: Rainbow trout: LC50 = 5.3 mg/L; 96 Hr; Flow-through at 25°C (pH 7.9-8.0)Fish: Bluegill/Sunfish: LD50 = 20 mg/L; 24-48 Hr; Unspecified If benzene is released to soil, it will be subject to rapid volatilization near the surface and that which does not evaporate will be highly to very highly mobile in the soil and may leach to groundwater. If benzene is released to water, it will be subject to rapid volatilization. It will not be expected to significantly adsorb to sediment, bioconcentrate in aquatic organisms or hydrolyze. It may be subject to biodegradation.
Environmental: If benzene is released to the atmosphere, it will exist predominantly in the vapor phase. Gas-phase benzene will not be subject to direct photolysis but it will react with photochemically produced hydroxyl radicals with a half-life of 13.4 days. The reaction time in polluted atmospheres which contain nitrogen oxides or sulfur dioxide is accelerated with the half-life being reported as 4-6 hours. Benzene is fairly soluble in water and is removed from the atmosphere in rain.
Physical: Products of photooxidation include phenol, nitrophenols, nitrobenzene, formic acid, and peroxyacetyl nitrate.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 71-43-2: waste number U019 (Ignitable waste, Toxic waste).

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	BENZENE	BENZENE
Hazard Class:	3	3
UN Number:	UN1114	UN1114
Packing Group:	II	II
Additional Info:		FLASHPOINT -11 C

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 71-43-2 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 71-43-2: 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogeni

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 71-43-2: immediate, delayed, fire.

Section 313

This material contains Benzene (CAS# 71-43-2, > 99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 71-43-2 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 71-43-2 is listed as a Hazardous Substance under the CWA. CAS# 71-43-2 is listed as a Priority Pollutant under the Clean Water Act. CAS# 71-43-2 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 71-43-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Benzene, a chemical known to the state of California to cause cancer. WARNING: This product contains Benzene, a chemical known to the state of California to cause male reproductive toxicity.

California No Significant Risk Level: CAS# 71-43-2: 6.4 æg/day NSRL (oral); 13 æg/day NSRL (inhalation)

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T F

Risk Phrases:

R 11 Highly flammable.
R 36/38 Irritating to eyes and skin.
R 45 May cause cancer.
R 46 May cause heritable genetic damage.
R 48/23/24/25 Toxic : danger of serious damage to health by prolonged exposure through inhalation, contact with skin and if swallowed.
R 65 Harmful: may cause lung damage if swallowed.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.

WGK (Water Danger/Protection)

CAS# 71-43-2: 3

Canada - DSL/NDSL

CAS# 71-43-2 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2, D2A, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 71-43-2 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/11/1999
Revision #8 Date: 9/11/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

MSDS Number: **T4914** * * * * * *Effective Date:* ***05/26/09*** * * * * * *Supercedes:* ***07/06/06***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker ®

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

1,1,1-TRICHLOROETHANE

1. Product Identification

Synonyms: Methyl chloroform; trichloroethane; chloroetene
CAS No.: 71-55-6
Molecular Weight: 133.40
Chemical Formula: CH3CCl3
Product Codes: 9435, 9437, W509, W510

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl Chloroform	71-55-6	96 - 100%	Yes
Dioxane	123-91-1	< 3%	Yes
1,2-Epoxybutane	106-88-7	< 0.5%	Yes
Actual concentrations proprietary			

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, AND CARDIOVASCULAR SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. CONTAINS DIOXANE WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Inhalation of vapors will irritate the respiratory tract. Affects the central nervous system. Symptoms include headache, dizziness, weakness, nausea. Higher levels of exposure (> 5000 ppm) can cause irregular heart beat, kidney and liver damage, fall in blood pressure, unconsciousness and even death.
Ingestion:
Harmful if swallowed. Symptoms similar to inhalation will occur along with nausea, vomiting. Aspiration of material into the lungs can cause chemical pneumonitis which can be fatal. If aspirated, may be rapidly absorbed through the lungs and result in injury to other body systems.
Skin Contact:
Causes mild irritation and redness, especially on prolonged contact. Repeated contact may cause drying or flaking of the skin.
Eye Contact:
Liquids and vapors cause irritation. Symptoms include tearing, redness, stinging, swelling.
Chronic Exposure:

Prolonged or repeated skin contact may cause dermatitis. Chronic exposure may affect the kidneys and liver. Dioxane is a suspected human carcinogen based on animal data.

Aggravation of Pre-existing Conditions:

Personnel with CNS, kidney, liver or heart disease may be more susceptible to the effects of this substance. Use of alcoholic beverages may aggravate symptoms.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Autoignition temperature: 500C (932F)
Flammable limits in air % by volume:
lel: 7.0; uel: 16.0
Vapors in containers can explode if subjected to high energy source.
Dioxane has a flash point below 16C (60F).

Explosion:

Can react with strong caustic, such as potash to form a flammable or explosive material. Air/vapor mixtures may explode when heated. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! Do not use aluminum, magnesium or zinc metal for storage container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do not use aluminum equipment or storage containers. Contact with aluminum parts in a pressurized fluid system may cause violent reactions.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):
350 ppm (TWA) for trichloroethane
100 ppm (TWA) skin for dioxane
-ACGIH Threshold Limit Value (TLV):
350 ppm (TWA), 450 ppm (STEL) for trichloroethane
20 ppm (TWA) skin, A3 - Animal Carcinogen for dioxane

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices,* most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained

breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has questionable warning properties. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Viton is a recommended material for personal protective equipment.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Mild chloroform-like odor.
Solubility:
4,400 ppm in water @ 20C (68F)
Specific Gravity:
1.34 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
74C (165F)
Melting Point:
-32C (-26F)
Vapor Density (Air=1):
4.63
Vapor Pressure (mm Hg):
100 @ 20C (68F)
Evaporation Rate (BuAc=1):
12.8

---

10. Stability and Reactivity

Stability:
Requires inhibitor content to prevent corrosion of metals. Slowly hydrolyzes in water to form hydrochloric and acetic acid.
Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition. Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Hazardous polymerization can occur in contact with aluminum trichloride.
Incompatibilities:
Open flames, welding arcs, nitrogen tetroxide, oxygen, liquid oxygen, sodium, sodium hydroxide, and sodium-potassium alloy, strong alkalis, oxidizers, aluminum and other reactive metals.
Conditions to Avoid:
Insufficient inhibitor, incompatibles, heat, flame and ignition sources

---

11. Toxicological Information

Oral rat LD50: 9600 mg/kg; inhalation rat LC50: 18000 ppm/4H; investigated as a mutagen, tumorigen, reproductive effector; irritation eye rabbit, Standard Draize, 2mg/24H severe.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methyl Chloroform (71-55-6)	No	No	3
Dioxane (123-91-1)	No	Yes	2B
1,2-Epoxybutane (106-88-7)	No	No	2B

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material is not expected to significantly bioaccumulate. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released to the atmosphere, this material has an average global half-life of 6.0 - 6.9 years. When released into the air, this material may adversely affect the ozone layer.

Environmental Toxicity:
This material is expected to be slightly toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: 1,1,1-TRICHLOROETHANE
Hazard Class: 6.1
UN/NA: UN2831
Packing Group: III
Information reported for product/size: 20L

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
Methyl Chloroform (71-55-6)                    Yes  Yes   Yes      Yes
Dioxane (123-91-1)                             Yes  Yes   Yes      Yes
1,2-Epoxybutane (106-88-7)                     Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                      --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
Methyl Chloroform (71-55-6)                    Yes   Yes   No     Yes
Dioxane (123-91-1)                             Yes   Yes   No     Yes
1,2-Epoxybutane (106-88-7)                     Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Methyl Chloroform (71-55-6)             No    No      Yes        No
Dioxane (123-91-1)                      No    No      Yes        No
1,2-Epoxybutane (106-88-7)              No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                      -RCRA-    -TSCA-
Ingredient                              CERCLA     261.33     8(d)
----------------------------------------  ------     ------    ------
Methyl Chloroform (71-55-6)             1000       U226       No
Dioxane (123-91-1)                      100        U108       No
1,2-Epoxybutane (106-88-7)              100        No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Mixture / Liquid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2[Z]
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, AND CARDIOVASCULAR SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. CONTAINS DIOXANE WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.
Label Precautions:
Avoid breathing vapor.

Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid contact with eyes, skin and clothing.

Label First Aid:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 3.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Composition/Information on Ingredient

Cas:
72-20-8
Code:
M
RTECS:
IO1575000
Code:
M
Name:
ENDRIN
Other REC Limits:
N/K
OSHA PEL:
0.1 MG/CUM
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
0.1 MG/CUM (SKIN)
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
N/K
Ventilation:
N/K
Protective Gloves:
RECOMMENDED
Eye Protection:
RECOMMENDED
Other Protective Equipment:
Equipment USE APPROPRIATE OSHA/MSHA SAFETY EQUIPMENT.
Work Hygienic Practices:
N/K
Supplemental Safety and Health:
N/K

Health Hazards Data

LD50LC50Mixture:
ORAL (RAT) LD50: 5000 MG/KG (TOLUENE)
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
EYES/SKIN/INHALATION/INGESTION: IRRITATION.

Explanation Of Carcinogenicity:
LINDANE, DDT ISOMERS, & DIELDRIN ARE SUSPECTED HUMAN CARCINOGENS. HEPTACHLOR IS AN A2 CARCINOGEN.
Signs And Symptions Of Overexposure:
EYES/SKIN/INGESTION/INHALATION: TOXIC & IRRITATION.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN IF NECESSARY. OBTAIN
MEDICAL ATTENTION IN ALL CASES.
Spill Release Procedures:
DUE TO THE SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. A LEAKING BOTTLE MAY BE
PLACED IN A PLASTIC BAG & NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE OR
SAND.
Neutralizing Agent:
N/K
Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCUBBER. OBSERVE ALL FEDERAL, STATE, & LOCAL LAWS
CONCERNING DISPOSAL.
Handling And Storage Precautions:
AVOID CONTACT W/EYES, SKIN, & CLOTHING. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE.
Other Precautions:
THIS MATERIAL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN THE SAFE HANDLING OF HAZARDOUS CHEMICALS.

Fire and Explosion Hazard Information

Flash Point Method:
N/P 6
Flash Point:
Flash Point Text:
COMBUSTIBLE
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
CO2, DRY CHEMICAL POWDER, OR WATER SPRAY
Fire Fighting Procedures:
N/K
Unusual Fire/Explosion Hazard:
COMBUSTIBLE.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/K
Melt/Freeze Pt:
M.P/F.P Text:
N/K
Decomp Temp:
Decomp Text:

N/K
Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K 7
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
N/K
Appearance and Odor:
LIQUID W/BENZENE-LIKE ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
STRONG OXIDIZERS
Hazardous Decomposition Products:
N/R
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

Composition/Information on Ingredient

Cas:
72-43-5
Code:
M
RTECS:
KJ3675000
Code:
M
Name:
METHOXYCHLOR
Other REC Limits:
N/K
OSHA PEL:
15 MG/M3 TDUST
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
10 MG/M3; 9293
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
N/K
Ventilation:
N/K
Protective Gloves:
RECOMMENDED
Eye Protection:
RECOMMENDED
Other Protective Equipment:
Equipment USE APPROPRIATE OSHA/MSHA SAFETY EQUIPMENT.
Work Hygienic Practices:
N/K
Supplemental Safety and Health:
N/K

Health Hazards Data

LD50LC50Mixture:
ORAL (RAT) LD50: 5000 MG/KG (TOLUENE)
Route Of Entry Inds - Inhalation:
YES

Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
EYES/SKIN/INHALATION/INGESTION: IRRITATION.
Explanation Of Carcinogenicity:
LINDANE, DDT ISOMERS, & DIELDRIN ARE SUSPECTED HUMAN CARCINOGENS. HEPTACHLOR IS AN A2 CARCINOGEN.
Signs And Symptions Of Overexposure:
EYES/SKIN/INGESTION/INHALATION: TOXIC & IRRITATION.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN IF NECESSARY. OBTAIN
MEDICAL ATTENTION IN ALL CASES.
Spill Release Procedures:
DUE TO THE SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. A LEAKING BOTTLE MAY BE
PLACED IN A PLASTIC BAG & NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE OR
SAND.
Neutralizing Agent:
N/K
Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCUBBER. OBSERVE ALL FEDERAL, STATE, & LOCAL LAWS
CONCERNING DISPOSAL.
Handling And Storage Precautions:
AVOID CONTACT W/EYES, SKIN, & CLOTHING. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE.
Other Precautions:
THIS MATERIAL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN THE SAFE HANDLING OF HAZARDOUS CHEMICALS.

Fire and Explosion Hazard Information

Flash Point Method:
N/P 6
Flash Point:
Flash Point Text:
COMBUSTIBLE
Autoignition Temp:

Autoignition Temp Text:
N/A
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
CO2, DRY CHEMICAL POWDER, OR WATER SPRAY
Fire Fighting Procedures:
N/K
Unusual Fire/Explosion Hazard:
COMBUSTIBLE.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/K
Melt/Freeze Pt:
M.P/F.P Text:
N/K
Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K 7
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
N/K
Appearance and Odor:
LIQUID W/BENZENE-LIKE ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
STRONG OXIDIZERS
Hazardous Decomposition Products:
N/R
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

Composition/Information on Ingredient

Cas:
72-54-8
Code:
M
RTECS:
KI0700000
Code:
M
Name:
DDD (SARA III)
Other REC Limits:
1 MG/CUM
OSHA PEL:
NOT ESTABLISHED
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
NOT ESTABLISHED
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
USE APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.
Ventilation:
HANDLE ONLY IN A HOOD
Protective Gloves:
AS REQUIRED
Eye Protection:
EYE SHIELDS
Other Protective Equipment:
Equipment N/K
Work Hygienic Practices:
REMOVE/WASH CONTAMINATED CLOTHING BEFORE REUSE. ONLY TRAINED PERSONNEL SHOULD HANDLE THIS
CHEMICAL OR ITS CONTAINER.
Supplemental Safety and Health:
FIRST AID; INGESTION: IF PATIENT IS VOMITING WATCH CLOSELY TO MAKE SURE AIRWAY DOESN’T BECOME
OBSTRUCTED BY VOMIT.

Health Hazards Data

LD50LC50Mixture:
LD50 (RAT OR MOUSE): 113 MG/KG.
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
YES
OSHA:
NO
Health Hazards Acute And Chronic:
SKIN: FATAL IF ABSORBED. INGESTION: FATAL. INHALATION: NERVOUS SYSTEM & LIVER INJURY, FATAL.
Explanation Of Carcinogenicity:
TDE IS A SUSPECTED A2 ANIMAL CARCINOGEN.
Signs And Symptions Of Overexposure:
SKIN: FATAL IF ABSORBED. INGESTION: FATAL. INHALATION: NERVOUS SYSTEM & LIVER INJURY, FATAL.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES/SKIN: FLUSH W/WATER FOR 15-20 MINS. USE SOAP & WATER TO CLEANSE SKIN IF NO BURNS. INHALATION: REMOVE TO FRESH
AIR, GIVE OXYGEN IF BREATHING DIFFICULTY. ADMINISTER CPR IF CARDIAC ARREST OCCURS. IF EXHIBITING SIGNS OF SHOCK- KEEP
WARM &QUIET. INGESTION: INDUCE VOMITING. DON'T ADMINISTER LIQUIDS/INDUCE VOMITING TO AN UNCONSIOUS/CONVULSING
PERSON. OBTAIN MEDICAL ATTENTION IN ALL CASES. SEE SUPP.
Spill Release Procedures:
EVACUATE AREA. WEAR APPROPRIATE EQUIPMENT. VENTILATE AREA. SWEEP UP & PLACE IN AN APPROPRIATE CONTAINER. HOLD FOR
DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
Neutralizing Agent:
N/K
Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER. DISPOSE OF IN ACCORDANCE W/FEDERAL, STATE, &
LOCAL REGULATIONS.
Handling And Storage Precautions:
KEEP CLOSED IN A COOL DRY PLACE. STORE ONLY W/COMPATIBLE CHEMICALS. FOR LABORATORY USE ONLY. DON'T WEAR CONTACT
LENSES.
Other Precautions:

DON'T USE AS DRUGS, COSMETICS, AGRICULTURAL OR PESTICIDAL PRODUCTS, FOOD ADDITIVES OR AS HOUSEHOLD CHEMICALS.
AVOID DIRECT PHYSICAL CONTACT. AVOID CONTACT W/SKIN, EYES & CLOTHING.
2

Fire and Explosion Hazard Information

Flash Point Method:
N/P
Flash Point:
Flash Point Text:
N/K
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
CO2, DRY CHEMICAL POWDER OR SPRAY.
Fire Fighting Procedures:
N/K
Unusual Fire/Explosion Hazard:
N/K

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/K 3
Melt/Freeze Pt:
M.P/F.P Text:
228-230F
Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P

Evaporation Rate & Reference:
N/K
Solubility in Water:
INSOLUBLE
Appearance and Odor:
CRYSTALLINE SOLID
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
STRONG OXIDIZING AGENTS
Hazardous Decomposition Products:
TOXIC FUMES
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Lookchem shall not be held liable for any damage resulting from

handling or from contact with the above product. See reverse side of invoice or packing slip for additional
terms and conditions of sale.

Composition/Information on Ingredient

Cas:
72-55-9
Code:
M
RTECS:
KV9450000
Code:
M
Name:
DDE (CERCLA)
Other REC Limits:
NONE RECOMMENDED
OSHA PEL:
NOT ESTABLISHED
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
NOT ESTABLISHED
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
NONE REQUIRED FOR NORMAL USE W/ADEQUATE VENTILATION. IN POORLY VENTILATED AREAS, USE NIOSH/MSHA
APPROVED ORGANIC VAPOR RESPIRATOR.
Ventilation:
LOCAL EXHAUST IS RECOMMENDED FOR CONFINED AREAS. GENERAL MECHANICAL VENTILATION IS ADEQUATE FOR
NORMAL USE. 7
Protective Gloves:
CHEMICAL RESIST GLOVES, (PVC).
Eye Protection:
SAFETY GLASSES. SPLASH PROOF GOGGLES.
Other Protective Equipment:
Equipment EYE BATH AND SAFETY SHOWER.
Work Hygienic Practices:
FOLLOW CURRENT H.M.I.S. REGULATIONS.
Supplemental Safety and Health:
NONE

Health Hazards Data

LD50LC50Mixture:
ORAL LD50 (RAT) IS UNKNOWN
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
YES
IARC:
YES

OSHA:
NO
Health Hazards Acute And Chronic:
ACUTE: EYES-MODERATE IRRITNAT. SKIN-MODERATE IRRITANT. INHALATION-HIGH CONCENTRATIONS OF VAPORS MAY PRODUCE
IRRITATION OF THE RESPIRATORY TRACT, HEADACHE, DIZZINESS, AND NAUSEA. INGESTION-SIMILIAR TO INHALATION.
CHRONIC:PROLONGED REPEATED OVEREXPOSURE TO THIS PRODUCT MAY LEAD TO SKIN SENSITIZATION OR DERMATITIS.
Explanation Of Carcinogenicity:
CHROMIUM:IARC MONOGRAPHS, VOL 49, PG 49, 1990:GRP 1. NTP 6TH ANNUAL RPT ON CARCINS, 1991:KNOWN TO BE CARCIN. (SUPP
DATA)
Signs And Symptions Of Overexposure:
INHALATION-HIGH CONCENTRATIONS OF VAPORS MAY PRODUCE IRRITATION OF THE RESPIRATORY TRACT, HEADACHE, DIZZINESS, &
NAUSEA. SKIN-MODERATE IRRITATION. INGESTION-NAUSEA AND VOMITING.
Medical Cond Aggravated By Exposure:
SKIN DISORDERS, RESPIRATORY DISORDERS.
First Aid:
EYES: FLUSH WELL W/WATER FOR AT LEAST 15 MINUTES. CONTACT A PHYSICIAN IF IRRITATION PERSISTS. SKIN: WASH W/SOAP &
WATER. INHALE: REMOVE PATIENT TO FRESH AIR. IF BREATHING IS DIFFICULT, ADMINISTER OXYG EN. INGEST: DO NOT INDUCE
VOMITING. CONTACT A PHYSICIAN. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO PREVENT ASPIRATION OF LIQUID INTO LUNGS.
Spill Release Procedures:
PREVENT SKIN & EYE CONTACT. USE NON-COMBUSTIBLE MATERIAL TO CONFINE &/OR ABSORB. ELIMINATE IGNITION SOURCES.
VENTILATE AREA.
Neutralizing Agent:
NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods:
6 REMOVE TO A WASTE DISPOSAL FACILITY OPERATING IN COMPLIANCE W/FEDERAL, STATE & LOCAL REGULATIONS. HAZ WASTE
CODES: D001 (IGNITABLITY); U031 (BUTYL ALCOHOL). RQ: 100 LBS.
Handling And Storage Precautions:
"EMPTY" CONTAINER RETAIN RESIDUE (LIQUID AND/OR VAPOR) AND CAN BE DANGEROUS.
Other Precautions:
DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND/EXPOSE SUCH CONTAINERS TO HEAT, SPARKS, FLAMES, STATIC
ELECTRICITY OR OTHER SOURCES OF IGNIT.

Fire and Explosion Hazard Information

Flash Point Method:
OC
Flash Point:
Flash Point Text:
-156F,-104C
Autoignition Temp:
Autoignition Temp Text:
N/K
Lower Limits:
1.38%
Upper Limits:
36.5%
Extinguishing Media:
CARBON DIOXIDE, DRY CHEMICAL, FOAM.
Fire Fighting Procedures:
FIRE FIGHTERS SHOULD WEAR SELF-CONTAINED BREATHING APPARATUS IN CONFINED AREAS.
Unusual Fire/Explosion Hazard:

VAPORS ARE HEAVIER THAN AIR & MAY TRAVEL ALONG GROUND, OR BE MOVED BY VENTILATION & BE IGNITED BY IGNITION SOURCE.

Physical/Chemical Properties

HCC:
V3
NRC/State LIC No:
N/R
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
10F-275F
Melt/Freeze Pt:
M.P/F.P Text:
N/K
Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
N/K
Vapor Density:
>1
Volatile Org Content %:
Spec Gravity:
0.86 (H2O=1)
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/R
Evaporation Rate & Reference:
>1 (BUTYL ACETATE=1)
Solubility in Water:
APPRECIABLE 8
Appearance and Odor:
BLUE OPAQUE LOW VISCOSITY LIQUID W/SWEET SOLVENT ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
HEAT, SPARKS OPEN FLAMES.
Materials To Avoid:
STRONG OXIDIZING AGENTS.
Hazardous Decomposition Products:
OXIDES OF CARBON.
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
NOT RELEVANT

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

For R&D use only. Not for drug, household or other uses.

Material Safety Data Sheet
Aluminum (Metallic, Powder)

ACC# 01000

Section 1 - Chemical Product and Company Identification

MSDS Name: Aluminum (Metallic, Powder)
Catalog Numbers: S79891, S79891-1, S798911, A559-500
Synonyms: None.
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7429-90-5	Aluminum	100	231-072-3

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: silver-gray powder.
Danger! Dust may form flammable or explosive mixture with air, especially when damp. Reacts violently and/or explosively with water, steam or moisture. May ignite or explode on contact with moist air. May cause eye and skin irritation. May cause respiratory tract irritation. Air sensitive.
Target Organs: Lungs, eyes, skin.

Potential Health Effects
Eye: May cause eye irritation.
Skin: May cause skin irritation. Low hazard for usual industrial handling. No sensitizing effects known.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea.
Inhalation: May cause respiratory tract irritation. May cause respiratory difficulty and coughing.
Chronic: Aluminum may be implicated in Alzheimer's disease. Inhalation of aluminum containing dusts may cause pulmonary disease.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes.

Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water reactive. Material will react with water and may release a flammable and/or toxic gas. Dust can be an explosion hazard when exposed to heat or flame. May ignite or explode on contact with steam or moist air. Aluminum powder may evolve hydrogen gas in contact with water and finely divided dust may be ignited by naked lights or sparks. Polished aluminum powders which have been treated with oils or wax for printing or paint purposes are not generally dangerous. Bulk dust when damp with water may heat spontaneously. Hazard greater as fineness increases.
Extinguishing Media: DO NOT USE WATER! Do NOT get water inside containers. Contact professional fire-fighters immediately. Do NOT use CO2 or halogenated extinguishing agents. Smother with dry sand, dry clay, dry ground limestone (CaCO3), or use approved Class D extinguishers.
Flash Point: Not applicable.
Autoignition Temperature: 760 deg C (1,400.00 deg F)
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 0; Flammability: 3; Instability: 1; Special Hazard: -W-

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. Do not expose spill to water. Vacuum or sweep up material and place into a suitable, dry disposal container.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not allow water to get into the container because of violent reaction. Minimize dust generation and accumulation. Avoid contact with skin and eyes. Avoid ingestion and inhalation. Do not allow contact with water. Keep from contact with moist air and steam. Use only with adequate ventilation.
Storage: Keep away from sources of ignition. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from water. Flammables-area. Keep containers tightly closed. Keep away from acidic, alkaline, combustible and oxidizing materials. Separate from halogenated compounds.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Aluminum	10 mg/m3 TWA (metal dust)	10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable dust)	15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)

OSHA Vacated PELs: Aluminum: 15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Powder
Appearance: silver-gray
Odor: odorless
pH: Not available.
Vapor Pressure: Negligible
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 2467 deg C @ 760 mmHg
Freezing/Melting Point:660 deg C
Decomposition Temperature:> 2400 deg C
Solubility: insoluble
Specific Gravity/Density:2.7020g/cm3
Molecular Formula: Al
Molecular Weight:26.98

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. Aluminum powder may evolve hydrogen gas in contact with water, and finely divided dust may be ignited by naked lights or sparks. Polished aluminum powders which have been treated with oils or wax for printing or paint purposes are not generally dangerous Uncoated aluminum powder reacts with strong acid and strong alkalies to release hydrogen gas.

Conditions to Avoid: Ignition sources, dust generation, exposure to air, excess heat, exposure to moist air or water.

Incompatibilities with Other Materials: Acids, alkalies, acid chlorides, halogenated agents, metal salts, strong oxidizing agents, Contact with water liberates highly flammable gases., ammonium nitrate, ammonium persulfate, antimony, arsenic oxides, barium bromate, barium chlorate, barium iodate.

Hazardous Decomposition Products: Hydrogen gas, aluminum oxide, aluminum fumes.

Hazardous Polymerization: Has not been reported

Section 11 - Toxicological Information

RTECS#:
CAS# 7429-90-5: BD0330000; BD1020000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 7429-90-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: Chronic exposure to aluminum has produced numbness in fingers and (in one case) brain effects.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	ALUMINUM POWDER, UNCOATED	ALUMINUM POWDER, UNCOATED
Hazard Class:	4.3	4.3
UN Number:	UN1396	UN1396
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7429-90-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 7429-90-5: immediate, delayed.

Section 313

This material contains Aluminum (CAS# 7429-90-5, 100%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7429-90-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

F

Risk Phrases:

R 15 Contact with water liberates extremely flammable gases.
R 17 Spontaneously flammable in air.

Safety Phrases:

S 7/8 Keep container tightly closed and dry.
S 43A In case of fire, use dry chemical (never use water).

WGK (Water Danger/Protection)

CAS# 7429-90-5: 0

Canada - DSL/NDSL

CAS# 7429-90-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B6, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7429-90-5 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/25/1999
Revision #6 Date: 6/06/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Composition/Information on Ingredient

Cas:
7439-89-6
Code:
M
RTECS:
NO4565500
Code:
M
Name:
IRON
Other REC Limits:
N/R
OSHA PEL:
N/R
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
N/R
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
USE RESPIRABLE FUME RESPIRATORY OR AIR SUPPLIED RESPIRATOR WHEN WELDING IN A CONFINED SPACE OR WHERE LOCAL EXHAUST OR VENTILATION DOES NOT KEEP EXPOSURE BELOW TLV.
Ventilation:
USE ADEQUATE GENERAL VENTILATION & LOCAL EXHAUST AT THE ARC. 10
Protective Gloves:
WELDER'S GLOVES
Eye Protection:
HELMET/FACE SHEILD WITH FILTER LENS.
Other Protective Equipment:
Equipment WEAR PROTECTIVE CLOTHING.
Work Hygienic Practices:
N/P
Supplemental Safety and Health:
N/P

Health Hazards Data

LD50LC50Mixture:
N/K
Route Of Entry Inds - Inhalation:
YES
Skin:
NO
Ingestion:
NO
Carcinogenicity Inds - NTP:
YES
IARC:
YES
OSHA:
NO
Health Hazards Acute And Chronic:
ACUTE:MAY RESULT IN DISCOMFORT SUCH AS DIZZINESS,NAUSEA,DRYNESS OR IRRITATION OF NOSE,THROAT OR EYES,TIGHTNESS IN CHEST,FEVER & ALLERGIC REACTIONS. CHRONIC:MAY LEAD TO SIDEROSIS & IS BELIEVED BY SOME INVESTIGATORS TO AFFECT PULMONARY FUNCTION.
Explanation Of Carcinogenicity:
CHROMIUM (CR+6) IS LISTED AS CARCINOGENIC.
Signs And Symptions Of Overexposure:
SEE "HEALTH HAZARDS".
Medical Cond Aggravated By Exposure:
N/P
First Aid:
REMOVE TO FRESH AIR,IF BREATHING IS DIFFICULT,ADMINISTER OXYGEN,IF BREATHING HAS SPED,APPLY ARTIFICIAL RESPIRATOR; GET MEDICAL HELP.
Spill Release Procedures:
SWEEP UP OR SCOOP UP.
Neutralizing Agent:
N/P 9
Waste Disposal Methods:
DISCARD ANY PRODUCT RESIDUE,DISPOSABLE CONTAINER OR LINER IN AN ENVIRONMENTALLY ACCEPTABLE MANNER.
Handling And Storage Precautions:
USE EXHAUST SYSTEM TO CLEAR WELDING FUMES.
Other Precautions:
N/P

Fire and Explosion Hazard Information

Flash Point Method:
N/P
Flash Point:
Flash Point Text:
N/R
Autoignition Temp:

Autoignition Temp Text:
N/A
Lower Limits:
N/R
Upper Limits:
N/R
Extinguishing Media:
NONE
Fire Fighting Procedures:
NONE
Unusual Fire/Explosion Hazard:
WELDING ARC AND SPARKS CAN IGNITE COMBUSTIBLES AND FLAMMABLES.

Physical/Chemical Properties

HCC:
N1
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/K
Melt/Freeze Pt:
M.P/F.P Text:
N/A
Decomp Temp:
Decomp Text:
N/A
Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K
VOC Pounds/Gallon:
PH: N/P
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
N/K 11
Appearance and Odor:
SOLID WIRE OR ROD
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/P

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
NONE
Materials To Avoid:
NONE
Hazardous Decomposition Products:
DIFFICULT TO DETERMINE.VARIES GREATLY.
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/P

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

For R&D use only. Not for drug, household or other uses.

MSDS Number: **L2347** * * * * * *Effective Date:* ***09/15/09*** * * * * * *Supercedes:* ***07/05/07***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

LEAD METAL

1. Product Identification

Synonyms: Granular lead, pigment metal; C.I. 77575
CAS No.: 7439-92-1
Molecular Weight: 207.19
Chemical Formula: Pb
Product Codes:
J.T. Baker: 2256, 2266
Mallinckrodt: 5668

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Lead	7439-92-1	95 - 100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. NEUROTOXIN. AFFECTS THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

Lead can be absorbed through the respiratory system. Local irritation of bronchia and lungs can occur and, in cases of acute exposure, symptoms such as metallic taste, chest and abdominal pain, and increased lead blood levels may follow. See also Ingestion.

Ingestion:

POISON! The symptoms of lead poisoning include abdominal pain and spasms, nausea, vomiting, headache. Acute poisoning can lead to muscle weakness, "lead line" on the gums, metallic taste, definite loss of appetite, insomnia, dizziness, high lead levels in blood and urine with shock, coma and death in extreme cases.

Skin Contact:

Lead and lead compounds may be absorbed through the skin on prolonged exposure; the symptoms of lead poisoning described for ingestion exposure may occur. Contact over short periods may cause local irritation, redness and pain.

Eye Contact:

Absorption can occur through eye tissues but the more common hazards are local irritation or abrasion.

Chronic Exposure:

Lead is a cumulative poison and exposure even to small amounts can raise the body's content to toxic levels. The symptoms of chronic exposure are like those of ingestion poisoning; restlessness, irritability, visual disturbances, hypertension and gray facial color may also be noted.

Aggravation of Pre-existing Conditions:

Persons with pre-existing kidney, nerve or circulatory disorders or with skin or eye problems may be more susceptible to the effects of this substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard. Powder/dust is flammable when heated or exposed to flame.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire. Do not allow water runoff to enter sewers or waterways.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Can produce toxic lead fumes at elevated temperatures and also react with oxidizing materials.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Areas in which exposure to lead metal or lead compounds may occur should be identified by signs or appropriate means, and access to the area should be limited to authorized persons. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

For lead, metal and inorganic dusts and fumes, as Pb:
-OSHA Permissible Exposure Limit (PEL): 0.05 mg/m3 (TWA)
For lead, elemental and inorganic compounds, as Pb:
-ACGIH Threshold Limit Value (TLV): 0.05 mg/m3 (TWA), A3 animal carcinogen
ACGIH Biological Exposure Indices (BEI): 30 ug/100ml, notation B (see actual Indices for more information).
For lead, inorganic:
-NIOSH Recommended Exposure Limit (REL): 0.1 mg/m3 (TWA)

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half-face high efficiency particulate respirator (NIOSH type N100 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece high efficiency particulate respirator (NIOSH type N100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Other Control Measures:

Eating, drinking, and smoking should not be permitted in areas where solids or liquids containing lead compounds are handled, processed, or stored. See OSHA substance-specific standard for more information on personal protective equipment, engineering and work practice controls, medical surveillance, record keeping, and reporting requirements. (29 CFR 1910.1025).

9. Physical and Chemical Properties

Appearance:

Small, white to blue-gray metallic shot or granules.

Odor:

Odorless.

Solubility:

Insoluble in water.

Density:

11.34

pH:

No information found.

% Volatiles by volume @ 21C (70F):

0

Boiling Point:

1740C (3164F)

Melting Point:

327.5C (622F)

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

1.77 @ 1000C (1832F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Does not decompose but toxic lead or lead oxide fumes may form at elevated temperatures.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Ammonium nitrate, chlorine trifluoride, hydrogen peroxide, sodium azide, zirconium, disodium acetylide, sodium acetylide and oxidants.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:

Investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:

Lead and other smelter emissions are human reproductive hazards. (Chemical Council on Environmental Quality; Chemical Hazards to Human Reproduction, 1981).

Carcinogenicity:

EPA / IRIS classification: Group B2 - Probable human carcinogen, sufficient animal evidence.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Lead (7439-92-1)	No	No	2B

12. Ecological Information

Environmental Fate:

When released into the soil, this material is not expected to leach into groundwater. This material may bioaccumulate to some extent.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Not regulated.

---

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
Lead (7439-92-1)                               Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                       --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
Lead (7439-92-1)                               Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                      -SARA 302-    ------SARA 313------
Ingredient                            RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Lead (7439-92-1)                      No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                -RCRA-    -TSCA-
Ingredient                            CERCLA    261.33     8(d)
----------------------------------------  ------    ------    ------
Lead (7439-92-1)                      10        No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Solid)
```

WARNING:
THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: None allocated.
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **3** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! MAY BE FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. NEUROTOXIN. AFFECTS THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy.

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **M0088** * * * * * *Effective Date:* ***11/02/01*** * * * * * *Supercedes:* ***11/17/99***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

MAGNESIUM METAL, POWDER

1. Product Identification

Synonyms: Magnesium powder
CAS No.: 7439-95-4
Molecular Weight: 24.30
Chemical Formula: Mg
Product Codes: Product Codes: 5894

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Magnesium Metal	7439-95-4	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! FLAMMABLE SOLID. DANGEROUS WHEN WET. HIGHLY REACTIVE. MAY IGNITE SPONTANEOUSLY ON CONTACT WITH WATER OR DAMP MATERIALS MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.

Potential Health Effects

Inhalation:
Inhalation of dusts or fumes may irritate the respiratory tract and may cause metal fume fever. Symptoms may include coughing, chest pain, fever, and leukocytosis.
Ingestion:
Magnesium metal does not have well-characterized toxicity. May cause abdominal pain and diarrhea.

Skin Contact:
Particles embedded in the skin may cause eruptions. Molten magnesium may cause serious skin burns.
Eye Contact:
High concentrations of dust may cause mechanical irritation. Watching a magnesium fire can cause eye injury.
Chronic Exposure:
No information found.
Aggravation of Pre-existing Conditions:
Existing wounds contaminated with magnesium are very slow to heal.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. Get medical attention for any breathing difficulty.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Remove any contaminated clothing. Wash skin with soap or mild detergent and water for at least 15 minutes. Get medical attention if irritation develops or persists.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.

---

5. Fire Fighting Measures

Fire:
Autoignition temperature: 473C (883F)
When heated in air to a temperature near its melting point, magnesium may ignite and burn. Dangerous in the form of dust or flakes, and when exposed to flame or by violent chemical reaction with oxidizing agents. Magnesium may react with moisture or acids to evolve hydrogen gas, which is a highly dangerous fire or explosion hazard.

Autoignition temperature is for Magnesium turnings or ribbon.
Explosion:
Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Minimum explosible concentration 0.030 grams/liter. Water used on molten magnesium will produce hydrogen gas and may cause an explosion.
Fire Extinguishing Media:
Use metal extinguishing powders such as G-1® graphite powder, Met-L-X® powder, powdered talc, dry graphite, powdered sodium chloride, soda ash, or dry sand. Warning! Do not use foam, chlorinated products such as Halon®, carbon dioxide, or water to extinguish magnesium fires, because dangerous reactions will occur. Use of water on molten magnesium will produce hydrogen gas and may cause an explosion.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Fire fighters should protect their eyes and skin from flying particles. In order to prevent eye injury, do not look directly at magnesium fires.

---

6. Accidental Release Measures

Remove all sources of ignition. Ventilate the area of the spill or leak. Wear appropriate personal protective equipment as specified in Section 8. Collect the spilled material and transfer to a clean, dry metal covered container for recovery or

disposal. Do not use water in the collection process. If the spilled magnesium has come into contact with water, proceed with caution. Hydrogen gas may be generated, which may cause a fire or explosion. Evacuate the area, put on fire fighting protective equipment and proceed as with a metal fire.

---

7. Handling and Storage

Keep in tightly closed container. Store in a cool, dry, ventilated area. Protect against physical damage. Store finely divided powder, chips or shavings in detached fire-resistant building, protected from moisture and away from oxidizers, chlorine, bromine, iodine, acids, and all possible sources of ignition. Heavier sections may be stored in the open. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Silver solid.
Odor:
Odorless.
Solubility:
Insoluble in water.
Specific Gravity:
1.74 @ 20C (68F) (solid)
pH:
No information found.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:

1100C (2012F)
Melting Point:
649C (1200F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
1.0 @ 621C (1150F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Slowly oxidizes in moist air.
Hazardous Decomposition Products:
Toxic gases and vapors may be released if involved in a fire.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Magnesium reacts dangerously with many substances, including oxidizers, carbonates, cyanides, chlorinated hydrocarbons, sulfates, acids, and other metals. Please refer to the NFPA publication "Fire Protection Guide on Hazardous Materials" most recent edition for details. Reacts with acids to form hydrogen gas.
Conditions to Avoid:
Moisture, heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure.

```
--------\Cancer Lists\------------------------------------------------------
                                    ---NTP Carcinogen---
Ingredient                          Known    Anticipated    IARC Category
----------------------------------  -----    -----------    -------------
Magnesium Metal (7439-95-4)          No          No            None
```

---

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: MAGNESIUM, POWDER
Hazard Class: 4.3, 4.2
UN/NA: UN1418
Packing Group: II
Information reported for product/size: 500G

International (Water, I.M.O.)

Proper Shipping Name: MAGNESIUM POWDER
Hazard Class: 4.3, 4.2
UN/NA: UN1418
Packing Group: II
Information reported for product/size: 500G

---

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Magnesium Metal (7439-95-4)	Yes	Yes	No	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Magnesium Metal (7439-95-4)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Magnesium Metal (7439-95-4)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Magnesium Metal (7439-95-4)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: Yes Pressure: No
Reactivity: Yes (Pure / Solid)

Australian Hazchem Code: 4[Y]
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **0** Flammability: **1** Reactivity: **2**

Label Hazard Warning:

WARNING! FLAMMABLE SOLID. DANGEROUS WHEN WET. HIGHLY REACTIVE. MAY IGNITE SPONTANEOUSLY ON CONTACT WITH WATER OR DAMP MATERIALS MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.

Label Precautions:

Keep away from heat, sparks and flame.
Do not allow contact with water, acids, or moisture.
Avoid contact with eyes, skin and clothing.
Avoid breathing dust.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:

If inhaled, remove to fresh air. Get medical attention for any breathing difficulty. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Get medical attention if irritation develops or persists.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Composition/Information on Ingredient

Cas:
7439-96-5
Code:
M
RTECS:
OO9275000
Code:
M
Name:
MANGANESE (SARA III)
Other REC Limits:
NONE RECOMMENDED 3
OSHA PEL:
(C) 5 MG/M3 DUST
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
5 MG/M3 DUST 9293
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
7 USE NIOSH/MSHA APPROVED RESPIRATOR FOR WELDING FUMES OR SUPPLIED AIR RESPIRATOR IN CONFINED
SPACES OR WHERE FUME CONCENTRATION EXCEEDS REGULATORY LIMITS.
Ventilation:
USE MECHANICAL OR LOCAL EXHAUST OR BOTH TO MAINTAIN LEVELS OF FUMES BELOW REGULATORY LIMITS.
Protective Gloves:
WELDERS WORK GLOVES
Eye Protection:
WELDERS HELMET WITH CORRECT LENSES
Other Protective Equipment:
Equipment CLOTHING TO PROTECT ENTIRE BODY FROM SPARKS.
Work Hygienic Practices:
WASH HANDS AFTER USE AND BEFORE EATING, DRINKING, OR SMOKING. LAUNDER CONTAMINATED CLOTHING
BEFORE REUSE.
Supplemental Safety and Health:

N/R

Health Hazards Data

LD50LC50Mixture:
ORAL LD50 (RAT) IS UNKNOWN
Route Of Entry Inds - Inhalation:
YES
Skin:
NO
Ingestion:
NO
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
ACUTE: INHALATION OF WELDING FUMES MAY CAUSE NERVOUS SYSTEM AND MUSCLE IRREGULARITIES, IRRITATION OF EYES, NOSE,
THROAT, AND RESPIRATORY SYSTEM, METAL FUME FEVER. CHRONIC: PROLONGED OR REPEATED INHALA TION OF FUMES MAY CAUSE SIDEROSIS, FLUOROSIS AND AFFECT LUNG FUNCTION.
Explanation Of Carcinogenicity:
NO INGREDIENT OF A CONCENTRATION OF 0.1% OR GREATER IS LISTED AS A CARCINOGEN OR SUSPECTED CARCINOGEN.
Signs And Symptions Of Overexposure:
INHALATION: NAUSEA, DIZZINESS, DRYNESS OF NOSE AND THROAT, COUGHING, WHEEZING AND SHORTNESS OF BREATH. EYES:
REDNESS, TEARING, BLURRED VISION.
Medical Cond Aggravated By Exposure:
NONE SPECIFIED BY MANUFACTURER.
First Aid:
INHALATION: REMOVE TO FRESH AIR. RESUSCITATE IF NEEDED. EYES: FLUSH WITH PLENTY OF WATER FOR 15 MINUTES. SEE DOCTOR.
SKIN: WASH WITH SOAP AND WATER. INGESTION: DO NOT INDUCE VOMITING. SEE DOCTOR. 6
Spill Release Procedures:
PICK UP RODS. SWEEP UP OR MOP. PLACE RESIDUE IN A CONTAINER FOR DISPOSAL.
Neutralizing Agent:
NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods:
DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.
Handling And Storage Precautions:
REMOVE ANY COMBUSTIBLES FROM WORK AREA: SPARKS OR WELDING ARC COULD IGNITE NEARBY COMBUSTIBLES.
Other Precautions:
NONE SPECIFIED BY MANUFACTURER.

Fire and Explosion Hazard Information

Flash Point Method:
N/P
Flash Point:
Flash Point Text:
NOT APPLICABLE
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/R
Upper Limits:
N/R
Extinguishing Media:
USE MEDIA APPROPRIATE FOR SURROUNDING FIRE.
Fire Fighting Procedures:
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE GEAR.
Unusual Fire/Explosion Hazard:
NON-FLAMMABLE; BUT SPARKS AND WELDING ARC MAY IGNITE COMBUSTIBLES DURING USE.

Physical/Chemical Properties

HCC:
N1
NRC/State LIC No:
N/R
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
UNKNOWN
Melt/Freeze Pt:
M.P/F.P Text:
UNKNOWN
Decomp Temp:
Decomp Text:
UNKNOWN
Vapor Pres:
UNKNOWN
Vapor Density:
UNKNOWN
Volatile Org Content %:
Spec Gravity:
UNKNOWN 8
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/R
Evaporation Rate & Reference:

UNKNOWN
Solubility in Water:
INSOLUBLE
Appearance and Odor:
SOLID ROD
Percent Volatiles by Volume:
N/K
Corrosion Rate:
UNKNOWN

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid:
NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:
METAL FUMES, FLUORIDES.
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
NONE SPECIFIED BY MANUFACTURER.

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

handling or from contact with the above product. See reverse side of invoice or packing slip for additional
terms and conditions of sale.

Material Safety Data Sheet
Mercury, 99.999%

ACC# 96252

Section 1 - Chemical Product and Company Identification

MSDS Name: Mercury, 99.999%
Catalog Numbers: AC193480000, AC193480500
Synonyms: Colloidal mercury; Hydrargyrum; Metallic mercury; Quick silver; Liquid silver
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7439-97-6	Mercury	99.999	231-106-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: silver liquid.
Danger! Corrosive. Harmful if inhaled. May be absorbed through intact skin. Causes eye and skin irritation and possible burns. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. May cause liver and kidney damage. May cause central nervous system effects. This substance has caused adverse reproductive and fetal effects in animals. Inhalation of fumes may cause metal-fume fever. Possible sensitizer.
Target Organs: Blood, kidneys, central nervous system, liver, brain.

Potential Health Effects

Eye: Exposure to mercury or mercury compounds can cause discoloration on the front surface of the lens, which does not interfere with vision. Causes eye irritation and possible burns. Contact with mercury or mercury compounds can cause ulceration of the conjunctiva and cornea.
Skin: May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Causes skin irritation and possible burns. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.
Ingestion: May cause severe and permanent damage to the digestive tract. May cause perforation of the digestive tract. May cause effects similar to those for inhalation exposure. May cause systemic effects.
Inhalation: Causes chemical burns to the respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability.

Aspiration may lead to pulmonary edema. May cause systemic effects. May cause respiratory sensitization.
Chronic: May cause liver and kidney damage. May cause reproductive and fetal effects. Effects may be delayed. Chronic exposure to mercury may cause permanent central nervous system damage, fatigue, weight loss, tremors, personality changes. Chronic ingestion may cause accumulation of mercury in body tissues. Prolonged or repeated exposure may cause inflammation of the mouth and gums, excessive salivation, and loosening of the teeth.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Wash mouth out with water.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician: The concentration of mercury in whole blood is a reasonable measure of the body-burden of mercury and thus is used for monitoring purposes. Treat symptomatically and supportively. Persons with kidney disease, chronic respiratory disease, liver disease, or skin disease may be at increased risk from exposure to this substance.
Antidote: The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel. The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
Extinguishing Media: Substance is nonflammable; use agent most appropriate to extinguish surrounding fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills

immediately, observing precautions in the Protective Equipment section. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Keep container tightly closed. Do not get on skin or in eyes. Do not ingest or inhale. Use only in a chemical fume hood. Discard contaminated shoes. Do not breathe vapor.
Storage: Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from metals. Store protected from azides.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Mercury	0.025 mg/m3 TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	0.05 mg/m3 TWA (vapor) 10 mg/m3 IDLH	0.1 mg/m3 Ceiling

OSHA Vacated PELs: Mercury: 0.05 mg/m3 TWA (vapor)
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: silver
Odor: odorless
pH: Not available.
Vapor Pressure: 0.002 mm Hg @ 25C
Vapor Density: 7.0
Evaporation Rate: Not available.
Viscosity: 15.5 mP @ 25 deg C
Boiling Point: 356.72 deg C
Freezing/Melting Point:-38.87 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:13.59 (water=1)

Molecular Formula: Hg
Molecular Weight:200.59

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: High temperatures, incompatible materials.
Incompatibilities with Other Materials: Metals, aluminum, ammonia, chlorates, copper, copper alloys, ethylene oxide, halogens, iron, nitrates, sulfur, sulfuric acid, oxygen, acetylene, lithium, rubidium, sodium carbide, lead, nitromethane, peroxyformic acid, calcium, chlorine dioxide, metal oxides, azides, 3-bromopropyne, alkynes + silver perchlorate, methylsilane + oxygen, tetracarbonylnickel + oxygen, boron diiodophosphide.
Hazardous Decomposition Products: Mercury/mercury oxides.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 7439-97-6: OV4550000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 7439-97-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: Intraperitoneal, rat: TDLo = 400 mg/kg/14D-I (Tumorigenic - equivocal tumorigenic agent by RTECS criteria - tumors at site of application).
Teratogenicity: Inhalation, rat: TCLo = 1 mg/m3/24H (female 1-20 day(s) after conception) Effects on Embryo or Fetus - fetotoxicity (except death, e.g., stunted fetus).
Reproductive Effects: Inhalation, rat: TCLo = 890 ng/m3/24H (male 16 week(s) pre-mating) Paternal Effects - spermatogenesis (incl. genetic material, sperm morphology, motility, and count).; Inhalation, rat: TCLo = 7440 ng/m3/24H (male 16 week(s) pre-mating) Fertility - post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants).
Mutagenicity: Cytogenetic Analysis: Unreported, man = 150 ug/m3.
Neurotoxicity: The brain is the critical organ in humans for chronic vapor exposure; in severe cases, spontaneous degeneration of the brain cortex can occur as a late sequela to past exposure.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 0.16-0.90 mg/L; 96 Hr; UnspecifiedFish: Bluegill/Sunfish: LC50 = 0.16-0.90 mg/L; 96 Hr; UnspecifiedFish: Channel catfish: LC50 = 0.35 mg/L; 96 Hr; UnspecifiedWater flea Daphnia: EC50 = 0.01 mg/L; 48 Hr; Unspecified In aquatic systems, mercury appears to bind to dissolved matter or fine particulates, while the transport of mercury bound to dust particles in the atmosphere or bed sediment particles in rivers and lakes is generally less substantial. The conversion, in aquatic environments, of inorganic mercury cmpd to methyl mercury implies that recycling of mercury from sediment to water to air and back could be a rapid process.
Environmental: Mercury bioaccumulates and concentrates in food chain (concentration may be as much as 10,000 times that of water). Bioconcentration factors of 63,000 for freshwater fish and

10,000 for salt water fish have been found. Much of the mercury deposited on land, appears to revaporize within a day or two, at least in areas substantially heated by sunlight.
Physical: All forms of mercury (Hg) (metal, vapor, inorganic, or organic) are converted to methyl mercury. Inorganic forms are converted by microbial action in the atmosphere to methyl mercury.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 7439-97-6: waste number U151.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	DOT regulated - small quantity provisions apply (see 49CFR173.4)	MERCURY
Hazard Class:		8
UN Number:		UN2809
Packing Group:		III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7439-97-6 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
CAS# 7439-97-6: Section 5
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 7439-97-6: 1 lb final RQ; 0.454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 7439-97-6: immediate, delayed.
Section 313
This material contains Mercury (CAS# 7439-97-6, 99.999%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 7439-97-6 (listed as Mercury compounds) is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

CAS# 7439-97-6 is listed as a Priority Pollutant under the Clean Water Act. CAS# 7439-97-6 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7439-97-6 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

WARNING: This product contains Mercury, a chemical known to the state of California to cause developmental reproductive toxicity.

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T

Risk Phrases:

R 23 Toxic by inhalation.

R 33 Danger of cumulative effects.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 7 Keep container tightly closed.

WGK (Water Danger/Protection)

CAS# 7439-97-6: 3

Canada - DSL/NDSL

CAS# 7439-97-6 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2A, E.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7439-97-6 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/15/1999
Revision #5 Date: 3/16/2007

Composition/Information on Ingredient

Cas:
7440-02-0
Code:
M
RTECS:
QR5950000
Code:
M
Name:
NICKEL (SARA III)
Other REC Limits:
N/P
OSHA PEL:
1 MG/M3
Code:
M
OSHA STEL:
ACGIH TLV: 1 MG/M3; 9192
Code:
2 OSHA STEL:
ACGIH TLV:
1 MG/M3; 9192
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
DURING SPRAYING OPERATIONS:USE NIOSH/MSHA METAL FUME MASK OR SUPPLIED AIR RESPIRATOR. AT OTHER TIMES:NONE IS EXPECTED TO BE NECESSARY. 4
Ventilation:
LOCAL EXHAUST DURING SPRAYING OPERATIONS SUFFICIENT TO MAINTAIN EXPOSURE BELOW PEL/TLV. OTHER TIMES NOT NECESSARY.
Protective Gloves:
AS NEEDED FOR BURN PROTECTION.
Eye Protection:
SAFETY GLASSES PLUS ANSI WELDERS LENSES.
Other Protective Equipment:
Equipment EYE WASH STATION. APRON ETC FOR THERMAL BURN PROTECTION. ANSI WELDERS LENS GOGGLES AND/OR FACESHIELD DURING SPRAYING.
Work Hygienic Practices:

USE GOOD INDUSTRIAL HYGIENE PRACTICE.

Supplemental Safety and Health:

MSDS NO 50-215.

Health Hazards Data

LD50LC50Mixture:

N/K

Route Of Entry Inds - Inhalation:

YES

Skin:

NO

Ingestion:

NO

Carcinogenicity Inds - NTP:

YES

IARC:

YES

OSHA:

NO

Health Hazards Acute And Chronic:

PRODUCT DOES NOT POSE A HAZARD UNTIL UTILIZED IN A SPRAY OPERATION,THEN THE HAZARDS ARE THERMAL BURNS,RETINAL BURNS,METALLIC VAPOR INHALATION,EXCESSIVE SOUND LEVELS.

Explanation Of Carcinogenicity:

NICKEL AND NICKEL COMPOUNDS ARE LISTED BY IARC AND NTP. SEE REPORTS FOR DETAILS.

Signs And Symptions Of Overexposure:

EYE:PHYSICAL IRRITATION,RETINA DAMAGE FROM UV EXPOSURE. SKIN:THERMAL BURNS FROM HOT MATERIAL. INHALED:RESPIRATORY IRRITATION,PULMONARY DAMAGE FROM PARTICULATES,SHAVERS DISEASE. INGESTED:NOT REPORTED.

Medical Cond Aggravated By Exposure:

NONE REPORTED.

First Aid:

EYE:FLUSH WITH WATER 15 MIN. SKIN:REMOVE CONTAMINATED CLOTHING. WASH AREA WITH SOAP AND WATER. LAUNDER CLOTHING BEFORE REUSE. INHALED:REMOVE FROM EXPOSURE. GIVE ARTIFICIAL RESPIRATION OR OXYGEN IF NEE DED. INGESTED:DO NOT INDUCE VOMITING. GIVE WATER OR MILK. (NOTHING BY MOUTH IF UNCONSCIOUS) GET IMMEDIATE MEDICAL CARE. IF SYMPTOMS PERSIST OR ARE SEVERE,GET MEDICAL CARE.

Spill Release Procedures:

SWEEP UP RESIDUE OR PICK UP PIECES. 3

Neutralizing Agent:

NONE

Waste Disposal Methods:

DISPOSE I/A/W FEDERAL,STATE,LOCAL REGULATIONS. HMIS SUGGESTS RECLAIM IF POSSIBLE,IF NOT,LANDFILL. NOTE:NICKEL HAS AN

RQ AND QUALIFIES AS HAZARDOUS WASTE IN SOME CASES.
Handling And Storage Precautions:
STORE IN A COOL,DRY,WELL VENTILATED AREA.
Other Precautions:
AVOID CONTACT WITH EYES AND SKIN;DO NOT BREATHE VAPORS/MIST/FUMES.

Fire and Explosion Hazard Information

Flash Point Method:
N/P
Flash Point:
Flash Point Text:
NONE
Autoignition Temp:
Autoignition Temp Text:
N/K
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
NOT FLAMMABLE. USE MEDIA APPROPRIATE FOR SURROUNDING FIRE. SHOULD WIRE BURN USE SAND OR OTHER AGENT FOR METAL
FIRE.
Fire Fighting Procedures:
FIRE FIGHTERS SHOULD USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT WHEN FIGHTING CHEMICAL FIRE. USE WATER
SPRAY TO COOL NEARBY CONTAINERS EXPOSED TO FIRE.
Unusual Fire/Explosion Hazard:
MODERATE FIRE HAZARDS IF EXPOSED TO FLAMES

Physical/Chemical Properties

HCC:
N1
NRC/State LIC No:
N/R
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/K
Melt/Freeze Pt:
M.P/F.P Text:
1300-2500
Decomp Temp:
Decomp Text:
UNKNOWN
Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:

Spec Gravity:
N/K
VOC Pounds/Gallon:
PH: N/K 5
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
NEGLIGIBLE
Appearance and Odor:
WIRE-NO ODOR.
Percent Volatiles by Volume:
NIL
Corrosion Rate:
UNKNOWN

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
NONE
Materials To Avoid:
ALKALIS.
Hazardous Decomposition Products:
NONE
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/R

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

The above information is believed to be correct but does not purport to be all inclusive and shall be used
only as a guide. The information in this document is based on the present state of our knowledge and is
applicable to the product with regard to appropriate safety precautions. It does not represent any
guarantee of the properties of the product. Lookchem shall not be held liable for any damage resulting from
handling or from contact with the above product. See reverse side of invoice or packing slip for additional
terms and conditions of sale.

Section 1 - Chemical Product and Company Identification

MSDS Name: Potassium Metal
Catalog Numbers: P168I-50
Synonyms: None
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7440-09-7	Potassium	>98%	231-119-8

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: silver solid.
Danger! Reacts violently with water liberatinghighly flammable gases. Causes eye and skin burns. Causes digestiveand respiratory tract burns. May ignite or explode on contact withmoist air. May form unstable peroxides.
Target Organs: Eyes, skin, mucous membranes.

Potential Health Effects

Eye: Causes eye burns.
Skin: Causes skin burns. Reacts with moisture in the skin to form potassium hydroxide and hydrogen with much heat.
Ingestion: Causes gastrointestinal tract burns.
Inhalation: May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Reacts with water to form explosive hydrogen gas. May ignite or explode on contact with steam or moist air.
Extinguishing Media: Use dry sand or earth to smother fire. Do NOT use carbon dioxide. Use approved class D extinguishing agents or smother with dry sand, clay, or sodium bicarbonate. DO NOT USE WATER! Contact professional fire-fighters immediately.
Flash Point: Not available.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating:(estimated) Health: 3; Flammability: 2; Instability: 2; Special Hazard: -W-

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. Do not expose spill to water.

Section 7 - Handling and Storage

Handling: Do not allow water to get into the container because of violent reaction. Use spark-proof tools and explosion proof equipment. Do not breathe dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Use with adequate ventilation. Store protected from air. Use and store under nitrogen. Do not allow contact with water. Container should be opened by a technically qualified person. Discard contaminated shoes. Keep from contact with moist air and steam.
Storage: Keep away from sources of ignition. Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from water. Water free area. Store in inert atmospheres, such as argon or nitrogen, under liquids that are oxygen free, such as toluene or kerosene, or in glass capsules that have been filled under vacuum or inert atmosphere.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Potassium	none listed	none listed	none listed

OSHA Vacated PELs: Potassium: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear chemical splash goggles and face shield.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: silver
Odor: odorless
pH: Basic in water (>7)
Vapor Pressure: Not applicable.
Vapor Density: Not applicable.
Evaporation Rate: Not applicable.
Viscosity: Not applicable.
Boiling Point: 770 deg C
Freezing/Melting Point:63 deg C
Decomposition Temperature: Not available.
Solubility: Reacts violently in water.
Specific Gravity/Density:0.862
Molecular Formula:K
Molecular Weight:39.0983

Section 10 - Stability and Reactivity

Chemical Stability: Combines vigorously or explosively with water. Potassium metal will form the peroxide and the superoxide at room temperature even when stored under mineral oil; may explode violently when handled or cut. Oxide-coated potassium should be destroyed by burning.
Conditions to Avoid: Exposure to air, contact with water, exposure to moist air or water.
Incompatibilities with Other Materials: Water, oxidizing agents.
Hazardous Decomposition Products: Hydrogen gas, peroxides, oxides of potassium.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 7440-09-7:TS6460000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 7440-09-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found

Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classifiedas a hazardous waste.US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3.Additionally, waste generators must consult state and local hazardous waste regulations toensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	POTASSIUM	POTASSIUM
Hazard Class:	4.3	4.3
UN Number:	UN2257	UN2257
Packing Group:	I	I

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7440-09-7 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 7440-09-7: immediate, fire, reactive.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this productare listed as Hazardous Substances under the CWA.
None of the chemicals in thisproduct are listed as Priority Pollutants under the CWA.

None of the chemicals in thisproduct are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this productare considered highly hazardous by OSHA.

STATE

CAS# 7440-09-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

F C

Risk Phrases:

R 14/15 Reacts violently with water liberating extremely flammable gases.
R 34 Causes burns.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 8 Keep container dry.
S 5B Keep contents under liquids which are oxygen-free, e.g. kerosen e, toluene, etc.

WGK (Water Danger/Protection)

CAS# 7440-09-7: 2

Canada - DSL/NDSL

CAS# 7440-09-7 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B6, E.

This product has been classified in accordance with the hazardcriteria of the Controlled Products Regulations and the MSDScontains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 12/12/1997
Revision #5 Date: 6/22/2006

Material Safety Data Sheet
Silver

ACC# 20770

Section 1 - Chemical Product and Company Identification

MSDS Name: Silver
Catalog Numbers: S163-10
Synonyms: Argentum.
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7440-22-4	Silver	100	231-131-3

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: white solid.
Caution! May cause respiratory and digestive tract irritation. May cause eye and skin irritation. Danger of cumulative effects.
Target Organs: Kidneys.

Potential Health Effects
Eye: May cause eye irritation.
Skin: May cause skin irritation. May cause skin discoloration.
Ingestion: May cause irritation of the digestive tract. Effects may be cumulative. Ingestion of silver compounds may cause abdominal pain, rigidity, convulsions and shock.
Inhalation: May cause respiratory tract irritation. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count.
Chronic: Chronic inhalation or ingestion of silver salts may cause argyria characterized by a permanent blue-gray discoloration of the eyes, skin, mucous membranes, and internal organs. This malady results from the accumulation of silver in the body.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If irritation develops, get medi cal aid.
Skin: Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.
Ingestion: Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water. Wash mouth out with water. Get medical aid if irritation or symptoms occur.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.
Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 1; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Wash thoroughly after handling. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation. Use with adequate ventilation.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. No special precautions indicated.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
		0.01 mg/m3 TWA (dust)	

Silver	0.1 mg/m3 TWA	10 mg/m3 IDLH (dust)	0.01 mg/m3 TWA

OSHA Vacated PELs: Silver: 0.01 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to minimize contact with skin.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: white
Odor: none reported
pH: Not available.
Vapor Pressure: 100 mm Hg @ 1865 C
Vapor Density: Not available.
Evaporation Rate: Not applicable.
Viscosity: Not available.
Boiling Point: 2212 deg C
Freezing/Melting Point:961 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble in water.
Specific Gravity/Density:10.5
Molecular Formula: Ag
Molecular Weight:107.8682

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, exposure to air.
Incompatibilities with Other Materials: Strong acids, strong bases, ethyleneimine.
Hazardous Decomposition Products: Irritating and toxic fumes and gases, silver fumes.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 7440-22-4: VW3500000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 7440-22-4: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: IARC Group 4: Substance nonclassifiable with regard to carcinogenicity.Tumorigenic

:See RTECS
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: Aquatic Fate: Sorption and precipitation processes are effective in reducing the concn of dissolved silver and result in higher concn in the bed sediments than in the overlying waters. Sorption by manganese dioxide and precipitation with halides are probably the dominant controls on the mobility of silver in the aquatic environment.
Physical: Algae, daphnia, fresh water mussels, and fathead minnows were all found capable of accumulating silver; but the food chain was not an important route of silver accumulation for animals at higher tropic levels, suggesting no food chain magnification.
Other: For more information, see "HANDBOOK OF ENVIRONMENTAL FATE AND EXPOSURE DATA."

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7440-22-4 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 7440-22-4: 1000 lb final RQ (no reporting of releases of this hazardous substance is requir

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 7440-22-4: delayed, fire.

Section 313

This material contains Silver (CAS# 7440-22-4, 100%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 7440-22-4 is listed as a Priority Pollutant under the Clean Water Act. CAS# 7440-22-4 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7440-22-4 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

Not available.

Risk Phrases:

R 33 Danger of cumulative effects.

Safety Phrases:

S 37 Wear suitable gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 28A After contact with skin, wash immediately with plenty of water
.

WGK (Water Danger / Protection)

CAS# 7440-22-4: 0

Canada - DSL / NDSL

CAS# 7440-22-4 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2A.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7440-22-4 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 12/12/1997
Revision #8 Date: 2/15/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet
Sodium Metal

ACC# 92022

Section 1 - Chemical Product and Company Identification

MSDS Name: Sodium Metal
Catalog Numbers: AC611144540
Synonyms: Natrium.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7440-23-5	Sodium	100	231-132-9

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: light silver solid.
Danger! May ignite spontaneously on exposure to moist air. Combustible solid. Causes eye burns. Causes digestive tract burns. Corrosive. Water-reactive. Contact with skin causes irritation and possible burns, especially if the skin is wet or moist. Causes respiratory tract burns.
Target Organs: Eyes, skin, mucous membranes.

Potential Health Effects

Eye: May cause irreversible eye injury. Contact with eyes may cause severe irritation, and possible eye burns.
Skin: Causes skin burns. May cause deep, penetrating ulcers of the skin.
Ingestion: Causes gastrointestinal tract burns.
Inhalation: May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema.
Chronic: Chronic inhalation and ingestion may cause effects similar to those of acute inhalation and ingestion.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Immediately flush skin with plenty of water for at least 15 minutes while removing

contaminated clothing and shoes. Get medical aid if irritation develops or persists.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Reacts violently with water giving off flammable gas which may explode. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Flammable solid. May react violently or explosively on contact with water. May be ignited by heat, sparks, and flame. May re-ignite after fire is extinguished.
Extinguishing Media: DO NOT USE WATER! Do NOT use CO2 or halogenated extinguishing agents. Smother with dry sand, dry clay, dry ground limestone (CaCO3), or use approved Class D extinguishers.
Flash Point: Not applicable.
Autoignition Temperature: 250 deg F (121.11 deg C)
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 3; Instability: 2; Special Hazard: -W-

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Remove all sources of ignition. Provide ventilation. Do not expose spill to water.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Do not get in eyes, on skin, or on clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Do not ingest or inhale. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from water.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Sodium	none listed	none listed	none listed

OSHA Vacated PELs: Sodium: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: light silver
Odor: odorless
pH: Not applicable.
Vapor Pressure: 1 mm Hg @ 440 deg C
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: 0.680cp @ 100C
Boiling Point: 1621 deg F
Freezing / Melting Point:208 deg F
Decomposition Temperature: Not available.
Solubility: Reacts violently with water
Specific Gravity / Density:0.9684 @ 20 C
Molecular Formula: Na
Molecular Weight:22.99

Section 10 - Stability and Reactivity

Chemical Stability: Reacts violently with water. Reacts violently with a broad range of materials.
Conditions to Avoid: Dust generation, exposure to moist air or water.
Incompatibilities with Other Materials: Water, strong oxidizing agents, strong acids, halogens, chloroform, sulfur dioxide.
Hazardous Decomposition Products: Irritating and toxic fumes and gases, sodium oxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 7440-23-5: VY0686000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 7440-23-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.

Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No information avialable.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	SODIUM	No information available.
Hazard Class:	4.3	
UN Number:	UN1428	
Packing Group:	I	

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7440-23-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 7440-23-5: 10 lb final RQ; 4.54 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 7440-23-5: immediate, fire, reactive.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 7440-23-5 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7440-23-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

F C

Risk Phrases:

R 14/15 Reacts violently with water liberating extremely flammable gases.
R 34 Causes burns.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 5 Keep contents under ... (appropriate liquid to be specified by t he manufacturer).
S 8 Keep container dry.
S 43H In case of fire, use dry chemical, soda ash, lime or sand. (D o not use water or foam).

WGK (Water Danger/Protection)

CAS# 7440-23-5: 2

Canada - DSL/NDSL

CAS# 7440-23-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B4, E, F.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 11/07/2001
Revision #5 Date: 10/03/2005

MSDS : Thallium
CAS : 7440-28-0
SYNONYMS : * Ramor
* Thallium

*** CHEMICAL IDENTIFICATION ***

RTECS NUMBER : XG3425000
CHEMICAL NAME : Thallium
CAS REGISTRY NUMBER : 7440-28-0
LAST UPDATED : 199712
DATA ITEMS CITED : 29
MOLECULAR FORMULA : Tl
MOLECULAR WEIGHT : 204.37
WISWESSER LINE NOTATION : .TL
COMPOUND DESCRIPTOR : Human
SYNONYMS/TRADE NAMES :
* Ramor
* Thallium

*** HEALTH HAZARD DATA ***

** ACUTE TOXICITY DATA **

TYPE OF TEST : TDLo - Lowest published toxic dose
ROUTE OF EXPOSURE : Oral
SPECIES OBSERVED : Human - man
DOSE/DURATION : 5714 ug/kg
TOXIC EFFECTS :
Peripheral Nerve and Sensation - structural change in nerve or sheath
Sense Organs and Special Senses (Eye) - changes in extra-ocular muscles
Skin and Appendages - hair
REFERENCE :
ATXKA8 Archiv fuer Toxikologie. (Berlin, Fed. Rep. Ger.) V.15-31, 1954-74.
For publisher information, see ARTODN. Volume(issue)/page/year: 19,65,1961

TYPE OF TEST : LDLo - Lowest published lethal dose
ROUTE OF EXPOSURE : Unreported
SPECIES OBSERVED : Human - man
DOSE/DURATION : 4412 ug/kg
TOXIC EFFECTS :
Details of toxic effects not reported other than lethal dose value
REFERENCE :
85DCAI "Poisoning; Toxicology, Symptoms, Treatments," 2nd ed., Arena, J.M.,
Springfield, IL, C.C. Thomas, 1970 Volume(issue)/page/year: 2,73,1970

*** REVIEWS ***

ACGIH TLV-TWA 0.1 mg/m3 (skin)

DTLVS* The Threshold Limit Values (TLVs) and Biological Exposure Indices
(BEIs) booklet issues by American Conference of Governmental Industrial
Hygienists (ACGIH), Cincinnati, OH, 1996 Volume(issue)/page/year: TLV/BEI,1997

*** U.S. STANDARDS AND REGULATIONS ***

MSHA STANDARD-air:TWA 0.1 mg/m3 (skin)
DTLVS* The Threshold Limit Values (TLVs) and Biological Exposure Indices
(BEIs) booklet issues by American Conference of Governmental Industrial
Hygienists (ACGIH), Cincinnati, OH, 1996 Volume(issue)/page/year: 3,256,1971

OSHA PEL (Gen Indu):8H TWA 0.1 mg(Tl)/m3 (skin)
CFRGBR Code of Federal Regulations. (U.S. Government Printing Office, Supt.
of Documents, Washington, DC 20402) Volume(issue)/page/year: 29,1910.1000,1994

OSHA PEL (Construc):8H TWA 0.1 mg(Tl)/m3 (skin)
CFRGBR Code of Federal Regulations. (U.S. Government Printing Office, Supt.
of Documents, Washington, DC 20402) Volume(issue)/page/year: 29,1926.55,1994

OSHA PEL (Shipyard):8H TWA 0.1 mg(Tl)/m3
CFRGBR Code of Federal Regulations. (U.S. Government Printing Office, Supt.
of Documents, Washington, DC 20402) Volume(issue)/page/year: 29,1915.1000,1993

OSHA PEL (Fed Cont):8H TWA 0.1 mg(Tl)/m3
CFRGBR Code of Federal Regulations. (U.S. Government Printing Office, Supt.
of Documents, Washington, DC 20402) Volume(issue)/page/year: 41,50-204.50,1994

*** OCCUPATIONAL EXPOSURE LIMITS ***

OEL-AUSTRALIA:TWA 0.1 mg/m3;Skin JAN 1993

OEL-BELGIUM:TWA 0.1 mg/m3;Skin JAN 1993

OEL-DENMARK:TWA 0.1 mg/m3;Skin JAN 1993

OEL-FINLAND:TWA 0.1 mg/m3;Skin JAN 1993

OEL-FRANCE:TWA 0.1 mg/m3 JAN 1993

OEL-GERMANY:TWA 0.1 mg/m3 JAN 1993

OEL-THE NETHERLANDS:TWA 0.1 mg/m3;Skin JAN 1993

OEL-THE PHILIPPINES:TWA 0.1 mg/m3;Skin JAN 1993

OEL-SWITZERLAND:TWA 0.1 mg/m3;Skin JAN 1993

OEL-THAILAND:TWA 0.1 mg/m3 JAN 1993

OEL-TURKEY:TWA 0.1 mg/m3;Skin JAN 1993

OEL-UNITED KINGDOM:TWA 0.1 mg/m3;Skin JAN 1993

OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV

OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGIH TLV

*** NIOSH STANDARDS DEVELOPMENT AND SURVEILLANCE DATA ***

NIOSH RECOMMENDED EXPOSURE LEVEL (REL) :
NIOSH REL TO THALLIUM, soluble compounds-air:10H TWA 0.1 mg/m3 (Sk)
REFERENCE :
NIOSH* National Institute for Occupational Safety and Health, U.S. Dept. of
Health, Education, and Welfare, Reports and Memoranda.
Volume(issue)/page/year: DHHS #92-100,1992

NIOSH OCCUPATIONAL EXPOSURE SURVEY DATA :
NOES - National Occupational Exposure Survey (1983)
NOES Hazard Code - X3172
No. of Facilities: 158 (estimated)
No. of Industries: 3
No. of Occupations: 5
No. of Employees: 1662 (estimated)
No. of Female Employees: 1308 (estimated)

*** STATUS IN U.S. ***

EPA TSCA Section 8(b) CHEMICAL INVENTORY

EPA TSCA Section 8(d) unpublished health/safety studies

EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JUNE 1998

NIOSH Analytical Method, 1994: Elements by ICP, 7300

NIOSH Analytical Method, 1994: Elements in blood or tissue, 8005

*** END OF RECORD ***

MSDS Number: **A7152** * * * * * *Effective Date:* ***08/02/00*** * * * * * *Supercedes:* ***09/08/97***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker ®

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

Antimony

1. Product Identification

Synonyms: Stibium, C.I. 77050
CAS No.: 7440-36-0
Molecular Weight: 121.75
Chemical Formula: Sb
Product Codes: 0848

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Antimony	7440-36-0	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! MAY BE FATAL IF INHALED. CAUSES IRRITATION. TARGET ORGAN(S): Respiratory system, cardiovascular system, eyes, skin.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 1 - Slight
Reactivity Rating: 2 - Moderate
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Is harmful may be fatal.
Ingestion:
None identified.
Skin Contact:
Prolonged contact may cause dermatitis.
Eye Contact:
None identified.
Chronic Exposure:
Kidney damage, liver damage.
Aggravation of Pre-existing Conditions:
No information found.

---

4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Prompt action is essential.
Ingestion:
If large amounts were swallowed, give water to drink and get medical advice.
Skin Contact:
In case of contact, flush skin with water.
Eye Contact:
In case of eye contact, immediately flush with plenty of water for at least 15 minutes.

---

5. Fire Fighting Measures

Fire:
Not expected to be a fire hazard.
Explosion:
Can be an explosion hazard, especially when heated.
Fire Extinguishing Media:
Use extinguishing media appropriate for surrounding fire.
Special Information:
No information found.

---

6. Accidental Release Measures

Wear self-contained breathing apparatus and full protective clothing. With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water.

---

7. Handling and Storage

Keep container tightly closed. Store in secure poison area. Keep product out of light. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
0.5 mg/m3 (TWA)

-ACGIH Threshold Limit Value (TLV):
0.5 mg/m3 (TWA)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the substance is apparent, consult an industrial hygienist. For emergencies, or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Silvery-white metal.

Odor:
No information found.

Solubility:
Negligible (< 0.1%)

Specific Gravity:
6.68

pH:
No information found.

% Volatiles by volume @ 21C (70F):
0

Boiling Point:
1635C (2975F)

Melting Point:
630C (1166F)

Vapor Density (Air=1):
4.2

Vapor Pressure (mm Hg):
Not applicable.

Evaporation Rate (BuAc=1):

No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
No information found.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizing agents, strong acids, halogen acids, chlorine, fluorine.
Conditions to Avoid:
Heat, Light.

---

11. Toxicological Information

Cancer Lists			
	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
Antimony (7440-36-0)	No	No	None

---

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Not regulated.

---

15. Regulatory Information

Chemical Inventory Status - Part 1				
Ingredient	TSCA	EC	Japan	Australia
Antimony (7440-36-0)	Yes	Yes	No	Yes

Chemical Inventory Status - Part 2

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Antimony (7440-36-0)	Yes	Yes	No	Yes

\--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Antimony (7440-36-0)	No	No	Yes	Antimony com

\--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Antimony (7440-36-0)	5000	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

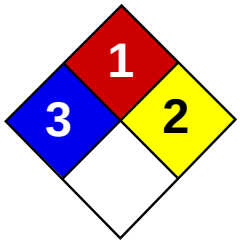
Label Hazard Warning:
POISON! DANGER! MAY BE FATAL IF INHALED. CAUSES IRRITATION. TARGET ORGAN(S): Respiratory system, cardiovascular system, eyes, skin.
Label Precautions:
Avoid contact with eyes, skin, clothing.
Do not breathe dust. Keep in tightly closed container. Use with adequate ventilation. Wash thoroughly after handling.
Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Prompt action is essential. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse.
Product Use:
Laboratory Reagent.
Revision Information:
No changes.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL

NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)



Health	3
Fire	1
Reactivity	2
Personal Protection	E

Material Safety Data Sheet
Arsenic MSDS

Section 1: Chemical Product and Company Identification

Product Name: Arsenic

Catalog Codes: SLA1006

CAS#: 7440-38-2

RTECS: CG0525000

TSCA: TSCA 8(b) inventory: Arsenic

CI#: Not applicable.

Synonym:

Chemical Name: Arsenic

Chemical Formula: As

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.01 from ACGIH (TLV) [United States] [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 74.92 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: Not available.

Melting Point: Sublimation temperature: 615°C (1139°F)

Critical Temperature: Not available.

Specific Gravity: 5.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 145 mg/kg [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Arsenic UNNA: UN1558 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic Pennsylvania RTK: Arsenic Massachusetts RTK: Arsenic TSCA 8(b) inventory: Arsenic

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R22- Harmful if swallowed. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

Created: 10/09/2005 04:16 PM

Last Updated: 11/01/2010 12:00 PM

Composition/Information on Ingredient

Cas:
7440-39-3
Code:
M
RTECS:
CQ8370000
Code:
M
Name:
BARIUM (SARA 313)
Other REC Limits:
N/K
OSHA PEL:
0.5 MG/M3
Code:
M
OSHA STEL:
Code:
3
ACGIH TLV:
N/K (FP N)
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
IF PERSONAL EXPOS CANNOT BE CONTROLLED BELOW APPLIC LIMITS VY BENT, WEAR NIOSH APPRVD, PROPERLY
FITTED ORGANIC VAPOR/PARTICULATE RESP. WHEN SANDING OR ABRADING DRIED FILM, WEAR DUST/MIST RESP
APPRVD B Y NIOSH FOR PROT AGAINST NON-VOLATILE MATERIALS IN INGREDIENT SECTION.
Ventilation:
LOC EXHST PREF. GEN EXHST ACCEPTABLE IF EXPOS MAINTAINED BELOW APPLIC LIMS. REFER TO OSHA STDS
1910.98, 107, 108.
Protective Gloves:
CHEMICAL RESISTANT GLOVES.
Eye Protection:
ANSI APPRVD CHEM WORKERS GOGGLES (FP N).
Other Protective Equipment:
Equipment ANSI APPROVED EYE WASH &DELUGE SHOWER (FP N).
Work Hygienic Practices:
NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health:
OTHER PREC: LEVELS ONLY DURING SANDING OR ABRADING OF DRIED FILM. IF NO SPECIFIC DUSTS ARE LISTED, THE
APPLIC LIMITS FOR NUISANCE DUSTS ARE ACGIH TLV 10 MG/M3 (TDUST), OSHA PEL 15 MG/M3 (TDUST), 5 MG /M3
(RESPIRABLE FRACTION). 5

Health Hazards Data

LD50LC50Mixture:
NONE SPECIFIED BY MANUFACTURER.
Route Of Entry Inds - Inhalation:

YES
Skin:
YES
Ingestion:
NO
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
IRRIT OF EYES, SKIN & RESP SYS. MAY CAUSE NERVOUS SYS DEPRESS. EXTREME OVEREXP MAY RSLT IN UNCON & POSS DEATH. HDCH,
DIZZ, NAUS & LOSS OF COORD ARE INDICATIONS OF EXCESSIVE EXPOS TO VAPORS OR SPRAY MI STS. REDNESS & ITCHING OR
BURNING SENSATION MAY INDICATE EYE OR EXCESSIVE SKIN EXPOSURE. PRLNGD OVEREXP TO HEXANE MAY CAUSE DMG TO NERVE
TISSUES OF ARMS & LEGS (PERIPHEREAL NEUROPATHY), RESULTING IN MUSCULAR WEAK & LOSS OF COORDINATION. THIS EFT MAY BE
INCREASED BY PRESENCE OF METHYL ETHYL K
Explanation Of Carcinogenicity:
NOT RELEVANT
Signs And Symptions Of Overexposure:
HLTH HAZ: REPORTS HAVE ASSOC RPTD & PRLNGD OVEREXP TO SOLVENTS W/PERMANENT BRAIN & NERVOUS SYSTEM DMG.
Medical Cond Aggravated By Exposure:
NONE GENERALLY RECOGNIZED.
First Aid:
INHAL: IF AFFECTED, REMOVE FROM EXPOSURE. RESTORE BRTHG. KEEP WARM & QUIET. SKIN: WASH AFFECTED AREA THOROUGHLY
W/SOAP & WATER. REMOVE CONTAMINATED CLOTHING & LAUNDER BEFORE REUSE. EYES: FLUSH EYES W/ LARGE AMOUNTS OF WATER
FOR AT LEAST 15 MINUTES. GET MED ATTN. INGEST: NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. DO NOT INDUCE
VOMITING. GIVE SEVERAL GLASSES OF WATER. SEEK MED ATTN.
Spill Release Procedures:
REMOVE ALL SOURCES OF IGNITION. VENTILATE AND REMOVE WITH INERT ABSORBENT.
Neutralizing Agent:
NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods:
WASTE FROM THIS PROD MAY BE HAZ AS DEFINED UNDER RCRA 40 CFR 261. WASTE MUST BE TESTED FOR IGNITABILITY TO
DETERMINE APPLIC EPA HAZ WASTE NUMBERS. DO NOT INCINERATE. DEPRESSURIZE CNTNR. DISPOSE OF I/A /W FED, STATE & LOCAL
REGS REGARDING POLLUTION.
Handling And Storage Precautions:
CONTENTS ARE EXTREMELY FLAM. KEEP AWAY FROM HEAT, SPKS & OPEN FLAME. VAPS WILL ACCUMULATE READILY & MAY IGNITE
EXPLOSIVELY. DURING USE & UNTIL ALL VAPS ARE GONE: KEEP AREA VENTD - DO NOT SMOKE - EXTIN G ALL FLAMES, PILOT LIGHTS &
HEATERS - TURN OFF STOVES, ELEC TOOLS & APPLIANCES & ANY(OTHER INFO)
Other Precautions:
INTENTIONAL MISUSE BY DELIB CONC & INHALING CONTENTS CAN BE HARMFUL/FATAL. USE ONLY W/ADEQ VENT. AVOID BRTHG VAP &
SPRAY MIST. AVOID CONTACT W/SKIN & EYES. WASH HANDS AFTER 4 USING. THESE COATINGS MAY C ONTAIN MATLS CLASSIFIED AS
NUISANCE PARTICULATES (LISTED "AS DUST" IN INGRED SECTION) WHICH MAY BE P RESENT AT HAZ (SUPP)

Fire and Explosion Hazard Information

Flash Point Method:
PMCC
Flash Point:
Flash Point Text:
<0F,<-18C
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
0.9%
Upper Limits:
13.1%
Extinguishing Media:
CARBON DIOXIDE, DRY CHEMICAL, FOAM.
Fire Fighting Procedures:
USE NIOSH APPRVD SCBA & FULL PROT EQUIP (FP N). WATER SPRAY MAY BE INEFTIVE. IF WATER IS USED, FOG NOZZS ARE PREF.
WATER MAY BE USED TO COOL CLSD CNTNRS TO PVNT PRESS BUILD-UP & POSS AUTOIGNIT OR EXPL O WHEN EXPOSED TO EXTREME
HEAT.
Unusual Fire/Explosion Hazard:
ISOLATE FROM HEAT, ELEC EQUIP, SPARKS & OPEN FLAME. CLOSED CNTNRS MAY EXPLODE WHEN EXPOSED TO EXTREME HEAT.
APPLICATION TO HOT SURFS REQS SPECIAL PRECS. DURING EMER CNDTNS OVEREXP TO DECOMP PRODS MAY CAUSE A HLTH HAZ.
SYMPS MAY NOT BE IMMED APPARENT. OBTAIN MED ATTN.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
<0F,<-18C
Melt/Freeze Pt:
M.P/F.P Text:
N/A
Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
SEE OTHER INFO
Vapor Density:
HVR/AIR
Volatile Org Content %:
Spec Gravity:
0.857 (FP N)
VOC Pounds/Gallon:
3.77
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
FASTER THAN ETHER
Solubility in Water:
N/A
Appearance and Odor:
NONE SPECIFIED BY MANUFACTURER.
Percent Volatiles by Volume:
N/K
Corrosion Rate:

N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid:
NONE KNOWN.
Hazardous Decomposition Products:
BY FIRE: CARBON DIOXIDE, CARBON MONOXIDE.
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
NOT RELEVANT

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

For R&D use only. Not for drug, household or other uses.

Composition/Information on Ingredient

Cas:
7440-41-7
Code:
M
RTECS:
DS1750000
Code:
M
Name:
BERYLLIUM (SARA 313) (CERCLA). PERCENTAGE (WT):<0
Other REC Limits:
N/K
OSHA PEL:
0.002 MG/M3, Z-2
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
.002 MG/M3, A2
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
NIOSH/MSHA APPROVED DUST RESPIRATOR.
Ventilation:
LOCAL EXHAUST:PROVIDE ADEQUATE EXHAUST VENT TO MEET TLV REQUIREMENTS. 6
Protective Gloves:
LEATHER OR RUBBER GLOVES.
Eye Protection:
ANSI APPROVED CHEM SAFETY GOGGLES (FP N)
Other Protective Equipment:
Equipment EYEWASH STATION.
Work Hygienic Practices:
GOOD PERSONAL HYGIENE TO BE FOLLOWED AT ALL TIMES.
Supplemental Safety and Health:
EXPLAN OF CARCIN:ANTIC TO BE CARCINOGEN.

Health Hazards Data

LD50LC50Mixture:
NONE SPECIFIED BY MANUFACTURER.
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
YES
IARC:
YES
OSHA:
NO
Health Hazards Acute And Chronic:

ACUTE:INHALATION OF DUST MAY CAUSE MECHANICAL IRRITATION TO RESPIRATORY TRACT. SKIN AND EYE CONTACT MAY CAUSE
MECHANICAL ABRASION IRRITATION. CHRONIC:LONG TERM OVEREXPOSURE TO SILICA CAUSES SILICOSIS, A FORM OF PULMONARY
FIBROSIS. CONTINUED EXPOSURE TO SILICA CAN LEAD TO CARDIOPULMONARY IMPAIRMENT.

Explanation Of Carcinogenicity:

SILICA, CRYSTALLINE-QUARTZ:IARC MONO, SUPP. VOL 7, PG 341, 1987:GROUP 2A. NTP 7TH ANNUAL RPT ON CARCIN, 1994: (SUPDAT)

Signs And Symptions Of Overexposure:

SEE HEALTH HAZARDS.

Medical Cond Aggravated By Exposure:

EXCESSIVE EXPOSURE ABOVE TLV CAN GIVE MILD PULMONARY IRRITATION.

First Aid:

SKIN:WASH WITH SOAP & WATER. EYES:FLUSH OUT W/GENEROUS AMTS OF WATER FOR @ LEAST 15 MINUTES. SEE PHYS IF IRRIT
PERSISTS. INHAL:REMOVE TO FRESH AIR. CONT PHYS IF BRTHG IS DFCLT. INGEST:IF CONSCIOUS GIV E LARGE QUANTITIES OF WATER
TO INDUCE VOMITING. GET MEDICAL ATTENTION.

Spill Release Procedures:

VACUUM OR SCOOP UP SPILLED MATERIAL FOR RECOVERY OR DISPOSAL, AVOID DUSTY CONDITIONS, USE GOOD VENTILATION.
WETTING SPILL WITH WATER SPRAY WILL KEEP DUST LEVEL DOWN.

Neutralizing Agent:

NONE SPECIFIED BY MANUFACTURER. 5

Waste Disposal Methods:

DISPOSAL TO BE IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS. DISCARDED MATERIAL WOULD BE CLASSIFIED AS
NON-HAZARDOUS. (RCRA)

Handling And Storage Precautions:

ENGINEERING CONTROLS SHOULD BE USED TO MAINTAIN FREE SILICA DUST BELOW TLV. ALUMINUM OXIDE IS REPORTABLE UNDER SARA
TITLE III, SECTION 313.

Other Precautions:

NONE.

Fire and Explosion Hazard Information

Flash Point Method:

N/P

Flash Point:

Flash Point Text:

NON-FLAMMABLE

Autoignition Temp:

Autoignition Temp Text:

N/A

Lower Limits:

N/A

Upper Limits:

N/A

Extinguishing Media:

AS APPROPRIATE FOR SURROUNDING COMBUSTIBLES. DOES NOT BURN OR SUPPORT COMBUSTION.

Fire Fighting Procedures:

USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire/Explosion Hazard:

NO FIRE OR EXPLOSION HAZARD.

Physical/Chemical Properties

HCC:

NRC/State LIC No:

Net Prop WT For Ammo:

Boiling Point:

B.P. Text:

N/A

Melt/Freeze Pt:
M.P/F.P Text:
N/A
Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
N/A
Vapor Density:
N/A
Volatile Org Content %:
Spec Gravity:
4.9-5.1(H*2O=1)
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
0 (BUTYL ACETATE =1)
Solubility in Water:
INSOLUBLE 7
Appearance and Odor:
REDDISH BROWN POWDER - NO ODOR
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
NONE.
Materials To Avoid:
NONE.
Hazardous Decomposition Products:
NONE.
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
NOT RELEVANT.

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any

guarantee of the properties of the product. Lookchem shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Material Safety Data Sheet
Cadmium metal, granular

ACC# 03720

Section 1 - Chemical Product and Company Identification

MSDS Name: Cadmium metal, granular
Catalog Numbers: 61213-5000, C3-500
Synonyms: None.
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7440-43-9	Cadmium	100	231-152-8

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: silver white granules.
Danger! Flammable solid. May be fatal if inhaled. Harmful if swallowed. Causes eye, skin, and respiratory tract irritation. Contains cadmium. Cancer hazard. Avoid creating dust. Can cause lung and kidney disease. Inhalation of fumes may cause metal-fume fever. Air sensitive. May cause reproductive and fetal effects.
Target Organs: Blood, kidneys, liver, lungs, skeletal structures, prostate.

Potential Health Effects

Eye: Causes eye irritation.
Skin: Causes skin irritation.
Ingestion: Harmful if swallowed. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Ingestion may produce fluid loss, acute renal failure, and cardiopulmonary depression.
Inhalation: May be fatal if inhaled. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. Damage may be delayed. May cause nausea, vomiting, abdominal pain, diarrhea, chest tightness, weakness, and delayed pulmonary edema. In humans inhalation causes proteinuria, an excess of protein in the urine.
Chronic: May cause respiratory tract cancer. Repeated inhalation may cause chronic bronchitis. Chronic inhalation may cause nasal septum ulceration and perforation. Cadmium and compounds may cause lung, liver and kidney damage and lung and prostate cancer in humans. May cause loss of smell, emphysema, anemia, bone demineralization, and lung fibrosis. The primary target organ for

chronic cadmium disease is clearly the kidney.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: POISON material. If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Attempt rescue only after notifying at least one other person of the emergency and putting into effect established emergency procedures. Do not become a casualty yourself.
Notes to Physician: Administration of calcium disodium EDTA may be useful in acute poisoning with its use at the discretion of qualified medical personnel. Persons with kidney disease, chronic respiratory disease, liver disease, or skin disease may be at increased risk from exposure to this substance.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Material can spontaneously ignite (pyrophoric) when exposed to air at normal or slightly elevated temperatures. Dust can be an explosion hazard when exposed to heat or flame. Flammable solid. May burn rapidly with flare burning effect. May re-ignite after fire is extinguished. Dangerous fire hazard in the form of dust when exposed to heat or flame.
Extinguishing Media: Use dry sand, graphite powder, dry sodium chloride-based extinguishers.
Flash Point: Not available.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 4; Flammability: 2; Instability: 1

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. Place under an inert atmosphere.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Use spark-proof tools and explosion proof equipment. Avoid contact with skin and eyes. Do not breathe dust, mist, or vapor. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep

away from heat, sparks and flame. Do not ingest or inhale. Handle under an inert atmosphere. Store protected from air. Use only in a chemical fume hood. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from heat and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Do not expose to air. Store under an inert atmosphere.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood. See 29CFR 1910.1027 for regulations applying to all occupational exposures to cadmium and cadmium compounds, in all forms.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Cadmium	0.01 mg/m3 TWA; 0.002 mg/m3 TWA (respirable fraction)	9 mg/m3 IDLH (dust)	5 æg/m3 TWA; 0.1 mg/m3 TWA (fume, applies to any operations or sectors for which the Cadmium standard is stayed or otherwise not in effect); 0.2 mg/m3 TWA (dust, applies to any operations or sectors for which the Cadmium standard is stayed or otherwise not in effect); 0.3 mg/m3 Ceiling (fume, applies to any operations or sectors for which the Cadm ium standard is stayed or otherwise not in effect); 0.6 mg/m3 Ceiling (dust, applies to any operations or sectors for which the Cadmium standard is stayed or otherwise not in effect); 2.5 æg/m3 Action Level; 5 æg/m3 TWA (Do not eat, drink or chew to bacco or gum or apply cosmetics in regulated areas. Carcinogen - dust can cause lung and kidney disease. See 29 CFR 1910.1027)

OSHA Vacated PELs: Cadmium: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Granules
Appearance: silver white
Odor: odorless
pH: Not available.
Vapor Pressure: Not applicable.
Vapor Density: Not available.
Evaporation Rate: Not applicable.
Viscosity: Not applicable.
Boiling Point: 765 deg C @ 760 mmHg
Freezing/Melting Point:321 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:8.64 @ 25°C
Molecular Formula: Cd
Molecular Weight:112.40

Section 10 - Stability and Reactivity

Chemical Stability: Oxidizes when exposed to air. Easily tarnishes in moist air. Powder or liquid is pyrophoric. Contact with acid liberates gas.
Conditions to Avoid: Ignition sources, dust generation, excess heat, prolonged exposure to air.
Incompatibilities with Other Materials: Strong oxidizing agents, acids, sulfur, zinc, selenium, tellurium.
Hazardous Decomposition Products: Toxic cadmium oxide fumes.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 7440-43-9: EU9800000
LD50/LC50:
CAS# 7440-43-9:
Inhalation, rat: LC50 = 25 mg/m3/30M;
Oral, mouse: LD50 = 890 mg/kg;
Oral, rat: LD50 = 2330 mg/kg;
.

Carcinogenicity:
CAS# 7440-43-9:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 10/1/87
- **NTP:** Known carcinogen
- **IARC:** Group 1 carcinogen

Epidemiology: Occupational exposure to cadmium has been implicated in a significant increase in prostate and respiratory tract cancer. There is evidence of a significant excess of respiratory cancer

deaths among a cohort of cadmium production workers, and concluded that cadmium and its compounds are potential carcinogens.
Teratogenicity: Oral, rat: TDLo = 155 mg/kg (male 13 week(s) pre-mating and female 13 week(s) pre-mating - 3 week(s) after conception) Effects on Newborn - growth statistics (e.g.%, reduced weight gain) and Effects on Newborn - behavioral.; Oral, rat: TDLo = 23 mg/kg (female 1-22 day(s) after conception) Specific Developmental Abnormalities - blood and lymphatic systems (including spleen and marrow).; Oral, mouse: TDLo = 1700 mg/kg (female 8-12 day(s) after conception) Effects on Newborn - viability index (e.g., # alive at day 4 per # born alive) and Effects on Newborn - growth statis
Reproductive Effects: Oral, rat: TDLo = 21500 ug/kg (multigenerations) Fertility - pre-implantation mortality (e.g. reduction in number of implants per female; total number of implants per corpora lutea).; Intraperitoneal, rat: TDLo = 1124 ug/kg (male 1 day(s) pre-mating) Paternal Effects - spermatogenesis (incl. genetic material, sperm morphology, motility, and count).
Mutagenicity: Micronucleus Test: Mouse, Embryo = 6 umol/L.; Cytogenetic Analysis: Hamster, Ovary = 1 umol/L.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: TLm = 30 ppm; 24 Hr; Hard waterFish: Striped bass: LC50 = 0.001 ppm; 24-48 Hr; Static bioassayFish: Fathead Minnow: TL50 = 7.2 ppm; 96 Hr; UnspecifiedFish: Bluegill/Sunfish: LCO = 0.08 ppm; 96 Hr; Static bioassay (Hard water) No data available.
Environmental: Cadmium can enter the air from natural sources.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	TOXIC SOLIDS, FLAMMABLE, ORGANIC, N.O.S.	Toxic Solid, Flammable, Organic, N.O.S. (CADMIUM METAL)
Hazard Class:	6.1	6.1
UN Number:	UN2930	UN2930
Packing Group:	I	I

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 7440-43-9 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 7440-43-9: 10 lb final RQ (no reporting of releases of this hazardous substance is required

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 7440-43-9: immediate, delayed, fire.

Section 313

This material contains Cadmium (CAS# 7440-43-9, 100%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 7440-43-9 (listed as Cadmium compounds) is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

CAS# 7440-43-9 is listed as a Priority Pollutant under the Clean Water Act. CAS# 7440-43-9 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7440-43-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Cadmium, a chemical known to the state of California to cause cancer. WARNING: This product contains Cadmium, a chemical known to the state of California to cause male reproductive toxicity.

California No Significant Risk Level: CAS# 7440-43-9: 0.05 æg/day NSRL (inhalation)

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T+ F

Risk Phrases:

R 11 Highly flammable.

R 25 Toxic if swallowed.

R 26 Very toxic by inhalation.

R 45 May cause cancer.

Safety Phrases:

S 36/37/39 Wear suitable protective clothing, gloves and eye/face pr
otection.

S 45 In case of accident or if you feel unwell, seek medical advice
immediately (show the label where possible)

immediately (show the label where possible).

S 53 Avoid exposure - obtain special instructions before use.

WGK (Water Danger/Protection)

CAS# 7440-43-9: No information available.

Canada - DSL/NDSL

CAS# 7440-43-9 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1A, B4.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7440-43-9 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/28/1999
Revision #7 Date: 2/13/2008

Composition/Information on Ingredient

Cas:
7440-47-3
Code:
M
RTECS:
GB4200000
Code:
M
Name:
CHROMIUM (SARA III)
Other REC Limits:
N/P
OSHA PEL:
1 MG/M3
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
0.5 MG/M3; 9192
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
ORGANIC VAP CANISTER WHERE OXYGE CONTENT IS ADEQ & VAP CONCENTRA IS
Ventilation:
LOC. EXHAUST-YES MECHANICAL-YES 5
Protective Gloves:
RUBBER GLOVES
Eye Protection:
GOGGLES
Other Protective Equipment:
Equipment N/P
Work Hygienic Practices:
N/P
Supplemental Safety and Health:
ADDTIL HAZARD INGRED:METHYL ETHYL,KETONE, XS5250000,5.50%,
100PPM;ISOPROPYL ALCOHOL, NT8050000,
2.75%, 400 PPM;METHYL ISOBUTYL KETONE, PO6125000, 6.70% 50 PPM

Health Hazards Data

LD50LC50Mixture:
N/P
Route Of Entry Inds - Inhalation:
N/P
Skin:
N/P
Ingestion:
N/P
Carcinogenicity Inds - NTP:
N/P
IARC:
N/P
OSHA:
N/P

Health Hazards Acute And Chronic:
N/P
Explanation Of Carcinogenicity:
N/P
Signs And Symptions Of Overexposure:
SYSTEM TOXIC EFFECTS MAY ALSO RESULT FR SKIN ABSORPTION.IRRIT TO EYES,NOSE & THROAT NEAR OR ABOVE
Medical Cond Aggravated By Exposure:
N/P
First Aid:
IF INHALED,REMOV TO FRESH AIR.IF NOT BREATHING,GIVE ARTIFICIAL RESPIRATION,PREFERABLY MOUTH TO MOUTH.CALL A DR. IN
CASE OF SKIN CONTACT WASH THOROUGHLY W/SOAP & WATER;FOR EYES,FLUSH IMMED.W/WATER FOR 15 MIN. & CONTACT A DR.
WASH CONT
Spill Release Procedures:
REMOVE ALL SOURCES OF IGNITION (FLAME) ELECTRICAL,STATIC OR FRICTIONAL SPARKS;HOT SURFACES,ETC).AVOID BREATHING
VAPORS.VENTILATE AREA.CONTAIN & SCOOP UP SPILL W/NON-SPARKING TOOLS,RAGS,ETC.USE INERT A BSORBENT MATERIALS ON
SMALL SPILLS OR ON RESIDUALS
Neutralizing Agent:
N/P 4
Waste Disposal Methods:
DISPOSE OF IAW LOCAL APPLICABLE REGS.
Handling And Storage Precautions:
KEEP CONTAINERS CLOSED & UPRIGHT TO PREVENT LEAKAGE.AVD FLAMES,WELDING,SMOKING,SPARKS,OPEN,LIGHTS,ETC.AVOID
BREATHING OF VAP OR SPRAY MIST.AVD EYE & S
Other Precautions:
MAINTAIN GOOD PERSONAL HYGIENE.DO NOT USE IN CONFINED AREAS, TANK OR PIT W/O ADEQ. VENTILATIONS.

Fire and Explosion Hazard Information

Flash Point Method:
N/P
Flash Point:
Flash Point Text:
23 F TCC -5 C
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
Upper Limits:
Extinguishing Media:
FOAM, DRY CHEMICAL,WATER SPRAY FOG OR CO*2
Fire Fighting Procedures:
USE AIR SUPPLIED EQMT FOR ENCL AREAS.COOL EXPOS CONTAINERS
Unusual Fire/Explosion Hazard:
KEEP AWAY FR HEAT,SPARKS & FLAME.

Physical/Chemical Properties

HCC:
F2
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/A
Melt/Freeze Pt:
M.P/F.P Text:
N/A

Decomp Temp:
Decomp Text:
N/A
Vapor Pres:
N/P
Vapor Density:
HEAV
Volatile Org Content %:
Spec Gravity:
GL 7.9
VOC Pounds/Gallon:
PH: N/P
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N. BUTYL ACET-FAST 6
Solubility in Water:
NEGLIGIBLE
Appearance and Odor:
VISCOUS RED LIQUID W/TYPICAL SOLVENT ODOR
Percent Volatiles by Volume:
76.2
Corrosion Rate:
N/P

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/P
Materials To Avoid:
N/P
Hazardous Decomposition Products:
N/P
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/P

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

Composition/Information on Ingredient

Cas:
7440-48-4
Code:
M
RTECS:
GF8750000
Code:
M
Name:
COBALT (SARA III)
Other REC Limits:
N/P
OSHA PEL:
0.1 MG/M3;AS CO
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
0.05 MG/M3;DUST 9293
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
SCBA IF INVOLVED IN FIRE, OTHERWISE GAS MASK.
Ventilation:
PROVIDE MECHAN(GEN/LOCAL EXHAUST)VENT TO MAINTN
Protective Gloves:
IMPERVIOUS
Eye Protection:
SAFETY GLASSES
Other Protective Equipment:
Equipment EYE WASH STATION. APRONS. SPECIAL IMPERVIOUS CLOTHING.
Work Hygienic Practices:
N/P
Supplemental Safety and Health:
SOURCE OF DATA-MIL HANDBOOK 600-1 SEP 76.SAFETY & HEALTH DATA DEVELOPED BY DGSC-STF.

Health Hazards Data

LD50LC50Mixture:
N/P
Route Of Entry Inds - Inhalation:
N/P
Skin:
N/P
Ingestion:
N/P
Carcinogenicity Inds - NTP:
N/P
IARC:
N/P
OSHA:
N/P
Health Hazards Acute And Chronic:

N/P
Explanation Of Carcinogenicity:
N/P
Signs And Symptions Of Overexposure:
2 HAZ DEGREE DEPENDS ON TYPE/QUANT OF RADIATION. LATENT EFFECTS:SOMATIC/GENETIC DAMAGE.
Medical Cond Aggravated By Exposure:
N/P
First Aid:
USE FIRST AID. CALL MEDICAL EMERGENCY CARE. REMOVE/ISOLATE COMTAMINATED CLOTHING.SHOWER VICTIM(S) W. SOAP & H*2O.
DETAIN PERSONNEL/EQUIPMENT EXPOSED. ADVISE MEDICAL PERSONNEL THAT VICTIM(S) MAY BE CON TAMINATED.
Spill Release Procedures:
HANDLE BROKEN DEVICE WITH GLOVES AND FORCEPS.
Neutralizing Agent:
N/P
Waste Disposal Methods:
CONTROLLED DISPOSAL REQUIRED-IN ACCORDANCE WITH DOD REGULATIONS AND FEDERAL,STATE & LOCAL REGULATIONS.
Handling And Storage Precautions:
SHIELD ACCORDING TO EMITTED RADIATION. PROTECT FROM FILM/FILM PLATES. KEEP CONTAINERS CLOSED. STORE IN AREA FOR
RADIOACTIVE MATERIALS.
Other Precautions:
N/P

Fire and Explosion Hazard Information

Flash Point Method:
N/P
Flash Point:
Flash Point Text:
N/A
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
Upper Limits:
Extinguishing Media:
3 EXTINQUISH W. AGENT SUITABLE FOR SURROUNDING FIRE.
Fire Fighting Procedures:
WEAR CHEMICAL PROTECTIVE SUIT WITH SELF CONTD BRTHG APP.
Unusual Fire/Explosion Hazard:
SOME OF MATL MAY BURN. CONT MAY EXPLODE IN HEAT OF FIRE.

Physical/Chemical Properties

HCC:
A2
NRC/State LIC No:
4
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/A
Melt/Freeze Pt:
M.P/F.P Text:
N/A
Decomp Temp:
Decomp Text:
N/A
Vapor Pres:
N/P
Vapor Density:

N/P
Volatile Org Content %:
Spec Gravity:
N/P
VOC Pounds/Gallon:
PH: N/P
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/P
Solubility in Water:
N/P
Appearance and Odor:
Percent Volatiles by Volume:
N/P
Corrosion Rate:
N/P

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/P
Materials To Avoid:
ISOLATE,SEGREGATE FROM MOST OTHER TYPE MATERIAL
Hazardous Decomposition Products:
DEPENDS ON CHEMICAL COMPOSITION; FISSION PRODUCTS
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/P

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

Composition/Information on Ingredient

Cas:
7440-50-8
Code:
M
RTECS:
GL5325000
Code:
M
Name:
COPPER (SARA 313) (CERCLA)
Other REC Limits:
N/K
OSHA PEL:
0.1MG/M3 FUME;1 DUST
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
0.2 MG/M3 FUME
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
4 NONE NORMALLY REQUIRED UNDER GENERAL VENT. IF EXPOSURE LEVELS ARE UNKNOWN, IF LEVELS EXCEED
TLV/PEL, OR IF EFFECTS OCCUR, USE NIOSH APPROVED DUST/MIST RESPIRATOR I/A/W APPLICABLE HEALTH &
SAFETY REGUL ATIONS & MFR'S RECOMMENDATIONS.
Ventilation:
GENERAL VENTILATION USUALLY ADEQUATE.
Protective Gloves:
CLOTH OR SYNTHETIC GLOVES.
Eye Protection:
ANSI APPROVED CHEM WORKERS GOGGS (FP N).
Other Protective Equipment:
Equipment EYE WASH FOUNTAIN &DELUGE SHOWER WHICH MEET ANSI DESIGN CRITERIA (FP N). CLEAN CLOTHING TO
COVER SKIN.
Work Hygienic Practices:
WASH HANDS BEFORE EATING.
Supplemental Safety and Health:

EFTS OF OVEREXP:METAL OF CURED CMPD/COATED SURF. RPTD/PRLNG OVEREXP TO METAL DUST MAY CAUSE METAL-FUME FEVER, METALLIC TASTE & DISCOLORATION OF SKIN & HAIR. REFER TO PROT EQUP SECTION FOR APPROP PROT MEASURES.

Health Hazards Data

LD50LC50Mixture:
NONE SPECIFIED BY MANUFACTURER.
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
YES
IARC:
YES
OSHA:
NO
Health Hazards Acute And Chronic:
ACUTE:EYE CONT:SLIGHTLY IRRIT BUT DOES NOT INJURE TISS. AT ELEVATED TEMPS MAY CAUSE IRRIT. SKIN CONT:PRLNG/RPTD CONT MAY CAUSE IRRIT.INHAL:AT ELEVATED TEMPS MAY CAUSE IRRIT OF RESP TRACT. INHAL OF DUS T AT LEVELS ABOVE RELS MAY CAUSE METALLIC/SWEET TASTE, IRRIT OF PHARYNX&POSS ULCERATION W/ HLTH HAZ:PERFORATION OF NASAL SEPTUM. INGEST:HARMFUL IF SWALLOWED. MOD TOX.IRRIT TO MOUTH, THROAT&STOM, W/NAU S. CHRONIC:RPTD & PRLNG INHAL OF GRAPHITE/CARBON DUSTS MAY CAUSE PULM FIBROSIS, EMPHYSEMA &
Explanation Of Carcinogenicity:
SILICA, CRYSTALLINE-QUARTZ:IARC MONOGRAPHS, VOL 68, 1997:GRP 1. NTP 7TH ANNUAL RPT ON CARCINS, 1994:ANTIC TO BE CARCIN.
Signs And Symptions Of Overexposure:
THIS PROD CONTAINS ENCAPSULATED SILICON DIOXIDE (QUARTZ, SILICA). NO EXPOS TO FREE RESPIRABLE SILICA IS ANTIC DURING NORMAL USE OF THIS PROD. INHAL OF FREE RESPIRABLE SILICA MAY CAUSE SILICOSIS/OTHER SERIOUS DELAYED LUNG INJURY. SILICA MAY BE RELS BY GRINDING/MACHINING OF COATED MATLS. USE NIOSH APPRVD DUST/MIST RESP WHEN GRINDING/MACHINING COATING/COATED ITEMS. THIS PROD :CONTAINS ENCAPSULATED ME TAL POWDER WHICH CONTAINS COPPER & ZINC. NO EXPOS TO FREE METAL POWDER IS ANTIC DURING NORM
Medical Cond Aggravated By Exposure:
PREEXISTING PULMONARY & DERMATOLOGICAL DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO HAZARDOUS COMPONENTS.

First Aid:
EYES:IMMED FLUSH W/PLENTY OF WATER FOR AT LST 15 MINS. GET MED ATTN, IF IRRIT PERSISTS. SKIN:WASH W/SOAP & WATER.
GET MED ATTN IF IRRIT DEVELS/PERSISTS. INHAL:REMOVE TO FRESH AIR & GET MED ATTN IF COU GH/OTHER SYMPS DEVEL.
INGEST:DO NOT INDUCE VOMIT. GIVE VICTIM GLASS OF WATER/MILK. CALL MD/POIS CTL CTR IMMED. NEVER GIVE ANYTHING BY MOUTH
TO UNCON PERS. NOTES TO MD:NO INFORMATION.
Spill Release Procedures:
RECLAIM CLEAN MATERIAL. CONTAMINATED MATERIAL SHOULD BE SWEPT OR SHOVELED INTO APPROPRIATE WASTE CONTAINER &
DISPOSED OF I/A/W APPLICABLE FEDERAL, STATE & LOCAL REGULATIONS.
Neutralizing Agent:
NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods:
REVIEW ALL CURRENT FEDERAL, STATE & LOCAL REGULATIONS REGARDING HEALTH & DISPOSAL FOR APPROPRIATE DISPOSAL
PROCEDURES. INCINERATION PREFERRED.
Handling And Storage Precautions:
AVOID PROLONGED OR REPEATED CONTACT W/SKIN. DO NOT TAKE INTERNALLY. FOR INDUSTRIAL USE ONLY. STORE AWAY FROM HEAT.
KEEP OUT OF THE REACH OF CHILDREN.
Other Precautions:
FOLLOW GENERAL INDUSTRIAL SAFETY PRACTICES DURING USE. DO NOT REUSE EMPTY CONTAINERS W/OUT COMMERCIAL CLEAN OR
RECONDITION. FOLLOW ALL MSDS/LABEL PRECAUTIONS EVEN AFTER CONTAINER IS EMPTIED.

Fire and Explosion Hazard Information

Flash Point Method:
PMCC
Flash Point:
Flash Point Text:
300F,149C
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/A
Upper Limits:
N/A
Extinguishing Media:
CO*2, DRY CHEMICAL, FOAM, WATER FOG.
Fire Fighting Procedures:
USE NIOSH APPRVD SCBA & FULL PROT EQUIP(FP N). USE WATER TO COOL EXPOS CNTNRS. WATER STREAM DIRECTED INTO FIRE MAY
CAUSE FROTHING W/SUBSEQUENT SPREAD OF FLAMES.
Unusual Fire/Explosion Hazard:

FINELY DIVIDED DUST IN AIR MAY PRESENT EXPLO HAZ. PVNT DUST BUILDUP. CLSD CNTNRS MAY RUPTURE/EXPLODE (DUE TO PRESS
BUILD UP) WHEN EXPOS TO EXTREME HEAT IRRIT &/OR TOX GASES/FUMES MAY BE GENERATED BY T HERMAL DECOMP/COMBUST.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
>550F,>288C
Melt/Freeze Pt:
M.P/F.P Text:
N/A
Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
N/A
Vapor Density:
HVR/AIR
Volatile Org Content %:
Spec Gravity:
1.3017
VOC Pounds/Gallon:
PH: N/A
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
SLOWER THAN BUTYL ACETATE
Solubility in Water:
INSOLUBLE
Appearance and Odor:
HIGH VISCOSITY, COPPER COLORED PASTE; SLIGHT PETROLEUM ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
PROLONGED EXPOSURE TO HEAT.
Materials To Avoid:
STRONG LEWIS/MINERAL ACIDS. STRONG BASES/OXIDANTS. NITRATES, NITRITES, CHLORINATED HYDROCARBONS, CHLORIDES,

PALLADIUM, SELENIUM, MANGANESE, MAGNESIUM + POTASSIUM CHLORATE, 5 SODIUM CARBONATE, SULFATES, DIBORANE.

Hazardous Decomposition Products:

OXIDES OF CARBON. VARIOUS HYDROCARBONS.

Hazardous Polymerization Indicator:

NO

Conditions To Avoid Polymerization:

NOT RELEVANT

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P

Federal Regulatory Information: N/P

State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

For R&D use only. Not for drug, household or other uses.

Material Safety Data Sheet
Vanadium, Powder, -325 Mesh, 99.5%

ACC# 99091

Section 1 - Chemical Product and Company Identification

MSDS Name: Vanadium, Powder, -325 Mesh, 99.5%
Catalog Numbers: AC318010000, AC318010100
Synonyms: None.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7440-62-2	Vanadium	99.5	231-171-1

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: light gray-white lusturous powder.
Warning! Causes eye, skin, and respiratory tract irritation. The toxicological properties of this material have not been fully investigated.
Target Organs: Respiratory system, eyes, skin.

Potential Health Effects
Eye: Causes severe eye irritation.
Skin: Causes skin irritation.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. The toxicological properties of this substance have not been fully investigated.
Inhalation: The toxicological properties of this substance have not been fully investigated. Causes severe respiratory tract irritation.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-

4 cupfuls of milk or water.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively. Green coloration of the tongue, resulting from the deposition of vanadium salts is an indicator of exposure; however, may be absent even in prolonged exposure..

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Flammable in dust form from heat, flame or sparks.
Extinguishing Media: Use agent most appropriate to extinguish fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.
Flash Point: Not available.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation. Use with adequate ventilation. Wash clothing before reuse.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Vanadium	none listed	1 mg/m3 TWA (dust, listed under Ferrovanadium dust)	0.5 mg/m3 Ceiling (respirable dust, as V2O5); 0.1 mg/m3 Ceiling (fume, as V2O5)

OSHA Vacated PELs: Vanadium: 0.05 mg/m3 TWA (respirable dust, as V2O5); 0.05 mg/m3 TWA (fume, as V2O5)

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Lusturous powder
Appearance: light gray-white
Odor: Not available.
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 3380 deg C
Freezing/Melting Point:1917 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:6.11 @ 18.7C
Molecular Formula:V
Molecular Weight:50.94

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions. Oxidizes readily above 600°C.
Conditions to Avoid: Incompatible materials, dust generation, excess heat.
Incompatibilities with Other Materials: Violent reaction with BrF3, Cl2, lithium, nitryl fluoride, oxidants..
Hazardous Decomposition Products: Excess heat, vanadium oxide (VOx) gases.
Hazardous Polymerization: Has not been reported

Section 11 - Toxicological Information

RTECS#:
CAS# 7440-62-2: YW1355000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 7440-62-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: Teratogenic effects have occurred in experimental animals.
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7440-62-2 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
Section 313
This material contains Vanadium (CAS# 7440-62-2, 99.5%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7440-62-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XI

Risk Phrases:

R 36/37/38 Irritating to eyes, respiratory system and skin.

Safety Phrases:

S 24/25 Avoid contact with skin and eyes.
S 37 Wear suitable gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 28A After contact with skin, wash immediately with plenty of water
.

WGK (Water Danger / Protection)

CAS# 7440-62-2: No information available.

Canada - DSL / NDSL

CAS# 7440-62-2 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7440-62-2 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 5/05/1999
Revision #5 Date: 11/20/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Composition/Information on Ingredient

Cas:
7440-66-6
Code:
T
RTECS:
ZG8600000
Code:
T
Name:
ZINC % low Wt: 11. Code: M % high Wt: 16. Code:
Other REC Limits:
N/P
OSHA PEL:
N/P
Code:
OSHA STEL:
N/P
Code:
ACGIH TLV:
N/P
Code:
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
AS IN ANY FIRE SITUATION, USE SELF-CONTAINED BREATHING APPARATUS (SCBA).
Ventilation:
N/A.
Protective Gloves:
3 WHEN HANDLING LEAKING BATTERIES.
Eye Protection:
N/A.
Other Protective Equipment:
Equipment N/A.
Work Hygienic Practices:
NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health:
NONE SPECIFIED BY MANUFACTURER.

Health Hazards Data

LD50LC50Mixture:
NONE SPECIFIED BY MANUFACTURER.
Route Of Entry Inds - Inhalation:
YES

Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
THESE CHEMICALS ARE CONTAINED IN A SEALED CAN. RISK OF EXPOSURE OCCURS ONLY IF THE BATTERY IS MECHANICALLY OR
ELECTRICALLY ABUSED. MOST LIKELY, RISK IS WHEN A CELL LEAKS. KOH (POTASSIUM HYDROXIDE) IS CAUSTIC AND SKIN CONTACT CAN
CAUSE IRRITATION OR BURNS. EYE CONTACT W/KOH MAY CAUSE PERMANENT INJURY.
Explanation Of Carcinogenicity:
NONE SPECIFIED BY MANUFACTURER.
Signs And Symptions Of Overexposure:
SKIN-IRRITATION, BURNS. EYES-PERMANENT INJURY.
Medical Cond Aggravated By Exposure:
2 AN ACUTE EXPOSURE WILL NOT GENERALLYAGGRAVATE ANY MEDICAL CONDITION.
First Aid:
IF LEAKAGE FROM CELLS CONTACTS: SKIN-FLUSH WITH WATER AND WASH WITH SOAP AND WATER. EYES-FLUSH WITH COPIOUS
AMOUNTS OF WATER FOR 15 MINUTES THEN SEE PHYSICIAN AT ONCE.
Spill Release Procedures:
AVOID SKIN AND EYE CONTACT. DO NOT INHALE VAPORS. COLLECT ALL RELEASED MATERIAL IN PLASTIC BAG FOR WASTE DISPOSAL.
Neutralizing Agent:
NONE SPECIFIED BY MANUFACTURER. DLA-HMIS STAFF: 5% ACETIC ACID SOLUTION.
Waste Disposal Methods:
IN SMALL QUANTITIES, BATTERIES MAY BE DISPOSED OF WITH HOUSEHOLD TRASH. DO NOT INCINERATE! DISPOSE OF LARGE
QUANTITIES IN ACCORDANCE WITH LOCAL REGULATIONS.
Handling And Storage Precautions:
STORE IN A DRY PLACE. DO NOT RECHARGE. DO NOT SHORT CIRCUIT.
Other Precautions:
USE BATTERY ONLY IN PROPER EQUIPMENT. OBSERVE CORRECT POLARITY WHEN INSTALLING INTO EQUIPMENT. DO NOT ATTEMPT TO
RECHARGE.

Fire and Explosion Hazard Information

Flash Point Method:
N/A
Flash Point:

Flash Point Text:
NA
Autoignition Temp:
Autoignition Temp Text:
NA
Lower Limits:
N/A
Upper Limits:
N/A
Extinguishing Media:
N/A
Fire Fighting Procedures:
FIRE FIGHTERS SHOULD USE SELF-CONTAINED BREATHING APPARATUS WHEN A LARGE NUMBER OF CELLS ARE INVOLVED.
Unusual Fire/Explosion Hazard:
CELLS MAY RUPTURE WHEN HEATED EXCESSIVELY.

Physical/Chemical Properties

HCC:
Z7
NRC/State LIC No:
N/P
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
KOH (1320) MNO2 N/A ZN
Melt/Freeze Pt:
M.P/F.P Text:
KOH (360) MNO2 (535) ZN
Decomp Temp:
Decomp Text:
N/P
Vapor Pres:
KOH MNO2 (NA) ZN (1)@487C
Vapor Density:
NA
Volatile Org Content %:
Spec Gravity:
KOH (2.0) MNO2 (5.0) ZN
VOC Pounds/Gallon:
PH: N/P
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
KOH MNO2, ZN (NA)
Solubility in Water:
KOH (50%), MNO2 (0%), ZN
Appearance and Odor:
KOH (CLEAR LIQUID), MNO2 (BLACK POWDER), ZN (GREY POWDER).

Percent Volatiles by Volume:
N/P
Corrosion Rate:
N/P

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
DO NOT HEAT, DISASSEMBLE, OR RECHARGE. DO NOT SHORT CIRCUIT.
Materials To Avoid:
N/A.
Hazardous Decomposition Products:
WHEN HEATED, CELLS MAY EMIT HAZARDOUS VAPORS OF CAUSTIC KOH.
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/A.

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

For R&D use only. Not for drug, household or other uses.

MSDS Number: **C0253** * * * * * *Effective Date:* ***07/03/07*** * * * * * *Supercedes:* ***05/07/07***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

CALCIUM METAL

1. Product Identification

Synonyms: Calcium metal crystalline
CAS No.: 7440-70-2
Molecular Weight: 40.08
Chemical Formula: Ca
Product Codes: 1262

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Calcium	7440-70-2	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! FLAMMABLE SOLID. WATER REACTIVE. CORROSIVE. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CONTACT MAY CAUSE BURNS TO ALL BODY TISSUE.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 3 - Severe (Water Reactive)
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS D EXTINGUISHER
Storage Color Code: Red Stripe (Store Separately)

Potential Health Effects

Inhalation:
Inhalation produces damaging effects on the mucous membranes and upper respiratory tract. Symptoms may include irritation of the nose and throat, and labored breathing. May cause lung edema, a medical emergency.
Ingestion:
Irritant due to formation of caustic lime by reaction with moisture. Large amounts may have a corrosive effect. Abdominal pain or stricture, possible nausea, vomiting, diarrhea are symptoms.
Skin Contact:
Corrosive. Symptoms of redness, pain, and severe burn can occur.
Eye Contact:
Corrosive. Causes redness, pain; possible burns and damage to eye tissues.
Chronic Exposure:
Prolonged inhalation of dust or fume may cause severe mucous membrane irritation, chemical pneumonitis.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Keep patient quiet in half upright position. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Wipe off excess material from skin then immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Flammable solid, water reactive. Can react vigorously with water, steam, acids to release flammable/explosive hydrogen. Dangerous in presence of oxidants. Liquid calcium can react violently.
Explosion:
Possible explosion hazard from generated hydrogen or intimate contact with strong oxidizers. Contact with alkali hydroxides or carbonates may cause detonation.
Fire Extinguishing Media:
Use dry soda ash, dry salt, sand, graphite powder or metal-fire-extinguishing dry powder such as Met-L-X®. Do not use water, foam, carbon dioxide, dry chemical, or chlorinated fire extinguishers.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water spray may be used to keep fire exposed containers cool. Do not allow contact of calcium with water. Finely divided calcium exposed to moist air may ignite spontaneously.

---

6. Accidental Release Measures

Collect spilled material quickly and transfer to a container of kerosene, light oil or similar hydrocarbon fluid for recovery. Minimize exposure to air. Do not use water on metal.
If the spilled calcium has come into contact with water, proceed cautiously. The reaction can rapidly proceed to self-ignition of hydrogen and spattering of molten calcium. Evacuate the area, put on protective equipment and proceed as with a metal fire.
Waste calcium should be packaged under a hydrocarbon fluid and sent to an approved disposal facility.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Keep away from water or locations where water may be needed for fire. Avoid high temperatures. Store under nitrogen or kerosene. Never store under halogenated hydrocarbons. A detached fire-resistive building is recommended for quantity storage. Isolate from air, acids, and oxidizing materials. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the dust or mist is apparent, a full-face respirator with particulate cartridges (NIOSH type N95 or better) should be worn. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Silver-gray granules or lumps.
Odor:
Odorless.
Solubility:
Reacts with water with evolution of hydrogen.
Density:
1.54
pH:
Water solution alkaline (pH > 7).
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
1440C (2624F)
Melting Point:
850C (1562F)
Vapor Density (Air=1):
1.4
Vapor Pressure (mm Hg):
10 @ 983C (1801F)
Evaporation Rate (BuAc=1):
Not applicable.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Water reactive.
Hazardous Decomposition Products:
Hydrogen, caustic calcium oxide and calcium hydroxide.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Air, asbestos cement, halogens, lead dichloride phosphorus pentoxide, silicon, sodium, mixed oxides, sulfur, water, acids, alcohols. Contact with alkali hydroxides or carbonates may cause detonation.
Conditions to Avoid:
Air, heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Calcium (7440-70-2)	No	No	None

---

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CALCIUM
Hazard Class: 4.3
UN/NA: UN1401
Packing Group: II

Information reported for product/size: 500G

International (Water, I.M.O.)

Proper Shipping Name: CALCIUM, METAL
Hazard Class: 4.3
UN/NA: UN1401
Packing Group: II
Information reported for product/size: 500G

International (Air, I.C.A.O.)

Proper Shipping Name: CALCIUM, METAL
Hazard Class: 4.3
UN/NA: UN1401
Packing Group: II
Information reported for product/size: 500G

---

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
Calcium (7440-70-2)                            Yes  Yes   No       Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                       --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
Calcium (7440-70-2)                            Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Calcium (7440-70-2)                     No    No      No         No

--------\Federal, State & International Regulations - Part 2\----------------
                                                -RCRA-    -TSCA-
Ingredient                              CERCLA     261.33     8(d)
----------------------------------------  ------     ------    ------
Calcium (7440-70-2)                     No         No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: Yes         (Pure / Solid)
```

Australian Hazchem Code: 4W
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **3** Flammability: **1** Reactivity: **2** Other: **Water reactive**
Label Hazard Warning:
DANGER! FLAMMABLE SOLID. WATER REACTIVE. CORROSIVE. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CONTACT MAY CAUSE BURNS TO ALL BODY TISSUE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe dust.
Use only with adequate ventilation.
Store in a tightly closed container.
Wash thoroughly after handling.
Remove and wash contaminated clothing promptly.
Do not allow contact with water, acids, or moisture.
Keep away from heat, sparks and flame.
Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, wipe off excess material from skin then immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.
Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 3.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

Company: AccuStandard, Inc.
125 Market Street
New Haven, CT 06513

Date MSDS Printed: 5/23/2008
Preparation Date: 5/23/2008
Information Phone Number: 203-786-5290
Emergency Phone Number: 203-786-5290
Hours: Mon. to Fri. 8am-5pm

Catalog Number: **APP-9-032**
Product Name: Bromomethane
Synonyms: N/A
Formula: N/A
Molecular Weight: N/A

SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

Component(s) (2)	CAS #	Appr. %	ACGIH-TLV (mg/m3) TWA	ACGIH-TLV (mg/m3) STEL	ACGIH-TLV (mg/m3) skin	OSHA-PEL (mg/m3) TWA	OSHA-PEL (mg/m3) STEL	OSHA-PEL (mg/m3) skin
Bromomethane	74-83-9	0.01	3.9		x			x
Methanol	67-56-1	99.99	262	328	x	260		

SECTION 3 - HAZARDS IDENTIFICATION

Health and Environmental Hazards/Symptoms of Exposure:

Over exposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure.

After ingestion or inhalation, initial symptoms may be only that of mild intoxication, but may become severe after 12 or 18 hours.

May cause eye, kidney, liver, and skin damage.

May cause central nervous system damage.

POISON: May be fatal or cause blindness if swallowed.

Fetal development abnormalities and effects on embryo or fetus have been reported from prolonged exposure to methanol in laboratory tests involving pregnant rats.

Potential Health Effects:

Irritating to eyes.

Irritating to skin.

Toxic if absorbed through skin.

Irritating to mucous membrane and upper respiratory system.

Toxic if inhaled.

Toxic if swallowed.

Routes of Entry:

Inhalation, ingestion or skin contact.

Carcinogenicity:

This product is or contains a component that is not listed (ACGIH, IARC, NTP, OSHA) as a cancer causing agent.

SECTION 4 - FIRST AID MEASURES

Emergency First Aid:

Get medical assistance for all cases of overexposure.

Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

Eye contact: Immediately flush with plenty of water. After initial flushing, remove and contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.

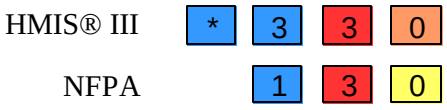
Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention.

Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person.

SECTION 5 - FIRE FIGHTING MEASURES

Flammable Properties:

Flash Point: 52 °F (11 °C) (tcc)
Flammable Limits LEL (%): 6.7
Flammable Limits UEL (%): 36.5
Autoignition Temperature: 385 °C



Dangerous fire and explosive hazard.

Containers can build up pressure if exposed to heat.

Vapors can travel to a source of ignition and flash back.

During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media:

Use alcohol foam, carbon dioxide, dry chemical, or water spray when fighting fires involving this material.

Fire Fighting Procedures:

As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Spill Response:

Wear suitable protective equipment listed under Exposure Controls / Personal Protection. Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards. Contain the release and eliminate its source, if this can be done without risk. Dispose as hazardous waste. Comply with Federal, State and local regulations.

SECTION 7 - HANDLING AND STORAGE

Store in a tighly closed container.
Keep refrigerated.
Avoid breathing vapors or mists.
Use with adequate ventilation.
Do not get in eyes, on skin or clothing.
Avoid prolonged or repeated exposure.
This product should only by used by persons trained in the safe handling of hazardous chemicals.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls and Personal Protection Equipment (PPE):

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your safety equipment supplier). Engineering and/or administrative controls should be implemented to reduce exposure.

Material should be handled or transferred in an approved fume hood or with adequate ventilation.

Protective gloves must be worn to prevent skin contact.

(Chloroprene, natural rubber, nitrile, or equivalent)

Safety glasses with side shields must be worn at all times.

General Hygiene Considerations:

Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear liquid
Odor: N/A
pH: N/A
Vapor Pressure: 97 mmHg (20 °C)
Vapor Density (Air = 1): 1.1 g/L
Boiling Point: 65 °C
Melting Point: -93.9 °C
Solubility in Water (%): Very soluble
Specific Gravity (H_2O = 1): 0.791 g/cm3
Flash Point: 52 °F (11 °C) (tcc)
Explosion Limits (%): 6.7 to 36.5
Autoignition Temperature: 385 °C
Percent Volatile: 99.9+
Evaporation Rate (BuAc = 1): 5.9

Molecular Weight: N/A
Molecular Formula: N/A

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable
Conditions To Avoid: Heat; Contact with ignition sources
Materials To Avoid: Acids
Oxidizers

Alkali metals; Reducing agents
Hazardous Decomposition: Oxides of carbon; Formaldehyde
Hazardous Polymerization: Will not occur

SECTION 11 - TOXICOLOGICAL INFORMATION

See section 3 for specific toxicological information for the ingredients of this product.

SECTION 12 - ECOLOGICAL INFORMATION

By complying with sections 6 and 7 there will be no release to the environment.

SECTION 13 - DISPOSAL CONSIDERATIONS

Recycle or incinerate at any EPA approved facility or dispose in compliance with Federal, State and local regulations. Empty containers must be triple-rinsed prior to disposal.

SECTION 14 - TRANSPORT INFORMATION

DOT UN Number: UN1230 Shipping Class: 3 Packing Group: II FLAMMABLE

SECTION 15 - REGULATORY INFORMATION

In addition to Federal and state regulations, local regulations may apply. Check with your local regulatory authorities.

All components are listed on the TSCA Inventory. For laboratory, reasearch and development use only. Not for manufacturing or commercial purposes.

WARNING: This product contains chemicals known to the state of California to cause birth defects or other reproductive harm.

SECTION 16 - OTHER INFORMATION

This document has been designed to meet the requirements of OSHA, ANSI and CHIPs regulations.

The statements contained herein are offered for informational purposes only and are based on technical data that we believe to be accurate. It is intended for use only by persons having the necessary technical skill and at their own discretion and risk. Since conditions and manner of use are outside our control, we make
NO WARRANTY, EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE.

Legend : N/A = Not Available ND = Not Determined NR = Not Regulated
* * * End of Document * * *

SUPELCO

Supelco is a Member of the Sigma-Aldrich Family
Providing Chromatography Products for Analysis and Purification.

Customer P.O. No. 4500153939

Material Safety Data Sheet

Date Printed: 05/14/2008
Date Updated: 01/01/2006

Section 1 - Product and Company Information

Catalog Number: 48622 (Reorder Product by this No.)
Product Name: CHLOROMETHANE
Street Address: 595 North Harrison Road
City, State, Zip, Country: Bellefonte, PA 16823-0048 USA
Fax (MSDS Dept.): 814-359-5930
Emergency Phone: 800-521-8956 EXT 2143
CHEMTREC: 800-424-9300

Section 2 - Composition/Information on Ingredient(s)

Substance Name: CHLOROMETHANE
CAS#: N/A
SARA 313: No
Ingredients:

Ingredient Name	CAS #	% OR Conc.	OSHA PEL	ACGIH TLV	SARA	LD50	Codes
CHLOROMETHANE	74-87-3	0.02	50 ppm	50 ppm	Yes	1800 mg/kg	OR
METHANOL	67-56-1	99.98	N/A	N/A	Yes	5628 mg/kg	OR

CODES: OR (Oral Rat), OM (Oral Mouse), OB (Oral Rabbit),
IR (Intraperitoneal Rat), IM (Intraperitoneal Mouse), IB(Intraperitoneal Rabbit)
VR (Intravenous Rat), VM (Intravenous Mouse), VB (Intravenous Rabbit),
SR (Subcutaneous Rat), SM(Subcutaneous Mouse), SB (Subcutaneous Rabbit)

Formula: MIXTURE
Chemical Name:
Synonym(s):
ANALYTICAL STANDARD IN METHANOL
RTECS Number: N/A
MSDS Dictionary:
CAS=Chemical Abstract Service; %=Percentage of Composition; TLV=Threshold Limit Value; SARA=Superfund Amendments and Reauthorization Act of 1986; TSCA=Toxic Substances Control Act; N/A=Not Available.

Section 3 - Hazards Identification

Emergency Overview:
Stable.
Harmful if inhaled.
May be fatal if swallowed.
To the best of our knowledge, the chemical, physical, & toxicological properties have not been thoroughly investigated.
See Section 11 for toxicological data.

Section 4 - First Aid Measures

Oral Exposure:
Immediately contact a physician.
Never give anything by mouth to an unconscious person.
Never try to make an unconscious person vomit.
Give 2 tablespoons of baking soda in a glass of water.
Press fingers to back of tongue to induce vomiting.
Inhalation Exposure:
Immediately move to fresh air.
Contact a physician.
If breathing stops, give artificial respiration.
Dermal Exposure:
Flush skin with large volumes of water.
Eye Exposure:
Contact a physician.
Flush eyes with water for 15 minutes.
Additional Information:

Section 5 - Fire Fighting Measures

Flammable Hazards:
Explosion Hazards:
Thermal Decomposition Components:
N/A
Extinguishing Media:
Suitable:
C02.
Dry chemical.
Alcohol foam.
Firefighting
Protective Equipment:
Wear self-contained breathing apparatus when fighting a chemical fire.
Specific Hazard(s):

	Value:	Method:
Flash Point (F):	50° F	
Autoignition Temperature:		
	Lower:	Upper:
Explosion Limits:	6.0%	36.5%

Additional Information:

Section 6 - Accidental Release Measures

Procedure to be followed in case of Leak or Spill:
Ventilate area.
Take up with absorbent material.
Eliminate all ignition sources.
Procedure(s) of Personal Precaution(s):
Avoid eye or skin contact.
Avoid breathing vapors.
Wear protective glasses.
Wear rubber gloves.
Wear face mask with organic vapor canister.
Methods for Cleaning Up:
Additional Information:

Section 7 - Handling and Storage

Handling
User Exposure:
Avoid eye or skin contact.
Avoid breathing vapors.
Storage
Suitable:
Refrigerate in sealed container.

Section 7 - Handling and Storage

Keep away from oxidizers.
Keep away from ignition sources.
Additional Information:

Section 8 - Exposure Controls/PPE

Engineering Controls:
Use only in well-ventilated area.
Personal Protective Equipment
Respiratory:
Wear face mask with organic vapor canister.
Hand:
Wear rubber gloves.
Eye:
Wear protective glasses.
Additional Equipment:
General Hygiene Measures:
Avoid eye or skin contact.
Avoid breathing vapors.
Additional Information:

Section 9 - Physical and Chemical Properties

Appearance:
Clear colorless liquid
Odor:

Molecular Weight:	N/A	
pH:		
	Value:	Method:
Boiling Point Range:	65° C	N/A
Melting Point Range:	-98° C	
Vapor Pressure:	100 mmHg	
Vapor Density:	1.10	(Air=1)
Volatile %:	100	
Specific Gravity/Density:	.790 g/cm3 or g/ml	(Water=1)
Evaporation Rate:	>1	(Ether=1)
	Value:	Method:
Flash Point (F):	50° F	
	Lower:	Upper:
Explosion Limits:	6.0%	36.5%
Solubility in Water:	100	
Refractive Index:		
Autoignition Temperature:		

Additional Information:
N/A = Not Available

Section 10 - Stability and Reactivity

Stability:
Stable:
Stable.
Materials to Avoid:
Oxidizing agents.
Chromic anhydride, lead perchlorate, perchloric acids.
Conditions to Avoid:
N/A
Hazardous Decomposition Products:
N/A
Hazardous Polymerization:
Will not occur.
Additional Information:

Section 11 - Toxicological Information

Route of Exposure
Skin Contact:
Skin Absorption:
Eye Contact:
Inhalation:
Harmful if inhaled.
Ingestion:
May be fatal if swallowed.
Critical Effects:
Blindness.
Additional Possible Effects:
Target Organ(s) or System(s):
Gastrointestinal disturbances.
Signs and Symptoms of Exposure:
Headache.
Nausea.
Conditions Aggravated by Exposure:
Additional Information:
Toxicity Data (LD50): 5628 mg/kg Oral Rat

Section 12 - Ecological Information

Ecotoxicity:
No Data Available.

Section 13 - Disposal Information

Appropriate Method of Disposal of Substance or Preparation:
Comply with all applicable federal, state, or local regulations.
Contact a licensed professional waste disposal service to dispose of this material.

Section 14 - Transport Information

DOT

Proper Shipping Name:	Methanol
UN#:	1230
Class:	3.0
Packing Group:	II
Hazard Label:	Excepted Qty
PIH:	N/A

IATA

Proper Shipping Name:	METHANOL (Methyl Alcohol)
IATA UN Number:	1230
Hazard Class:	3.0 6.1
Packing Group:	II
Hazard Label:	Excepted Qty
PIH:	N/A

Section 15 - Regulatory Information

EU Directives Classification
Symbol of Danger: F T
Indication of Danger:
Highly flammable
Toxic
Risk Statements: R: 11 23 25
Highly flammable.

Section 15 - Regulatory Information

Toxic by inhalation and if swallowed.
Safety Statements: S: 16 24
Keep away from sources of ignition - No smoking.
Avoid contact with skin.
US Classification and Label Text
Indication of Danger:
Risk Statements:
Safety Statements:
US Statements:
United States Regulatory Information
SARA Listed: No
Deminimis:
Notes:
TSCA Inventory Item: Yes
United States - State Regulatory Information
California Prop-65:
Canada Regulatory Information
WHMIS Classification:
Class B - Division 2 - Flammable liquids (CPR 35).
Class D - Division 1 - Poisonous and infectious materials.
DSL:
NDSL:
Additional Information:

Section 16 - Other Information

Disclaimer:
For R&D use only. Not for drug, household or other uses.
Warranty:
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Supelco, shall not be held liable for any damage resulting from handling or from contact with the above product.

Health	2
Fire	0
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Methylene bromide MSDS

Section 1: Chemical Product and Company Identification

Product Name: Methylene bromide

Catalog Codes: SLM3166

CAS#: 74-95-3

RTECS: PA7350000

TSCA: TSCA 8(b) inventory: Methylene bromide

CI#: Not applicable.

Synonym: Dibromomethane

Chemical Name: Methylene bromide

Chemical Formula: CH2Br2

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Methylene bromide	74-95-3	100

Toxicological Data on Ingredients: Methylene bromide: ORAL (LD50): Acute: 108 mg/kg [Rat]. 1000 mg/kg [Rabbit]. DERMAL (LD50): Acute: >4000 mg/kg [Rabbit]. VAPOR (LC50): Acute: 3977.9 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant). Slightly hazardous in case of skin contact (irritant). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for mammalians. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to blood, lungs, the nervous system, digestive system, gastrointestinal tract. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Section 7: Handling and Storage

Precautions:
Keep locked up Do not ingest. Do not breathe gas/fumes/ vapour/spray. Avoid contact with eyes Wear suitable protective clothing If ingested, seek medical advice immediately and show the container or the label.

Storage:

Keep container tightly closed. Keep in a cool, well-ventilated place. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 173.85 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 96.95°C (206.5°F)

Melting Point: -52.5°C (-62.5°F)

Critical Temperature: 310°C (590°F)

Specific Gravity: 2.497 (Water = 1)

Vapor Pressure: 40 mm of Hg (@ 20°C)

Vapor Density: 6.05 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether, acetone.

Solubility:
Partially soluble in methanol, diethyl ether, acetone. Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Slightly reactive to reactive with metals.

Corrosivity: Not available.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Not available.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 108 mg/kg [Rat]. Acute dermal toxicity (LD50): >4000 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 3977.9 ppm 4 hour(s) [Rat].

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for mammalians. Mutagenic for bacteria and/or yeast. The substance is toxic to blood, lungs, the nervous system, digestive system, gastrointestinal tract.

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Dibromomethane : UN2664 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Methylene bromide Massachusetts RTK: Methylene bromide New Jersey: Methylene bromide TSCA 8(b) inventory: Methylene bromide TSCA 8(a) IUR: Methylene bromide TSCA 12(b) annual export notification: Methylene bromide SARA 313 toxic chemical notification and release reporting: Methylene bromide CERCLA: Hazardous substances.: Methylene bromide: 1000 lbs. (453.6 kg)

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R36- Irritating to eyes. R48/25- Toxic: danger of serious damage to health in case of prolonged exposure if swallowed.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 10:43 AM

Last Updated: 11/01/2010 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Material Safety Data Sheet
Bromochloromethane

ACC# 49355

Section 1 - Chemical Product and Company Identification

MSDS Name: Bromochloromethane
Catalog Numbers: AC159130000, AC159130010, AC159130050, AC159132500
Synonyms: Chlorobromomethane; Methylene chlorobromide; Mono-chloro-mono-bromo-methane; Methane, bromochloro-; Chloromethyl bromide
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
74-97-5	Bromochloromethane	98	200-826-3

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless clear liquid.
Warning! Causes eye and skin irritation. Causes digestive and respiratory tract irritation. May cause central nervous system depression. May cause liver and kidney damage. Light sensitive.
Target Organs: Kidneys, central nervous system, liver, respiratory system, eyes, skin.

Potential Health Effects

Eye: Causes eye irritation. May cause eye injury.
Skin: Causes skin irritation. May cause dermatitis.
Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause liver and kidney damage. May cause central nervous system depression.
Inhalation: Causes respiratory tract irritation. May cause chemical bronchitis with coughing and difficulty in breathing. Vapors may cause dizziness or suffocation.
Chronic: May cause liver and kidney damage. Prolonged exposure may produce a narcotic effect. Laboratory experiments have resulted in mutagenic effects.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while

removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Material will not burn. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Water may be ineffective. Material is lighter than water and a fire may be spread by the use of water. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.
Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. For small fires, use dry chemical, carbon dioxide, or water spray. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray.
Flash Point: 400 deg C (752.00 deg F)
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 1; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation. Use with adequate ventilation. Store protected from light. Not compatible with some forms of plastics and coatings.
Storage: Do not store in direct sunlight. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from light.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Bromochloromethane	200 ppm TWA	200 ppm TWA; 1050 mg/m3 TWA 2000 ppm IDLH	200 ppm TWA; 1050 mg/m3 TWA

OSHA Vacated PELs: Bromochloromethane: 200 ppm TWA; 1050 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Clear liquid
Appearance: clear, colorless
Odor: Sweet chloroform-like odor.
pH: Not available.
Vapor Pressure: 117 mm Hg @ 20 C
Vapor Density: 4.46
Evaporation Rate: Not available.
Viscosity: 0.667 cP 25 deg C
Boiling Point: 68 deg C @ 760.00mm Hg
Freezing/Melting Point:-88 deg C
Decomposition Temperature:400 deg C
Solubility: Insoluble.
Specific Gravity/Density:1.9910g/cm3
Molecular Formula:CH2BrCl
Molecular Weight:129.38

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. May discolor on exposure to light. Light sensitive.
Conditions to Avoid: Incompatible materials, light, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents, strong bases, magnesium, zinc, calcium, powdered aluminum.
Hazardous Decomposition Products: Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide, hydrogen bromide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 74-97-5: PA5250000
LD50/LC50:

CAS# 74-97-5:
Inhalation, mouse: LC50 = 12030 mg/m3/7H;
Oral, mouse: LD50 = 4300 mg/kg;
Oral, rat: LD50 = 5 gm/kg;
Skin, rabbit: LD50 = >20 gm/kg;
.

Carcinogenicity:
CAS# 74-97-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: Mutation in Microorganisms: Salmonella typhimurium = 10 mg/plate.Mutation in Microorganisms: Salmonella typhimurium = 10 ug/plate.Cytogenetic analysis: Hamster lung = 1 umol/L.Sister Chromatid Exchange: Hamster lung = 5 umol/L.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Estimated BCF values = 3 and 7. These values suggest that bioconcentration in fish and aquatic organisms will not occur to any significant extent. Estimated Koc values = 21 and 139. Leaching may occur.
Environmental: Bromochloromethane will display high to very high mobility in soil. Direct photochemical degradation in the atmosphere or water is unlikely.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	BROMOCHLOROMETHANE	BROMOCHLOROMETHANE
Hazard Class:	6.1	6.1
UN Number:	UN1887	UN1887
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 74-97-5 is listed on the TSCA inventory.

Health & Safety Reporting List

CAS# 74-97-5: Effective 6/1/87, Sunset 12/19/95

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 74-97-5: immediate, delayed.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants. CAS# 74-97-5 is listed as a Class 1 ozone depletor with an 0.12 ODP

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 74-97-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XI

Risk Phrases:

R 36/37/38 Irritating to eyes, respiratory system and skin.

Safety Phrases:

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 37/39 Wear suitable gloves and eye/face protection.

WGK (Water Danger / Protection)

CAS# 74-97-5: 2

Canada - DSL / NDSL

CAS# 74-97-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 74-97-5 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 2/18/1999
Revision #5 Date: 11/05/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

For R&D use only. Not for drug, household or other uses.
Click http://www.lookchem.com/cas-75/75-00-3.html for suppliers of this product.

Composition/Information on Ingredient

Cas:
75-00-3
Code:
M
RTECS:
KH7525000
Code:
M
Name:
ETHYL CHLORIDE (SARA III)
Other REC Limits:
2600 MG/CUM
OSHA PEL:
1000 PPM
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
1000 PPM; 9192
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
IN DUSTY ATMOSPHERES, USE AN APPROVED DUST RESPIRATOR.
Ventilation:
PROVIDE MECHANICAL & LOCAL EXHAUST VENTILATION TO CONTROL AIRBORNE LEVELS TO KEEP
Protective Gloves:
N/K
Eye Protection:
SAFETY GLASSES, CHEMICAL GOGGLES
Other Protective Equipment:
Equipment N/K
Work Hygienic Practices:
USE CLEAN BODY-COVERING CLOTHING.
Supplemental Safety and Health:
GAS FIRED RECIRCULATING AIR FURNANCES OR HEATERS/GAS WATER HEATER, ETC., DRAWING AIR FROM AREAS
WHERE THERE MAY BE A PRESENCE OF ETHYL CHLORIDE GAS FROM STORAGE/FABRICATION OF EXPANDED
POLYSTYRENE FOA M, CAN HAVE RUST/CORROSION PROBLEMS AS A RESULT OF THE THERMAL DECOMPOSITION OF
ETHYL CHLORIDE TO HYDROGEN CHLORIDE.

Health Hazards Data

LD50LC50Mixture:
N/K
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:

YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
EYES: SOLID OR DUST MAY CAUSE IRRITATION OR CORNEAL INJURY DUE TO MECHANICAL ACTION.
SKIN: NON-IRRITATING/INJURY ONLY.
INGESTION: PHYSICAL INJURY & MAY CAUSE CHOKING. INHALATION: DUST MAY CAUSE IRRITA TION TO UPPER RESPIRATORY TRACT.
Explanation Of Carcinogenicity:
NONE
Signs And Symptions Of Overexposure:
EYES: SOLID OR DUST MAY CAUSE IRRITATION OR CORNEAL INJURY DUE TO MECHANICAL ACTION.
SKIN: NON-IRRITATING/INJURY ONLY.
INGESTION: PHYSICAL INJURY ONLY & MAY CAUSE CHOKING. INHALATION: DUST MAY CAUSE I RRITATION TO UPPER RESPIRATORY
TRACT.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES: FLUSH W/WATER FOR AT LEAST 5 MINUTES. INHALATION: REMOVE TO FRESH AIR & CONSULT PHYSICIAN.
Spill Release Procedures:
PICK UP OR IF DUST OR IN SMALL PIECES, SWEEP UP & PLACE IN SUITABLE CONTAINER FOR DISPOSAL.
Neutralizing Agent:
N/K
Waste Disposal Methods:
BURY IN AN APPROVED LANDFILL OR BURN IN AN ADEQUATE INCINERATOR W/EXCESS OXYGEN, IN ACCORDANCE W/ALL LOCAL, STATE &
FEDERAL REGULATIONS.
Handling And Storage Precautions:
STORAGE OF LARGE QUANTITIES OF FOAM IN CONFINED, VIRTUALLY AIRTIGHT SPACES SHOULD BE AVOIDED TO PREVENT BUILDUP OF
COMBUSTIBLE VAPORS.
Other Precautions:
EXPANDED POLYSTYRENE INSULATION IS COMBUSTIBLE & MAY CONSTITUTE A FIRE HAZARD IF IMPROPERLY USED OR INSTALLED. THIS
INSULATION CONTAINS A FLAME RETARDANT ADDITIVE TO INHIBIT ACCIDENTAL IGNITION FROM S MALL FIRE SOURCES.

Fire and Explosion Hazard Information

Flash Point Method:
N/P
Flash Point:
Flash Point Text:
N/R 3
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/R
Upper Limits:
N/R
Extinguishing Media:
WATER FOG
Fire Fighting Procedures:
WEAR POSITIVE-PRESSURE, SELF-CONTAINED BREATHING APPARATUS. APPLY LARGE VOLUMES OF WATER DIRECTLY ON FLAME OR

BURNING SURFACE.
Unusual Fire/Explosion Hazard:
EMITS DENSE, BLACK SMOKE WHEN BURNED. GRINDING OR CUTTING MAY LEAD TO A BUILD-UP OF DUST SUSPENED IN AIR WHICH CAN
CAUSE A DUST EXPLOSION IF IGNITED.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/R
Melt/Freeze Pt:
M.P/F.P Text:
N/K
Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
N/R
Vapor Density:
N/R 4
Volatile Org Content %:
Spec Gravity:
0.027-0.064
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
NONE
Appearance and Odor:
RIGID CELLULAR FOAM BOARD W/NO ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
HIGH TEMPERATURES >572F, FLAME, &IGNITION SOURCES. TEMPS >300C WILL RELEASE COMBUSTIBLE GASES.
Materials To Avoid:
AROMATIC HYDROCARBONS, HIGHER ALIPHATIC HYDROCARBONS, ESTERS, AMINES, HIGHER ALDEHYDES.
Hazardous Decomposition Products:
CO, CO2, CARBON, SMALL AMOUNTS OF HYDROGEN BROMIDE/AROMATIC HYDROCARBONS, STYRENE/ETHYLBENZENE. ETHYL/HYDROGEN
CHLORIDE
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Lookchem shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

SAFETY DATA SHEET

VINYL CHLORIDE (MONOMER)

MSDS No.: M9192 **Rev. Date:** 2009-Oct-07 **Rev. Num.:** 02

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Company Identification:	Occidental Chemical Corporation 5005 LBJ Freeway P.O. Box 809050 Dallas, Tx 75380-9050
24 Hour Emergency Telephone Number:	1-800-733-3665 or 1-972-404-3228 (U.S.); 32.3.575.55.55 (Europe); 1800-033-111 (Australia)
To Request an MSDS:	MSDS@oxy.com or 1-972-404-3245
Customer Service:	1-800-752-5151 or 1-972-404-3700
Synonyms:	VCM, Monochloroethylene, Chloroethene, Ethylene, chloro-, Vinyl chloride monomer
Product Use:	PVC Manufacturing

2. HAZARDS IDENTIFICATION

****

EMERGENCY OVERVIEW:

Color:	Colorless
Physical State:	Compressed, liquefied gas
Odor:	Sweet
Signal Word:	DANGER

MAJOR HEALTH HAZARDS: LIQUID MAY CAUSE FROSTBITE TO EYES AND SKIN. MAY CAUSE CENTRAL NERVOUS SYSTEM EFFECTS. CONTAINS VINYL CHLORIDE, A KNOWN HUMAN CANCER AGENT. CAUSES DAMAGE TO LIVER AND PERIPHERAL NERVOUS SYSTEM THROUGH PROLONGED OR REPEATED EXPOSURE. CAUSES DAMAGE TO LUNGS THROUGH PROLONGED OR REPEATED EXPOSURE BY INHALATION. SUSPECTED OF CAUSING GENETIC DEFECTS. REPRODUCTIVE HAZARD.
PHYSICAL HAZARDS: Extremely flammable gas under pressure.
PRECAUTIONARY STATEMENTS: Keep away from heat, sparks and flame. Wash thoroughly after handling. Avoid contact with eyes, skin and clothing. Do not breathe vapors or spray mist. Do not eat, drink or smoke in areas where this material is used. Use only outdoors or in a well-ventilated area. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Store in well-ventilated place. Keep container tightly closed.

****

POTENTIAL HEALTH EFFECTS:

Inhalation: Several minutes of exposure to high, but attainable concentrations (over 1000 ppm) may cause central nervous system depression with effects such as dizziness, drowsiness, disorientation, tingling, numbness or burning sensation of the hands and feet, impaired vision, nausea, headache, difficulty breathing, cardiac arrhythmias, unconsciousness, or even death.

Skin contact: May cause irritation. Rapid evaporation of the material may cause frostbite.

Eye contact: May cause irritation. Rapid evaporation of the material may cause frostbite.

Ingestion: Not a likely route of exposure.

Chronic Effects: Causes damage to the liver, musculoskeletal system, and peripheral nervous system through prolonged or repeated exposure.

Interaction with Other Chemicals Which Enhance Toxicity: Alcohol may enhance toxic effects

Medical Conditions Aggravated by Exposure: Hepatitis B infection

See Section 11: TOXICOLOGICAL INFORMATION

3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	Percentage	CAS Number
Vinyl chloride	99 - 100	75-01-4

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. If respiration or pulse has stopped, have a trained person administer basic life support (Cardio-Pulmonary Resuscitation and/or Automatic External Defibrillator) and CALL FOR EMERGENCY SERVICES IMMEDIATELY.

SKIN CONTACT: If frostbite or freezing occur, immediately flush with plenty of lukewarm water (100-105 F, 38-41 C). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT: Immediately flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissues. Washing eyes within several seconds is essential to achieve maximum effectiveness. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION: Not a likely route of exposure.

Notes to Physician: Cardiac stimulants such as epinephrine should not be given to persons overexposed to chlorinated hydrocarbons.

5. FIRE-FIGHTING MEASURES

Fire Hazard: Severe fire hazard. Vapor/air mixtures are explosive. Vapors or gases may ignite at distant sources and flash back. Containers may rupture or explode if exposed to heat.

Extinguishing Media: Stop flow of gas before extinguishing fire. Use carbon dioxide, regular dry chemical, foam or water. Use water spray to keep containers cool.

Fire Fighting: Move container from fire area if it can be done without risk. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this can't be done, then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Stop leak if possible without personal risk. Let burn unless leak can be stopped immediately. Wear NIOSH approved positive-pressure self-contained breathing apparatus operated in pressure demand mode.

Sensitivity to Mechanical Impact: Not sensitive.

Sensitivity to Static Discharge: Electrostatic charges may build up during handling and may form ignitable vapor-air mixtures in storage containers. Ground equipment in accordance with industry standards and best practices such as NFPA 77 [Recommended Practices on Static Electricity (2007)] and American Petroleum Institute (API) RP Recommended Practice 2003 [Protection Against Ignitions Arising our of Static, Lightning, and Stray Currents (2008)].

Lower Flammability Level (air): 3.6 %
Upper Flammability Level (air): 33.0 %
Flash point: -108 F (-78 C)
Autoignition Temperature: 882 F (472 C)

Hazardous Combustion Products: Oxides of carbon, Hydrogen chloride, Phosgene

6. ACCIDENTAL RELEASE MEASURES

Occupational Release:
Remove sources of ignition. Ventilate closed spaces before entering. Stop leak if possible without personal risk. Vapors or gases may ignite at distant ignition sources and flash back. Reduce vapors with water spray. Keep unnecessary people away, isolate hazard area and deny entry. Keep out of water supplies and sewers. Wear appropriate personal protective equipment recommended in Section 8 of the SDS. Releases should be reported, if required, to appropriate agencies.

7. HANDLING AND STORAGE

Storage Conditions: Store and handle in accordance with all current regulations and standards. Keep container tightly closed and properly labeled. Store in a cool, dry area. Store in a well-ventilated area. Do not enter confined spaces unless adequately ventilated. Avoid heat, flames, sparks and other sources of ignition. May be subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Keep separated from incompatible substances (see Section 10 of SDS).

7. HANDLING AND STORAGE

Handling Procedures: Avoid breathing vapor or mist. Avoid contact with skin, eyes and clothing. Keep away from heat, sparks and flame. Ground any equipment used in handling. Use non-sparking tools and equipment. All energized electrical equipment must be designed in accordance with the electrical classification of the area.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Regulatory Exposure limit(s):

Component	CAS Number	OSHA Final PEL TWA	OSHA Final PEL STEL	OSHA Final PEL Ceiling
Vinyl chloride	75-01-4	1 ppm	5 ppm	-----

OEL: Occupational Exposure Level; OSHA: United States Occupational Safety and Health Administration; PEL: Permissible Exposure Limit; TWA: Time Weighted Average; STEL: Short Term Exposure Limit

Non-Regulatory Exposure Limit(s):

- The Non-Regulatory United States Occupational Safety and Health Administration (OSHA) limits shown in the table are the Vacated 1989 PEL's (vacated by 58 FR 35338, June 30, 1993).

- The American Conference of Governmental Industrial Hygienists (ACGIH) is a voluntary organization of professional industrial hygiene personnel in government or educational institutions in the United States. The ACGIH develops and publishes recommended occupational exposure limits each year called Threshold Limit Values (TLVs) for hundreds of chemicals, physical agents, and biological exposure indices.

Component	CAS Number	ACGIH TWA	ACGIH STEL	ACGIH Ceiling	OSHA TWA (Vacated)	OSHA STEL (Vacated)	OSHA Ceiling (Vacated)
Vinyl chloride	75-01-4	1 ppm	-----	-----	-----	-----	-----

ENGINEERING CONTROLS: Use closed systems when possible. Provide local exhaust ventilation where vapor may be generated. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection: Wear safety glasses with side-shields. If eye contact is likely, wear chemical resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin and Body Protection: Wear appropriate chemical resistant clothing.

Hand Protection: Wear appropriate chemical resistant gloves

Protective Material Types: Butyl rubber, Nitrile, Silver Shield®, Viton®

Respiratory Protection: Refer to 29 CFR 1910.1017 for selection of respirators for vinyl chloride. A respiratory protection program that meets 29 CFR 1910.134 must be followed whenever workplace conditions warrant use of a respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Compressed, liquefied gas

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	Colorless
Odor:	Sweet
Odor Threshold:	Not reliable to prevent excessive exposure
Molecular Weight:	62.5
Molecular Formula:	C2ClH3
Flash point:	-108 F (-78 C)
Lower Flammability Level (air):	3.6 %
Upper Flammability Level (air):	33.0 %
Boiling Point/Range:	7 F (-14 C)
Freezing Point/Range:	No data available
Vapor Pressure:	2660 mmHg @ 25 C
Vapor Density (air=1):	2.15
Specific Gravity (water=1):	0.91 @ 25/25 C
Water Solubility:	2.7 g/L
pH:	Not applicable
Volatility:	100%
VOC Content(%):	100%
Evaporation Rate (ether=1):	>15
Partition Coefficient (n-octanol/water):	Log Kow = 1.36

10. STABILITY AND REACTIVITY

Reactivity/ Stability: Stable at normal temperatures and pressures.

Conditions to Avoid: Avoid air and sunlight. Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat.

Incompatibilities/ Materials to Avoid: Oxidizing agents, Oxides of nitrogen, Metals, Aluminum, Aluminum alloys, Copper, Metal alkyl complexes and alkali metals such as sodium, potassium and their alloys

Hazardous Decomposition Products: Oxides of carbon, Chlorine, Hydrogen chloride, Phosgene

Hazardous Polymerization: Polymerization can occur. Avoid elevated temperatures, oxidizing agents, oxides of nitrogen, oxygen, peroxides, other polymerization catalysts/initiators, air and sunlight.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:

Component	LD50 Oral	LC50 Inhalation	LD50 Dermal
Vinyl chloride	500 mg/kg (Rat)	-----	-----

CHRONIC TOXICITY: Occupational overexposure has produced a specific cancer (angiosarcoma of the liver) and is associated with hepatocellular cancer. Occupational exposure has also resulted in changes in bones and skin, especially in the extremities such as the fingers (acroosteolysis). Additionally, repeated exposure may result in dose-related sensory disorders, peripheral nervous system effects, blood system damage, lymphatic system changes, liver malfunction, and pulmonary insufficiency.

CARCINOGENICITY: This material is classified as follows:

Component	NTP:	IARC (GROUP 1):	IARC (GROUP 2):	OSHA:
Vinyl chloride	Known Carcinogen	Group 1	Not listed	Listed

MUTAGENIC DATA: Mutagenic in bacteria studies. Genetic studies in animals were negative in some cases and positive in others.

REPRODUCTIVE TOXICITY: Reproductive effects and testes damage occurred in rats exposed to vinyl chloride. These endpoints, however, were generally noted at concentrations greater than those necessary to cause liver damage.

12. ECOLOGICAL INFORMATION

Aquatic Toxicity:
This material is believed to be practically non-toxic to fish on an acute basis (LC50>100 mg/L)

FATE AND TRANSPORT:

BIODEGRADATION: Vinyl chloride may degrade under anaerobic conditions.

PERSISTENCE: Tropospheric half-life is estimated to be 23 hours. If released to air, this material will remain in the gas phase. If released to soil, volatilization will occur, but material that does not volatilize may be highly mobile. If released to water, evaporation will occur.

BIOCONCENTRATION: Bioconcentration potential is low (BCF <100 or log Kow <3).

13. DISPOSAL CONSIDERATIONS

Reuse or reprocess, if possible. Dispose in accordance with all applicable regulations. May be subject to disposal regulations: U.S. EPA 40 CFR 261. Hazardous Waste Number(s): D001, U043.

14. TRANSPORT INFORMATION

U.S.DOT 49 CFR 172.101:

PROPER SHIPPING NAME: Vinyl chloride, stabilized
UN NUMBER: UN1086
HAZARD CLASS/ DIVISION: 2.1
LABELING REQUIREMENTS: 2.1
DOT RQ (lbs): RQ 1 Lbs. (Vinyl chloride)

14. TRANSPORT INFORMATION

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

SHIPPING NAME: Vinyl chloride, stabilized
UN NUMBER: UN1086
CLASS OR DIVISION: 2.1

15. REGULATORY INFORMATION

U.S. REGULATIONS

OSHA REGULATORY STATUS: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200) (US)

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): If a release is reportable under CERCLA section 103, notify the state emergency response commission and local emergency planning committee. In addition, notify the National Response Center at (800) 424-8802 or (202) 426-2675.

Component	CERCLA Reportable Quantities:
Vinyl chloride	1 lb (final RQ)

EPCRA EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated

EPCRA SECTIONS 311/312 HAZARD CATEGORIES (40 CFR 370.21):
Fire Hazard, Reactive Hazard, Sudden Release of Pressure, Acute Health Hazard, Chronic Health Hazard

EPCRA SECTION 313 (40 CFR 372.65): The following chemicals are listed in 40 CFR 372.65 and may be subject to Community Right-to Know Reporting requirements

Component	Status:
Vinyl chloride	Listed

OSHA SPECIFICALLY REGULATED SUBSTANCES: OSHA 29 CFR 1910.1017 (Vinyl chloride); The U.S. Department of Labor, Occupational Safety and Health Administration specifically regulates manufacturing, handling and processing of vinyl chloride. Such regulations have been published at 29 CFR 1910.1017.

OSHA PROCESS SAFETY (PSM) (29 CFR 1910.119): The PSM standard may apply to processes which involve a flammable liquid or gas in a quantity of 10,000 pounds (4535.9 kg) or more.

NATIONAL INVENTORY STATUS

U.S. INVENTORY STATUS: Toxic Substance Control Act (TSCA): All components are listed or exempt

TSCA 12(b): This product is not subject to export notification

Canadian Chemical Inventory: All components are listed

STATE REGULATIONS

Component	Vinyl chloride
California Proposition 65 Cancer WARNING:	Listed
Massachusetts Right to Know Hazardous Substance List	Listed

	New Jersey Right to Know Hazardous Substance List	Listed	
	New Jersey Special Health Hazards Substance List	Listed	a
	New Jersey - Environmental Hazardous Substance List	Listed	
	Pennsylvania Right to Know Hazardous Substance List	Listed	
	Pennsylvania Right to Know Special Hazardous Substances	Listed	
	Pennsylvania Right to Know Environmental Hazard List	Listed	
	Rhode Island Right to Know Hazardous Substance List	Listed	

CANADIAN REGULATIONS
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

WHMIS Classification: A, B1, D2A, D2B, F

16. OTHER INFORMATION

Prepared by: OxyChem Corporate HESS - Health Risk Management

HMIS: (SCALE 0-4) (Rated using National Paint & Coatings Association HMIS: Rating Instructions, 2nd Edition)
Health: 2* **Flammability:** 4 **Reactivity:** 2
NFPA 704 - Hazard Identification Ratings (SCALE 0-4)
Health: 2 **Flammability:** 4 **Reactivity:** 2

IMPORTANT:
The information presented herein, while not guaranteed, was prepared by technical personnel and is true and accurate to the best of our knowledge. NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTY OR GUARANTY OF ANY OTHER KIND, EXPRESS OR IMPLIED, IS MADE REGARDING PERFORMANCE, SAFETY, SUITABILITY, STABILITY OR OTHERWISE. This information is not intended to be all-inclusive as to the manner and conditions of use, handling, storage, disposal and other factors that may involve other or additional legal, environmental, safety or performance considerations, and OxyChem assumes no liability whatsoever for the use of or reliance upon this information. While our technical personnel will be happy to respond to questions, safe handling and use of the product remains the responsibility of the customer. No suggestions for use are intended as, and nothing herein shall be construed as, a recommendation to infringe any existing patents or to violate any Federal, State, local or foreign laws.

OSHA Standard 29 CFR 1910.1200 requires that information be provided to employees regarding the hazards of chemicals by means of a hazard communication program including labeling, material safety data sheets, training and access to written records. We request that you, and it is your legal duty to, make all information in this Material Safety Data Sheet available to your employees.

Material Safety Data Sheet
Acetonitrile

ACC# 00170

Section 1 - Chemical Product and Company Identification

MSDS Name: Acetonitrile
Catalog Numbers: AC149520000, AC149520010, AC149520025, AC149520050, AC149520250, AC149525000, AC167650000, AC258560000, AC258560010, AC258560025, AC258560051, AC268260000, AC268260010, AC268270000, AC268270010, AC325730000, AC325730010, AC325730025, AC326680000, AC326680010, AC326680025, AC326750000, AC326750010, AC326750025, AC326810000, AC326810010, AC326811000, AC326812500, AC364310000, AC364310010, AC364311000, AC364315000, AC400130000, AC400132500, AC423250000, AC423250010, AC423255000, AC610130040, AC61022019, AC61022019, AC61022050, AC61022115, AC61022115, AC61022200, AC61022200, AC610500190, AC610500500, AC610501150, AC610502000, AC610700190, AC610700500, AC610701150, AC610702000, 16765-0010, 16765-2500, 26826-0025, 26827-0025, 26827-0040, 61001-0040, 61022-0010, 61022-1000, 61096-1000, 61110-0500, 61514-0025, A21-1, A21-20, A21-200, A21-4, A21200LC, A21FB115, A21FB19, A21FB200, A21FB50, A21RB115, A21RS-50, A21RS115, A21RS19, A21RS200, A21RS28, A955-1, A955-4, A9931, A993RS-19, A996-1, A996-4, A9964LC, A996J1, A996N2-19, A996RS-115, A996RS-200, A996RS-28, A996RS-50, A996SK-4, A996SS-115, A996SS-19, A996SS-200, A996SS28, A996SS50, A998-1, A998-212, A998-4, A99818, A9984LC, A998J1, A998N1-19, A998N2-19, A998POP-50, A998RS-115, A998RS-19, A998RS-200, A998RS-28, A998RS-50, A998SK-1, A998SK-4, A998SS-115, A998SS-200, A998SS-28, A998SS-50, A999-4, BP1165-50, BP1170-4, BP1170-450, BP1170N1-19, BP1170N2-19, BP1170POP-200, BP1170POP-50, BP1170POP20, BP1170RS-115, BP1170RS-1350, BP1170RS-19, BP1170RS-200, BP1170RS-28, BP1170RS-50, BP1170SS-115, BP1170SS-1350, BP1170SS-200, BP1170SS-30, BP1170SS-50, BP2405-1, BP2405-4, BP2405SK-1, BP2405SK-4, BP2600-100, NC9173153, NC9229342, NC9234885, NC9239862, NC9445091, NC9574352, NC9585208, NC9638863, NC9647795, NC9677816, NC9708859, O1034-500, PS03490, PS03491
Synonyms: Cyanomethane; Ethanenitrile; Ethyl nitrile; Methyl cyanide; Methanecarbonitrile.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
75-05-8	Acetonitrile	100	200-835-2

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 2 deg C.

Warning! Flammable liquid and vapor. Causes eye irritation. May be harmful if swallowed, inhaled, or absorbed through the skin. May cause skin and respiratory tract irritation. Metabolized to cyanide in the body, which may cause headache, dizziness, weakness, unconsciousness, convulsions, coma and possible death. May cause liver and kidney damage.
Target Organs: Kidneys, central nervous system, liver, respiratory system, cardiovascular system, eyes.

Potential Health Effects

Eye: Causes eye irritation. Lachrymator (substance which increases the flow of tears). May produce superficial reversible injury.
Skin: Causes mild skin irritation. If absorbed, causes symptoms similar to those of inhalation. May be harmful if absorbed through the skin. May be metabolized to cyanide which in turn acts by inhibiting cytochrome oxidase impairing cellular respiration. A Skin notation is recommended based upon the case report of child poisoning from dermal contact. A LD50 >2000 mg/kg was obtained in a well-conducted acute dermal toxicity study in rabbits.
Ingestion: May cause tissue anoxia, characterized by weakness, headache, dizziness, confusion, cyanosis (bluish skin due to deficient oxygenation of the blood), weak and irregular heart beat, collapse, unconsciousness, convulsions, coma and death. Metabolism may release cyanide, which may result in headache, dizziness, weakness, collapse, unconsciousness and possible death. Different animal species and individuals of the same species varied widely in susceptibility to acetonitrile in single-dose toxicity studies by various routes. The range of oral LD50 values for acetonitrile in mammals is between 140 - 6762 mg/kg body weight. Mouse and guinea pig seem to be the most sensitive species. In a well-conducted study in mice, the oral LD50 of acetonitrile was calculated to be 617 mg/kg.
Inhalation: May cause respiratory tract irritation. May cause lung damage. May be harmful if inhaled. Acetonitrile breaks down slowly in the body to release the cyanide ion. Exposure to very high concentrations of acetonitrile can result in cyanide poisoning. Symptoms are usually delayed several hours after exposure. Early symptoms include weakness, headache, giddiness, dizziness, confusion, anxiety, nausea and vomiting. In severe cases, breathing is rapid, then becomes slow and gasping. The victim may feel an irregular heart beat and tightness in the chest.
Chronic: May be metabolized to cyanide which in turn acts by inhibiting cytochrome oxidase impairing cellular respiration. Exposure to small amounts of cyanide compounds over long periods of time is reported to cause loss of appetite, headache, weakness, nausea, dizziness, and symptoms of irritation of the upper respiratory tract and eyes. Animal studies indicate that the product may affect the liver and kidneys. Animal evidence for acetonitrile and other cyanide compounds clearly indicates that toxic effects would be expected in the fetus at exposure levels which are toxic to the

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.
Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Exposure should be treated as a cyanide poisoning. Effects may be delayed. For methemoglobinemia, administer oxygen alone or with Methylene Blue depending on the methemoglobin concentration in the blood. May be partially metabolized to cyanide in the body.
Antidote: Always have a cyanide antidote kit on hand when working with cyanide compounds. Get medical advice to use. Methylene blue, alone or in combination with oxygen is indicated as a treatment in nitrite induced methemoglobinemia.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or appropriate foam.
Flash Point: 2 deg C (35.60 deg F)
Autoignition Temperature: 524 deg C (975.20 deg F)
Explosion Limits, Lower:3.0 vol %
Upper: 16.00 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Provide ventilation. Evacuate unnecessary personnel. Approach spill from upwind.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Avoid breathing vapor or mist.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area. Store protected from moisture.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Acetonitrile	20 ppm TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	20 ppm TWA; 34 mg/m3 TWA 500 ppm IDLH	40 ppm TWA; 70 mg/m3 TWA

OSHA Vacated PELs: Acetonitrile: 40 ppm TWA; 70 mg/m3 TWA
Personal Protective Equipment

Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: sweetish odor - ethereal odor
pH: Not available.
Vapor Pressure: 88.8 mm Hg @ 25 deg C
Vapor Density: 1.42 (air=1)
Evaporation Rate:5.79 (Butyl acetate=1)
Viscosity: 0.36 cP 20 deg C
Boiling Point: 81.6 deg C @ 760 mmHg
Freezing/Melting Point:-45 deg C
Decomposition Temperature:> 500 deg C
Solubility: Soluble.
Specific Gravity/Density:.7810g/cm3
Molecular Formula:C2H3N
Molecular Weight:41.05

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Ignition sources, excess heat, exposure to moist air or water.
Incompatibilities with Other Materials: Strong oxidizing agents, strong reducing agents, strong acids.
Hazardous Decomposition Products: Hydrogen cyanide, nitrogen oxides, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 75-05-8: AL7700000
LD50/LC50:
CAS# 75-05-8:
Draize test, rabbit, eye: 100 uL/24H Moderate;
Inhalation, mouse: LC50 = 2693 ppm/1H;
Inhalation, rabbit: LC50 = 2828 ppm/4H;
Inhalation, rat: LC50 = 7551 ppm/8H;
Oral, mouse: LD50 = 269 mg/kg;
Oral, rabbit: LD50 = 50 mg/kg;
Oral, rat: LD50 = 2460 mg/kg;
Skin, rabbit: LD50 = >2 gm/kg;
.

In a well-conducted study in mice, the oral LD50 of acetonitrile was calculated to be 617 mg/kg.
Carcinogenicity:
CAS# 75-05-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: Three volunteers were exposed for 4 hours at 40, 80, or 160 ppm acetonitrile. At 40 ppm, odor was detected, after which olfactory fatigue was noted. At this concentration, 2 persons had no signs of response, including no appreciable blood or urinarycyanide or thiocyanate. The third person experienced slight tightness in the chest that evening. A sensation of cooling in the lungs was observed and persisted for 24 hours. Traces of urinary thiocyanate were recorded.
Teratogenicity: In most of the available assays, teratogenicity was associated with maternal toxicity. In a well-conducted study, rats exposed by inhalation to acetonitrile did not result in significant fetal effects, even at concentrations which were overtly toxic tothe dam. In this study, a maternal NOAEL of 1200 ppm and NOAEL of 1200 ppm with respect to developmental toxicity were established. A case-control study of pregnancy outcome among Finnish lab workers revealed no association between exposure toacetonitrile and increased risk of spontaneous abortion in mothers, or malformation and birth weight in their children.
Reproductive Effects: In relation to fertility, there is no information available in humans and there are no animal studies specifically investigating such effects. However, no changes were seen in weight of the right cauda or right testis and no effect on sperm motility inrats or mice exposed for 13 weeks with 100, 200 and 400 ppm to acetonitrile.
Mutagenicity: See actual entry in RTECS for complete information.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: 1150 ppm; 24 Hr; TLm (hard water)Fish: Fathead Minnow: 1000 mg/L; 96 Hr; TLm (soft water)Fish: Bluegill/Sunfish: 1850 mg/L; 96 Hr; TLm (soft water)Fish: Fathead Minnow: 1640 mg/L; 96 Hr; LC50 (flow-bioassay)Fish: Fathead Minnow: 1640 mg/L; 96 Hr; EC50 (flow-bioassay) No data available.
Environmental: Estimated Koc value = 16. Acetonitrile is expected to weakly adsorb to most soils based on the Koc value. Volatilization from soil surfaces and leaching into ground water is expected to be significant. Estimated BCF value = 0.3. This value indicates that acetonitrile will not significantly bioconcentrate in aquatic organisms or adsorb to suspended solids and sediments in water. Acetonitrile is unreactive towards photochemically-generated free radicals and direct photolysis in the gaseous phase.
Physical: No information available.
Other: Biodegradable.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 75-05-8: waste number U003 (Ignitable waste, Toxic waste).

Section 14 - Transport Information

	US DOT	Canada TDG

Shipping Name:	ACETONITRILE	ACETONITRILE
Hazard Class:	3	3
UN Number:	UN1648	UN1648
Packing Group:	II	II
Additional Info:		FLASHPOINT 6 C

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 75-05-8 is listed on the TSCA inventory.

Health & Safety Reporting List

CAS# 75-05-8: Effective 10/4/82, Sunset 10/4/92

Chemical Test Rules

CAS# 75-05-8: 40 CFR 799.5115

Section 12b

CAS# 75-05-8: Section 4, 1 % de minimus concentration

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 75-05-8: 5000 lb final RQ; 2270 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 75-05-8: immediate, delayed, fire.

Section 313

This material contains Acetonitrile (CAS# 75-05-8, 100%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 75-05-8 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 75-05-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN F

Risk Phrases:

R 11 Highly flammable.

R 20/21/22 Harmful by inhalation, in contact with skin and if swallowed.
R 36 Irritating to eyes.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 36/37 Wear suitable protective clothing and gloves.

WGK (Water Danger/Protection)

CAS# 75-05-8: 2

Canada - DSL/NDSL

CAS# 75-05-8 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2, D1B, D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 75-05-8 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 4/23/1999
Revision #16 Date: 2/28/2008

MSDS Number: **M4420** * * * * * *Effective Date:* ***08/20/08*** * * * * * *Supercedes:* ***10/06/05***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

METHYLENE CHLORIDE

1. Product Identification

Synonyms: MC; Dichloromethane (DCM); Methylene dichloride; Methylene bichloride; Methane dichloride
CAS No.: 75-09-2
Molecular Weight: 84.93
Chemical Formula: CH2Cl2
Product Codes: 9235, 9264, 9266, 9295, 9315, 9324, 9329, 9330, 9348, 9350, 9965, Q480

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methylene Chloride	75-09-2	> 99%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, CARDIOVASCULAR SYSTEM, AND BLOOD. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 1 - Slight
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Causes irritation to respiratory tract. Has a strong narcotic effect with symptoms of mental confusion, light-headedness, fatigue, nausea, vomiting and headache. Causes formation of carbon monoxide in blood which affects cardiovascular system and central nervous system. Continued exposure may cause increased light-headedness, staggering, unconsciousness, and even death. Exposure may make the symptoms of angina (chest pains) worse.
Ingestion:
May cause irritation of the gastrointestinal tract with vomiting. If vomiting results in aspiration, chemical pneumonia could follow. Absorption through gastrointestinal tract may produce symptoms of central nervous system depression ranging from light headedness to unconsciousness.
Skin Contact:
Causes irritation, redness and pain. Prolonged contact can cause burns. Liquid degreases the skin. May be absorbed through skin.
Eye Contact:
Vapors can cause eye irritation. Contact can produce pain, inflammation and temporal eye damage.
Chronic Exposure:
Can cause headache, mental confusion, depression, liver effects, kidney effects, bronchitis, loss of appetite, nausea, lack of balance, and visual disturbances. Can cause

dermatitis upon prolonged skin contact. Methylene chloride may cause cancer in humans.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders, eye problems, impaired liver, kidney, respiratory or cardiovascular function may be more susceptible to the effects of this substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Autoignition temperature: 556C (1033F)
Flammable limits in air % by volume:
lel: 12; uel: 23
Forms flammable vapor-air mixtures above 100C (212F).

Explosion:

Concentrated can be ignited by a high intensity ignition source. Vapor may form flammable mixture in atmosphere that contains a high percentage of oxygen. Sealed containers may rupture when heated.

Fire Extinguishing Media:

Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Outside or detached storage is recommended. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. To minimize decomposition, all storage containers should be galvanized or lined with a phenolic coating. This material may corrode plastic and rubber. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Odor Threshold: 205 - 307 ppm. The odor threshold only serves as a warning of exposure; not smelling it does not mean you are not being exposed.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

Methylene Chloride (Dichloromethane):
- OSHA Permissible Exposure Limit (PEL) -
25 ppm (TWA), 125 ppm (STEL), 12.5 ppm (8-hour TWA - Action Level)
- ACGIH Threshold Limit Value (TLV) -
50 ppm (TWA), A3 - suspected human carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. The cartridges recommended for this material have a predicted service of less than 30 minutes at concentrations of ten times (10x) the exposure limits. Actual service life will vary considerbly, depending on concentration levels, temperature, humidity, and work rate. This substance has poor warning properties.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment. Natural rubber and polyvinyl chloride ARE NOT recommended materials for personal protective equipment.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.
Other Control Measures:
Do not use closed circuit rebreathing system employing soda lime or other carbon dioxide absorber because of formation of toxic compounds capable of producing cranial nerve paralysis. See OSHA Standard for medical surveillance, record keeping, and reporting requirements for methylene chloride (29 CFR 1910.1052).

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Chloroform-like odor.
Solubility:
1.32 gm/100 gm water @ 20C.
Specific Gravity:
1.318 @ 25C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
39.8C (104F)
Melting Point:
-97C (-143F)
Vapor Density (Air=1):
2.9
Vapor Pressure (mm Hg):
350 @ 20C (68F)
Evaporation Rate (BuAc=1):
27.5

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Emits highly toxic fumes of phosgene when heated to decomposition. Decomposes in a flame or hot surface to form toxic gas phosgene and corrosive mists of hydrochloric acid. Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizers, strong caustics, plastics, rubber, nitric acid, water + heat, and chemically active metals, such as aluminum and magnesium powder, sodium, potassium, and lithium. Avoid contact with open flames and electrical arcs. Liquid methylene chloride will attack some forms of plastics, rubber, and coatings.
Conditions to Avoid:
Moisture, heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:
Dichloromethane: Oral rat LD50: 1600 mg/kg; inhalation rat LC50: 52 gm/m3; investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
Dichloromethane has been linked to spontaneous abortions in humans.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methylene Chloride (75-09-2)	No	Yes	2B

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into

water, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of greater than 30 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.

Environmental Toxicity:

The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN/NA: UN1593
Packing Group: III
Information reported for product/size: 52L

International (Water, I.M.O.)

Proper Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN/NA: UN1593
Packing Group: III
Information reported for product/size: 52L

International (Air, I.C.A.O.)

Proper Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN/NA: UN1593
Packing Group: III
Information reported for product/size: 52L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Methylene Chloride (75-09-2)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient		--Canada--		
	Korea	DSL	NDSL	Phil.
Methylene Chloride (75-09-2)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Methylene Chloride (75-09-2)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Methylene Chloride (75-09-2)	1000	U080	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2Z
Poison Schedule: S5
WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, CARDIOVASCULAR SYSTEM, AND BLOOD. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

Label Precautions:

Do not breathe vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.
Do not get in eyes, on skin, or on clothing.

Label First Aid:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **C0957** * * * * * *Effective Date:* ***05/26/09*** * * * * * *Supercedes:* ***07/27/06***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

CARBON DISULFIDE

1. Product Identification

Synonyms: Carbon bisulfide
CAS No.: 75-15-0
Molecular Weight: 76.1
Chemical Formula: CS2
Product Codes:
J.T. Baker: 9172, E350
Mallinckrodt: 8831

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Carbon Disulfide	75-15-0	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE CENTRAL AND PERIPHERAL NERVOUS SYSTEMS. A DEVELOPMENTAL AND REPRODUCTIVE HAZARD. AFFECTS CARDIOVASCULAR SYSTEM, LIVER AND KIDNEYS.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Vapors cause irritation to the respiratory tract, followed by symptoms of headache, dizziness, fatigue, garlic breath, nausea, vomiting, and abdominal pains. Affects the central nervous system and peripheral nervous system. Overexposure may produce hallucinations, narcosis, unconsciousness, convulsions, and even death.
Ingestion:
TOXIC! Symptoms parallel those of inhalation. May cause permanent disabilities described below in Chronic Exposure.
Skin Contact:
May produce reddening and burning, cracking and peeling. Contact with liquid for several minutes may result in a second-degree burn. Skin absorption can occur even in the presence of vapors, with toxic effects paralleling inhalation.
Eye Contact:
Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.
Chronic Exposure:
Kidney and liver damage, reproductive disorders, central and peripheral nervous system damage, vision problems, psychosis, and cardiovascular effects are associated

with chronic exposure to Carbon Disulfide.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance. Affects the developing fetus.

4. First Aid Measures

FOLLOWING ANY ROUTE OF EXPOSURE GET MEDICAL ATTENTION IMMEDIATELY.

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:

Since effects may be delayed, keep victim under observation. The iodide-azide test is useful in detecting degree of exposure and hyposusceptiblility of exposed workers. I.V. urea 0.5 to 1.5 g/kg is recommended to inactivate free carbon disulfide in the blood. Vitamin B6 in large doses is recommended. Obtain CBC, EKG, urinalysis, and electrolyte balance.

5. Fire Fighting Measures

Fire:

Flash point: -30C (-22F) CC
Autoignition temperature: 90C (194F)
Flammable limits in air % by volume:
lel: 1.3; uel: 50
Extremely Flammable Liquid and Vapor. Contact with strong oxidizers may cause fire. May ignite on contact with hot surfaces such as light bulbs, steam pipes, or engine exhaust pipes.

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated. Sensitive to static discharge.

Fire Extinguishing Media:

Dry chemical, foam or carbon dioxide. Fluoroprotein and protein foams are recommended over other types for carbon disulfide. Water spray may be used to keep fire exposed containers cool. Do not allow water runoff to enter sewers or waterways.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. This highly flammable liquid must be kept from sparks, open flame, hot surfaces, and all sources of heat and ignition. Flush area with water spray to cool containers and prevent reignition.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Prepare safe grounding routes for lightning strikes in storage area. Electrical installations and heating facilities must be prohibited in or near storage areas. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

OSHA Z-2 TWA, 8 hour 20 ppm;
30 ppm Ceiling; 100 ppm Peak Concentration; Maximum Duration 30 minutes

ACGIH Threshold Limit Value (TLV):
1 ppm (TWA) (skin)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Nearly odorless when pure, but most material has a strong garlic-type odor.

Solubility:
0.2 gm/100 ml water.

Density:
1.26

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
46C (115F)

Melting Point:
-100C (-148F)

Vapor Density (Air=1):
2.6

Vapor Pressure (mm Hg):
300 @ 20C (68F)

Evaporation Rate (BuAc=1):
22.6

---

10. Stability and Reactivity

Stability:
Stable at room temperature in sealed containers. Heat and sunlight can contribute to instability. Containers may burst when heated.

Hazardous Decomposition Products:
Burning may produce carbon monoxide, carbon dioxide, sulfur oxides.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Contact with strong oxidizers and chemically active metals (such as Potassium, Zinc), chlorine, nitrogen oxides, azides, and organic amines may cause fire and explosions.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Toxicological Data:
Inhalation rat LC50: 25 gm/m3/2H. Investigated as a mutagen, reproductive effector.

Reproductive Toxicity:
Carbon disulfide is a known human reproductive hazard. Menstrual disorders, spontaneous abortions and premature births are reported in cases of chronic exposure.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Carbon Disulfide (75-15-0)	No	No	None

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life of less than 1 day. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CARBON DISULFIDE
Hazard Class: 3, 6.1
UN/NA: UN1131
Packing Group: I
Information reported for product/size: 2.5L

International (Water, I.M.O.)

Proper Shipping Name: CARBON DISULPHIDE
Hazard Class: 3, 6.1
UN/NA: UN1131
Packing Group: I
Information reported for product/size: 2.5L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Carbon Disulfide (75-15-0)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Carbon Disulfide (75-15-0)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Carbon Disulfide (75-15-0)	100	10000	Yes	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Carbon Disulfide (75-15-0)	100	P022	Yes

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 3WE
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **4** Reactivity: **0**

Label Hazard Warning:

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE CENTRAL AND PERIPHERAL NERVOUS SYSTEMS. A DEVELOPMENTAL AND REPRODUCTIVE HAZARD. AFFECTS CARDIOVASCULAR SYSTEM, LIVER AND KIDNEYS.

Label Precautions:

Keep away from heat, sparks and flame.
Do not breathe vapor.
Keep container closed.
Do not get in eyes, on skin, or on clothing.
Use only with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 75-25-2
Date: 03/09/2001

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: BROMOFORM

SYNONYMS: Tribromomethane, Methyl Tribromide, Methenyl Tribromide.

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	OSHA PEL	MAC	Other STEL
BROMOFORM	CHBR3	75-25-2	99+%	.5	.5	.5	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Poisonous liquid and vapor.
May cause irritation to eyes, skin, and respiratory tract.
Central nervous system depressant.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Ingestion , Skin

ACUTE EFFECTS: If inhaled, may be irritating to mucous membrane and upper respiratory tract. Overexposure may cause nausea, headache, dizziness, vomiting and weakness. It is a metabolic poison and causes lachrymation. Acts as a central nervous system depressant. May damage liver and kidney. Can be absorbed through the skin. Severe exposure may lead to narcosis and coma.

CHRONIC EFFECTS: None known

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Existing problems with CNS, kidneys, liver, and lungs may be worsened.

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - NO
IARC MONOGRAPHS - NO
OSHA REGULATED - NO

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration.

EYE CONTACT: Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: DO NOT INDUCE VOMITING. Have victim drink 8 to 10 oz. (240 to 300 ml.) of water to dilute material in stomach. If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration to the victim. Never give anything by mouth to an unconscious person.

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 75-27-4
Date: 03/09/2001

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: BROMODICHLOROMETHANE

SYNONYMS: Methane-bromodichloro, BDCM, Monobromodiclorомethane.

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	OSHA PEL	MAC	Other STEL
BROMODICHLOROMETHANE	CHBRCL2	75-27-4	99+%	NE	NE	NE	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Nonflammable liquid and vapor.
May cause irritation to eyes, skin, and mucous membranes.
May cause respiratory tract and central nervous system depression.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Skin

ACUTE EFFECTS: Inhalation can cause irritation to the eyes, mucous membranes, and respiratory tract. Can be absorbed through the skin. This material is narcotic in high concentrations. Prolonged exposure can cause nausea, dizziness and headaches. Acts as a central nervous system depressant.

CHRONIC EFFECTS: None known Suspected human carcinogen.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - Yes
IARC MONOGRAPHS - Yes

OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration.

EYE CONTACT: Do not allow victim to rub or keep eyes tightly shut. Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes.

SKIN CONTACT: Immediately remove contaminated clothing. Rinse the affected area with flooding amounts of water and then wash it with soap and water.

INGESTION: Never give anything by mouth to an unconscious person. Contact a poison control center. Unless the poison control center advises otherwise, have the conscious and alert person drink 1 to 2 glasses of water to dilute.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: Nonflammable

AUTOIGNITION TEMPERATURE: N/Ap

FLAMMABLE LIMITS: Nonflammable

LOWER:
UPPER:

EXTINGUISHING MEDIA: Use what is appropriate for surrounding fire.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide, chlorine, phosgene, and bromine gases.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Emits toxic fumes under fire conditions.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Absorb with sand or vermiculite and place in closed containers for disposal.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation.

EYE / FACE PROTECTION: Goggles. A safety shower and eyewash station should be readily available.

SKIN PROTECTION: Protective gloves. Wear suitable protective clothing.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Unknown.

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @20 deg. C: 50 mmHg

VAPOR DENSITY (AIR=1): N/Av

BOILING POINT (C): 90.6

SOLUBILITY IN WATER: 4,500 mg/L

SPECIFIC GRAVITY (H2O=1): @20 deg. C: 1.980

EVAPORATION RATE: N/Av

ODOR THRESHOLD: 1680 mg/m3

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage near a heat source.

MATERIALS TO AVOID: Bases. Oxidizing agents. Magnesium.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Fumes of carbon monoxide, hydrogen chloride gas and hydrogen bromide gas.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): NONE ESTABLISHED

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Return cylinders to supplier with any valve outlet plugs or caps secured and valve protection cap in place. Follow federal, state and local regulations. Non-returnable cylinders must not be refilled. Dispose of non-refillable cylinders in accordance with federal, state, and local regulations.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Environmentally hazardous substances, liquid, n.o.s.
HAZARD CLASS: 9, Packing group III.
INDENTIFICATION NUMBER: UN3082
REPORTABLE QUANTITIES: None
LABELING: CLASS 9

ADR / RID (EU Only): N/Av

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 200-856-7

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: 45,46,20/21/22,36/37/38

S: 45,26,28,27,36/37/39

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 75-34-3
Date: 03/09/2001

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: 1,1-DICHLOROETHANE SYNONYMS: Ethylidene chloride, Ethylidene Dichloride

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	**Formula**	**CAS #**	**Concentration**	**ACGIH TLV**	**OSHA PEL**	**MAC**	**Other STEL**
1,1-DICHLOROETHANE	C2H4Cl2	75-34-3	99+%	100	100	100	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.
Can form explosive mixtures with air.
Can cause irritation to eyes, skin and respiratory tract.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Skin , Ingestion

ACUTE EFFECTS: Moderately toxic by inhalation and ingestion. Overexposure may cause nausea, headache, dizziness, vomiting and weakness. Skin exposure may cause irritation, itching, erythema, swelling, burning and pain. Can be absorbed through the skin. Liquid contact with the eye causes severe corneal injury.

CHRONIC EFFECTS: Kidney and liver damage.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - No
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Never give anything by mouth to an unconscious person. Have conscious and alert person drink 1 to 2 glasses of water.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: -5.6 deg. celsius

AUTOIGNITION TEMPERATURE: 458 deg. C

FLAMMABLE LIMITS: Vol.%

LOWER: 5.6
UPPER: NONE ESTABLISHED

EXTINGUISHING MEDIA: Carbon dioxide, foam, or dry chemical.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Keep fire exposed cylinders cool with water spray. Water is ineffective except for keeping containers cool. Use blanketing effect to smother fires. Extinguish only if flow can be stopped. Dangerous fire hazard and moderate explosion hazard when heated.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide, hydrogen chloride and phosgene.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Cylinder rupture may occur under fire conditions. Emits toxic fumes under fire conditions. Vapors may travel a considerable distance to the source of ignition and flash back.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Remove leaking cylinder to exhaust hood or safe outdoor area. Shut off source if possible and remove source of heat. Absorb with sand or vermiculite and place in closed containers for disposal.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders. Use only in a well-ventilated area.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use. Store away from oxidizers, combustible materials, and source of ignition or heat.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Goggles. A safety shower and eyewash station should be readily available.

SKIN PROTECTION: Impervious gloves, coveralls, boots, and/or other resistant protective clothing.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Mild aromatic odor.

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @25 deg.C: 230 mm Hg

VAPOR DENSITY (AIR=1): 3.44

BOILING POINT (C): 57.3

SOLUBILITY IN WATER: Slight

SPECIFIC GRAVITY (H2O=1): @20 deg.C: 1.174

EVAPORATION RATE: N/Av

ODOR THRESHOLD: N/Av

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: Oxidizing agents. Alkali or alkaline earth metals, aluminum. Bases.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: HCl gas, phosgene gas, CO and oxides of chlorine.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): None Established

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place. Waste can be burned in an approved incinerator equipped with an afterburner and scrubber.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: 1,1-Dichloroethane
HAZARD CLASS: 3 (flammable), Packing Group II
INDENTIFICATION NUMBER: UN2362
REPORTABLE QUANTITIES: 1000 lb.
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): Class 3, 3(b)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 200-863-5

NUMBER IN ANNEX 1 OF DIR 67/548: Material is listed in annex 1.

EU CLASSIFICATION: N/Av

R: 11-22-36/37

S: 16-23

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 75-35-4
Date: 05/31/2006

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: 1,1-DICHLOROETHYLENE SYNONYMS: Vinylidene Chloride

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	**Formula**	**CAS #**	**Concentration**	**ACGIH TLV**	**OSHA PEL**	**MAC**	**Other STEL**
1,1-DICHLORORETHYLENE	C2H2Cl2	75-35-4	99+%	5	1	5	100

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.
Can form explosive mixtures with air.
May be fatal if inhaled.
May cause heart, liver and kidney damage.
May cause irritation to the respiratory tract and skin.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation, Ingestion, Skin

ACUTE EFFECTS: Inhalation causes irritation of the respiratory tract.Symptoms include shortness of breath, headache, confusion, nausea, dizziness, and unconsciousness.Severe exposure may cause unconsciousness and death.Eye contact may cause irritation, redness, or blurred vision.Skin contact can cause defatting and dermatitis.Can be absorbed through the skin.Ingestion irritates the digestive tract and may cause partial paralysis, unconsciousness and kidney damage.

CHRONIC EFFECTS: Kidney and liver damage.Heart damage.Alteration of genetic material.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - No
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air.If breathing has stopped, give artificial respiration.If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Never give anything by mouth to an unconscious person.Have conscious and alert person drink 1 to 2 glasses of water.Induce vomiting after victim drinks water.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: -17.8 deg. C

AUTOIGNITION TEMPERATURE: 570 deg.C

FLAMMABLE LIMITS: Vol.%

LOWER: 7.3
UPPER: 16

EXTINGUISHING MEDIA: Carbon dioxide, foam, or dry chemical.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing.Keep fire exposed cylinders cool with water spray.If possible, stop the product flow.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide, hydrogen chloride and phosgene.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Emits toxic fumes under fire conditions.Cylinder rupture may occur under fire conditions.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Remove leaking cylinder to exhaust hood or safe outdoor area if this can be done safely.Evacuate and ventilate area.Use a self-contained breathing apparatus in case of emergency or non-routine use.Shut off source if possible and remove source of heat.Absorb with sand or vermiculite and place in closed containers for disposal.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling.Use suitable hand truck to move cylinders.Use only in a well-ventilated area.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas.Keep valve protection cap on cylinders when not in use.Store away from heat, flame, and sparks.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Goggles.

SKIN PROTECTION: Impervious gloves, coveralls, boots, and/or other resistant protective clothing.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Sweet chloroform odor.

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @20 deg. celsius: 500 mm Hg

VAPOR DENSITY (AIR=1): 3.25

BOILING POINT (C): 31.9

SOLUBILITY IN WATER: Insoluble

SPECIFIC GRAVITY (H2O=1): @20 deg. celsius: 1.218

EVAPORATION RATE: N/Av

ODOR THRESHOLD: 500ppm

10. STABILITY AND REACTIVITY

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas.Storage near a heat source.Exposure to light, moisture, and ignition sources.

MATERIALS TO AVOID: Powdered alkali or alkaline earth metals, strong oxidizing agents.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: HCl gas, phosgene gas, CO and oxides of chlorine.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): NONE ESTABLISHED

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.Waste can be burned in an approved incinerator equipped with an afterburner and scrubber.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Vinylidene chloride, inhibited
HAZARD CLASS: 3 (flammable), Packing Group I
INDENTIFICATION NUMBER: UN1303
REPORTABLE QUANTITIES: 100 lb.
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): Class 3, 1A

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 200-864-0

NUMBER IN ANNEX 1 OF DIR 67/548: Material is listed in annex 1.

EU CLASSIFICATION: N/Av

R: 12-20-40

S: 7-16-29

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

BOC GASES

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: HALOCARBON 11

1. Chemical Product and Company Identification

BOC Gases,
Division of
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974

TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800) 424-9300

BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER:
(905) 501-0802
EMERGENCY RESPONSE PLAN NO: 20101

PRODUCT NAME: HALOCARBON 11
CHEMICAL NAME: Trichlorofluoromethane
COMMON NAMES/SYNONYMS: Fluorocarbon 11, Freon (R) 11, Trichlorofluoromethane
TDG (Canada) CLASSIFICATION: Not Regulated
WHMIS CLASSIFICATION: A, D2B

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 6/7/96

2. Composition, Information on Ingredients

INGREDIENT	% VOLUME	PEL-OSHA[1]	TLV-ACGIH[2]	LD_{50} or LC_{50} Route/Species
Trichlorofluoromethane FORMULA: CCl_3F CAS: 75-69-4 RTECS #: PB6125000	>99.0	Not Available	1000 ppm TWA	LC_{50} 130,000 ppm/ 15min (rat)

[1] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[2] As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW

This product does not contain oxygen and may cause asphyxia if released in a confined area. Chlorofluorocarbons can cause irritation, central nervous system depression and irregular heart beat at high concentrations. Nonflammable but decomposes to toxic gases, including phosgene, under fire conditions.

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	No

HEALTH EFFECTS:

Exposure Limits	Irritant	Sensitization
Yes	Yes	No
Teratogen	**Reproductive Hazard**	**Mutagen**
No	No	No
Synergistic Effects None Reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:
Persons with potential exposure should not wear contact lenses. Contact may cause tissue damage and cryogenic burns similar to skin contact. Seek medical treatment as soon as possible.

SKIN EFFECTS:
Contact with the rapidly evaporating liquid may cause frostbite. Frostbite effects appear as a change in color of the skin to grey or white, possibly followed by blistering.

INGESTION EFFECTS:
Ingestion is not likely.

INHALATION EFFECTS:
Product is relatively nontoxic. CFCs can irritate the eyes, mucous membranes and respiratory system.

Inhalation of high concentrations may cause dizziness, disorientation, incoordination, narcosis, nausea or vomiting leading to unconsciousness.. At high concentrations narcotic effects may be produced and may cause the heart to beat irregularly and stop.

Oxygen deficiency may occur in the presence of high concentrations resulting in asphyxiation. Maintain oxygen levels above 19.5% at sea level. Effects of oxygen deficiency resulting from simple asphyxiants may include: rapid breathing, diminished mental alertness, impaired muscular coordination, faulty judgement, depression of all sensations, emotional instability, and fatigue. As asphyxiation progresses, nausea, vomiting, prostration, and loss of consciousness may result, eventually leading to convulsions, coma, and death.

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:
Pre-existing heart condition.

NFPA HAZARD CODES	HMIS HAZARD CODES	RATINGS SYSTEM
Health: 1	Health: 1	0 = No Hazard
Flammability: 0	Flammability: 0	1 = Slight Hazard
Reactivity: 0	Reactivity: 0	2 = Moderate Hazard
		3 = Serious Hazard
		4 = Severe Hazard

4. First Aid Measures

EYES:
Never introduce ointment or oil into the eyes without medical advice! If pain is present, refer the victim to an opthalmologist for treatment and follow up. If the victim cannot tolerate light, protect the eyes with a light bandage.

SKIN:
Remove contaminated clothing and flush affected areas with lukewarm water. If irritation persists, seek medical attention.

INGESTION:
None anticipated. Product is a gas.

INHALATION:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Remove victim to fresh air. Administer artificial respiration if breathing has stopped and supplement with oxygen by a trained individual. Further treatment should be symptomatic and supportive. Seek medical attention as soon as possible for follow up treatment. Remove to fresh air. If necessary, give oxygen or provide artificial respiration. Call a physician.

NOTE TO PHYSICIAN: A patient adversely affected by exposure to this product should not be given adrenalin (epinephrine) or similar heart stimulant since these would increase the risk of cardiac arrhythmias.

5. Fire Fighting Measures

Conditions of Flammability: Nonflammable		
Flash point: None	Method: Not Applicable	Autoignition Temperature: None
LEL(%): None	UEL(%): None	
Hazardous combustion products: None. Decomposes to toxic gases at fire temperatures		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

FIRE AND EXPLOSION HAZARDS:
If involved in a fire, product may decompose yielding toxic products, which may include phosgene, hydrochloric and hydrofluoric acids.

EXTINGUISHING MEDIA:
None required. Use media appropriate for surrounding flammable substances.

FIRE FIGHTING INSTRUCTIONS:
Positive-pressure, self-contained respiratory equipment for fires involving large quantities of this material.

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.

7. Handling and Storage

Product is noncorrosive and may be used with any common structural material. Silver and carbon bearing alloys can act as catalysts for decomposing the product at high temperatures. Alloys containing more than 2% magnesium should not be used if water is present.

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<150 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Protect cylinders from physical damage.

Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time. For additional handling recommendations, consult Compressed Gas Association Pamphlet P-1. Handle with reasonable care. Store in a cool, dry place.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

8. Exposure Controls, Personal Protection

EXPOSURE LIMITS[1]:

INGREDIENT	% VOLUME	PEL-OSHA[2]	TLV-ACGIH[3]	LD_{50} or LC_{50} Route/Species
Trichlorofluoromethane FORMULA: CCl3F CAS: 75-69-4 RTECS #: PB6125000	>99.0	Not Available	1000 ppm TWA	LC_{50} 130,000 ppm/ 15min (rat)

[1] Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.
[2] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[3] As stated in the ACGIH 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

ENGINEERING CONTROLS:
Hood with forced ventilation; provide local exhaust to prevent accumulation above the exposure limit.

EYE/FACE PROTECTION:
Chemical splash goggles or faceshield recommended to prevent contact with cryogenic liquid.

SKIN PROTECTION:
Neoprene rubber gloves. If contact with the liquid phase may occur, gloves should provide sufficient insulation to protect against frostbite and cold burns.

RESPIRATORY PROTECTION:
A Type C respirator with full-face piece equipped with an escape bottle or a self-contained breathing apparatus should be available for emergency use. Operate this equipment in the positive pressure demand mode.

OTHER/GENERAL PROTECTION:
Safety shoes, eyewash "fountain."

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure at 70 °F	: 635.9	psia
Vapor density (Air = 1)	: Not Available	
Evaporation point	: Not Available	
Boiling point	: 74.8	°F
	: 23.8	°C
Freezing point	: -168	°F
	: -111.1	°C
pH	: Not Available	
Specific gravity	: 4.87	
Oil/water partition coefficient	: Not Available	
Solubility (H20)	: Slight	
Odor threshold	: Not Available	
Odor and appearance	: Slight ethereal odor at concentrations greater than 20% by volume. Water white volatile liquid.	

10. Stability and Reactivity

STABILITY:
Stable

INCOMPATIBLE MATERIALS:
May react violently with chemically active metals such as sodium, potassium and barium, powdered magnesium, powdered aluminum and organometallics.

HAZARDOUS DECOMPOSITION PRODUCTS:
Decomposes at fire temperatures to hydrochloric and hydrofluoric acids, carbonyl fluoride and phosgene.

HAZARDOUS POLYMERIZATION:
Will not occur.

11. Toxicological Information

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

No chronic effects data given in the Registry of Toxic Effects of Chemical Substances (RTECS) or Sax, Dangerous Properties of Industrial Materials, 7th ed.

12. Ecological Information

No data given.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Compressed gases, n.o.s. (Trichlorofluoromethane)	Compressed gases, n.o.s. (Trichlorofluoromethane)
HAZARD CLASS:	2.2	2.2
IDENTIFICATION NUMBER:	UN1956	UN1956
SHIPPING LABEL:	NONFLAMMABLE GAS	NONFLAMMABLE GAS

Additional Marking Requirement: If net weight of product in a single container ≥ 5000 pounds, the container must be marked with the letters "RQ".

Additional Shipping Paper Description Requirement: If net weight of product in a single container ≥ 5000 pounds, the shipping papers must be marked with the letters "RQ".

15. Regulatory Information

SARA TITLE III NOTIFICATIONS AND INFORMATION
Releases of trichlorofluoromethane in quantities equal to or greater than the reportable quantity (RQ) of 5,000 pounds are subject to reporting to the National Response Center under CERCLA, Section 304 SARA Title III.

SARA TITLE III - HAZARD CLASSES:
Acute Health Hazard
Sudden Release of Pressure Hazard

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:
This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

CAS NUMBER	INGREDIENT NAME	PERCENT BY VOLUME
75-69-4	Trichlorofluoromethane	> 99.0

This information must be included on all MSDSs that are copied and distributed for this material.

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

1. PRODUCT AND COMPANY INFORMATION

CHEMICAL NAME; CLASS: DICHLORODIFLUOROMETHANE

SYNONYMS: Fluorocarbon 12; Refrigerant 12; Propellant 12; Halon 12; Freon 12; FC 12; F-12
CHEMICAL FAMILY NAME: Halogenated Aliphatic Hydrocarbon
FORMULA: CCl_2F_2

	Document Number: 20044
PRODUCT USE:	Refrigerant; blowing agent; aerosol propellant solvent; degreasing agent; monomer for resins; leak-detecting agent; preparation of frozen tissue sections.
MANUFACTURED/SUPPLIED FOR:	
ADDRESS:	2700 Post Oak Drive Houston, TX 77056-8229
EMERGENCY PHONE:	CHEMTREC: 1-800-424-9300
BUSINESS PHONE:	
General MSDS Information	1-713/896-2896
Fax on Demand:	1-800/231-1366

2. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Dichlorodifluoromethane is a colorless, non-flammable, liquefied gas with a slightly ethereal odor. Dichlorodifluoromethane can cause central nervous system depression after inhalation exposures. Symptoms of such over-exposure can include drowsiness, fatigue, and weakness. At high concentrations, the gas can act as an asphyxiant, by displacing oxygen. Therefore, exposure to high concentrations of this gas can be fatal. Frostbite can be caused by contact with rapidly expanding gases or the liquefied gas. This gas is not flammable and not reactive in normal emergency response situations. However, if involved in a fire, this product can decompose to produce toxic gases (i.e. hydrogen fluoride, phosgene).

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for this gas is by inhalation.

Exposures to high concentrations of this gas (above 10,000 ppm) may cause central nervous system depression and cause irritation of the nose, throat and upper respiratory system. Effects of such over-exposure can include light-headedness, giddiness, shortness of breath and in extreme cases, irregular heartbeats, cardiac arrest, and death. At concentrations of 40,000 ppm symptoms of exposure include slurred speech, a tingling sensation, humming in the ears, and apprehension. At 100,000 ppm, symptoms of incoordination can appear. All symptoms all more pronounced as the concentration of Dichlorodifluoromethane increases.

Deliberate abuse of Dichlorodifluoromethane by aerosol "sniffing" and use or misuse of brochiodilator aerosols have resulted in death. The cause of death is usually related to irregular heartbeat leading to cardiac arrest. These effects have not been reported in the workplace.

High concentrations of this gas can also cause an oxygen-deficient environment. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The following effects associated with various levels of oxygen are as follows:

CONCENTRATION	SYMPTOM OF EXPOSURE
12-16% Oxygen:	Breathing and pulse rate increased, muscular coordination slightly disturbed.
10-14% Oxygen:	Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen:	Nausea and vomiting, collapse or loss of consciousness.
Below 6%:	Convulsive movements, possible respiratory collapse, and death.

OTHER POTENTIAL HEALTH EFFECTS: Contact with liquid or rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact can quickly subside.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Over-exposure to may cause the following health effects:

ACUTE: The most significant hazard associated with this product is inhalation of high concentrations of Dichlorodifluoromethane. Such over-exposure can cause central nervous system depression and can cause oxygen deficiency. Symptoms of oxygen deficiency include respiratory difficulty, ringing in ears, headaches, shortness of breath, wheezing, headache, dizziness, indigestion, nausea, and, at high concentrations, unconsciousness or death may occur. The skin of a victim of over-exposure may have a blue color.

CHRONIC: This gas can cause moderate cardiac sensitization in test animals. Refer to Section 11 (Toxicology Information) for additional data.

TARGET ORGANS: Respiratory system, central nervous system.

3. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			OTHER
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	IDLH ppm	
DICHLORODIFLUOROMETHANE	75-71-8	100	1000, A4 (Not Classifiable as a Human Carcinogen)	NE	1000	NE	NE	NIOSH REL: 1000 ppm TWA DFG MAK: 1000 ppm

This material is classified as hazardous under OSHA regulations in the United States and the WHMIS in Canada.

NE = Not Established C = Ceiling Limit See Section 16 for Definitions of Terms Used.

NOTE: all WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-2004 format.

4 FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS PRODUCT WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus should be worn.

Remove victim(s) to fresh air, as quickly as possible. If not breathing, give artificial respiration If breathing is difficult, give oxygen Only trained personnel should administer supplemental oxygen.

SKIN EXPOSURE: Contact with the liquid or rapidly expanding gases can cause frostbite. In the event of frostbite, medical attention must be sought. Frozen tissue is painless and appears waxy, with a possible yellow color. Frozen tissue will become swollen, painful and prone to infection when thawed. If the frozen part of the body has been thawed by the time medical attention has been obtained, cover the area with a dry sterile dressing and a large bulky protective covering.

EYE EXPOSURE: If liquid is splashed into eyes, or if irritation of the eye develops after exposure to liquid or gas, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Seek medical assistance immediately, preferably an ophthalmologist.

Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s).

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS: Non-flammable, inert gas. Use extinguishing media appropriate for surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: When involved in a fire, this material may decompose and produce toxic gases (i.e. phosgene, hydrogen fluoride, hydrogen chloride, and carbonyl fluoride). Dichlorodifluoromethane does not burn; however, containers, when involved in fire, may rupture or burst in the heat of the fire.

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment.

6. ACCIDENTAL RELEASE MEASURES

LEAK RESPONSE: Evacuate immediate area. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with trained personnel.

Minimum Personal Protective Equipment should be: **Level B: Self-Contained Breathing Apparatus.** Locate and seal the source of the leaking gas. Colorimetric tubes are available to detect the presence of Dichlorodifluoromethane.

Readings should be below levels listed in Section 2 (Composition and Information on Ingredients) and the area should be monitored for oxygen levels. The atmosphere must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus.

If leaking incidentally from the cylinder or its valve, contact your supplier.

7. HANDLING AND STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of this product could occur without any significant warning symptoms, due to oxygen deficiency.

STORAGE AND HANDLING PRACTICES: Cylinders should be stored upright and be firmly secured to prevent falling or being knocked-over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Cylinders should be stored in dry, well-ventilated areas away from sources of heat, ignition and direct sunlight.

Keep storage area clear of materials which can burn. Do not allow area where cylinders are stored to exceed 52°C (125°F). Store containers away from heavily trafficked areas and emergency exits. Store away from process and production areas, away from elevators, building and room exits or main aisles leading to exits. Protect cylinders against physical damage. Use only storage containers and equipment (pipes, valves, fittings to relieve pressure, etc.) designed for the temperatures and pressures for the use and storage of Liquid Dichlorodifluoromethane.

Use a check valve or other protective device in the discharge line to prevent hazardous backflow. Never tamper with pressure relief valves and cylinders.

Keep the smallest amount necessary on-site at any one time. Full and empty cylinders should be segregated. Use a first-in, first-out inventory systems to prevent full containers from being stored for long periods of time.

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Compressed gases can present significant safety hazards. The following rules are applicable to work situations in which cylinders are being used.

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap (where provided) in-place until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Do not use oils or grease on gas-handling fittings or equipment. Immediately contact the supplier if there are any difficulties associated with operating cylinder valve. Never insert an object (e.g wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Use an adjustable strap wrench to remove over-tight or rusted caps. Never strike an arc, on a compressed gas cylinder or make a cylinder part of and electric circuit.

After Use: Close main cylinder valve. Valves should be closed tightly. Replace valve protection cap. Mark empty cylinders “EMPTY”.

NOTE: Use only DOT or ASME code containers designed for gas storage. Close valve after each use and when empty.

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA: Use the proper CGA connections**,** DO NOT USE ADAPTERS:

THREADED**:**	0-3000 psig - CGA 660
	0 - 500 psig - CGA 165 (limited standard)
	0 - 500 psig - CGA 182 (limited standard)
PIN-INDEXED YOKE:	Not Applicable.
ULTRA HIGH INTEGRITY:	716

7. HANDLING AND STORAGE (Continued)

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. Local exhaust ventilation is preferred, because it prevents gas dispersion into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the level of oxygen.

RESPIRATORY PROTECTION: Maintain oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection if oxygen levels are below 19.5% or during emergency response to a release of this product. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent State standards.

EYE PROTECTION: Splash goggles or safety glasses. Face-shields should be worn if contact with the liquefied gas is anticipated.

HAND PROTECTION: Wear leather gloves or glove protection appropriate to the specific operation for which this product is used.

BODY PROTECTION: Use body protection appropriate for task. Transfer of large quantities under pressure may require protective equipment appropriate to protect employees from splashes of liquefied product. Safety shoes are recommended when handling cylinders.

9. PHYSICAL and CHEMICAL PROPERTIES

GAS DENSITY @ 21.1°C (70°F) and 1 atm: 0.319 lb/ft^3 (5.110 kg/m^3)

BOILING POINT @ 1 atm: -29.79°C (-21.2°F)

FREEZING/MELTING POINT @ 1 atm: -158°C (-252°F)

SPECIFIC GRAVITY (air = 1) @ 21.1°C (70°F): 4.32

SOLUBILITY IN WATER weight % @ 25°C (77°F): 0.028%

EVAPORATION RATE (nBuAc = 1): Not applicable.

ODOR THRESHOLD: Not applicable.

VAPOR PRESSURE @ 21.1°C (70°F): 70.2

pH: Not applicable.

MOLECULAR WEIGHT: 120.93

EXPANSION RATIO: Not applicable.

SPECIFIC VOLUME (ft^3/lb): 3.1348

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

APPEARANCE AND COLOR: Colorless, odorless, non-flammable gas. At high concentrations, this gas may have a sweetish odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no distinct warning properties. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

10. STABILITY and REACTIVITY

STABILITY: Normally stable.

DECOMPOSITION PRODUCTS: If product is exposed to fire, it may decompose yielding toxic products (i.e. hydrogen fluoride, phosgene, hydrogen chloride, carbonyl fluoride).

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: The following materials are not compatible with this product:: alkaline, alkaline earth metals, and other reactive chemicals, (i.e. sodium, potassium, calcium, magnesium, powdered aluminum, and zinc). Silver and copper-bearing alloys can act as catalysts for decomposition of this product at high temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid contact with incompatible materials and avoid exposing cylinders to extremely high temperatures, which could cause the cylinders to rupture or burst.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following information is available for Dichlorodifluoromethane.

TCLo (inhalation, human) = 200,000 ppm/30 minutes; eye, pulmonary, liver

LC50 (inhalation, rat) = 80 pph/30 minutes

LC50 (inhalation, mouse) = 76 pph/30 minutes

LC50 (inhalation, rabbit) = 80 pph/30 minutes

LC50 (inhalation, guinea pig) = 80 pph/30 minutes

SHORT-TERM INHALATION: Dichlorodifluoromethane has very low acute toxicity and acts a weak narcotic. Deaths occurred in rats, but not in guinea pigs after 2-hour exposure at 60% Dichlorodifluoromethane. In various other experiments, rats, guinea pigs, and cats all survived exposures to concentrations as high as 30%-8-% for several hours. It was found that this product produced respiratory-circulatory effects including respiratory depression, bronchio-constriction and tachycardia (abnormal rapidity of heart action) in concentrations of 5-10%. No pathologic changes were observed in guinea pigs, rats, cats, and dogs following four weeks of 3.5 hour exposures at 10%. Mice exposed at 4% 30 minutes a day for 3-6 weeks showed some weak pathology.

SKIN IRRITATION: No significant irritation was observed in rats and rabbits treated with a 30/70 mixture of Dichlorodifluoromethane and trichloromethane.

EYE IRRITATION: No significant irritation was observed in rabbits treated with a 30/70 mixture of Dichlorodifluoromethane and trichloromethane.

EFFECTS ON CARDIOVASCULAR SYSTEM: The cardiac sensitization potential of this product is considered moderate. Five out of 12 dogs exposed to 5% for 5 minutes showed evidence of cardiac arrhythmia. Cardiac sensitization can be induced with endogenous epinephrine at levels of 10-80%. Concentrations of 5-25% cause rapid heartbeat, and high blood pressure in dogs and monkeys.

LONG-TERM INHALATION: Rats, monkeys, dogs, rabbits, and guinea pigs were exposed to 810 ppm Dichlorodifluoromethane 24 hours/day for 90 days. There were no deaths and the only pathologic changes observed was in the liver of exposed guinea pigs. At exposure levels of 20%, there was an occurrence of generalized tremors, slight blood changes, and signs of mild narcosis.

SUSPECTED CANCER AGENT: Dichlorodifluoromethane is not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC, and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies. This gas is classified as follows: ACGIH-A4 (Not Classifiable as a Human Carcinogen).

IRRITANCY OF PRODUCT: Dichlorodifluoromethane may be slightly irritating to the nose, throat, and tissues of the upper respiratory system. Contact with rapidly expanding gases can cause frostbite to exposed tissue.

SENSITIZATION OF PRODUCT: Dichlorodifluoromethane is not known to cause sensitization in humans. This gas can cause moderate cardiac sensitization in test animals.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects Dichlorodifluoromethane on the human reproductive system.

Mutagenicity: No mutagenicity effects on humans have been described for Dichlorodifluoromethane. The following information has been obtained during clinical studies: Dichlorodifluoromethane was produced negative results in bacterial tests and cultured mammalian cells.

Embryotoxcity: This product has not been reported to cause embryotoxic effects; see following paragraph for further information.

Teratogenicity: No teratogenicity effects on humans have been described for Dichlorodifluoromethane. The following information has been obtained during clinical studies. Tetrology studies in rats and rabbits were negative.

Reproductive Toxicity: No reproductive toxicity effects on humans have been described for Dichlorodifluoromethane.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing respiratory conditions, central nervous system disorders, and cardio-vascular conditions may be aggravated by over-exposure to this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and reduce over-exposure. Note: Epinephrine increases the toxicity of Dichlorodifluoromethane on the heart.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for Dichlorodifluoromethane.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: The gas will be dissipated rapidly in well-ventilated areas. Dichlorodifluoromethane is a chlorofluorocarbon (CFC) compound. Chlorofluorocarbon compounds have been implicated in the possible depletion of the stratospheric ozone, via a series of complex chemical reactions which occur in the upper atmosphere. Atmospheric ozone is essential in protecting plants and animals from potentially harmful ultraviolet-light exposures. All work practice must be directed at eliminating environmental contamination.

12. ECOLOGICAL INFORMATION (Continued)

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Any adverse effect on animals would be related to adverse effects on the cardiovascular system and to exposure to oxygen deficient environments. The symptoms experienced by over-exposed animals would be similar to those described for exposed humans. No adverse effect is anticipated to occur to plant-life, except for frost produced in the presence of rapidly expanding gases.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on this product's effects on aquatic life.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Return cylinders with any residual product to Air Liquide. Do not dispose of locally.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Dichlorodifluoromethane
HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)
UN IDENTIFICATION NUMBER: UN 1028
PACKING GROUP: Not applicable.
DOT LABEL(S) REQUIRED: Non-Flammable Gas
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 126
MARINE POLLUTANT: Dichlorodifluoromethane is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles present serious safety hazards and should be discouraged.

NOTE: Shipment of compressed gas cylinders which have not been filled with the owners consent is a violation of Federal law (49 CFR, Part 173.301 (b).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: Dichlorodifluoromethane is subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows:

COMPONENT	SARA 302	SARA 304	SARA 313
Dichlorodifluoromethane	NO	YES	YES

SARA THRESHOLD PLANNING QUANTITY: Not applicable.

TSCA INVENTORY STATUS: Dichlorodifluoromethane is listed on the TSCA Inventory.

CERCLA REPORTABLE QUANTITIES (RQ): 5000 lbs.

CALIFORNIA PROPOSITION 65: Dichlorodifluoromethane is not on the California Proposition 65 lists.

STATE REGULATORY INFORMATION: Dichlorodifluoromethane is covered under the following specific State regulations:

Alaska - Designated Toxic and Hazardous Substances: Dichlorodifluoromethane.
California - Permissible Exposure Limits for Chemical Contaminants: Dichlorodifluoromethane
Florida - Substance List: Dichlorodifluoromethane
Illinois - Toxic Substance List: No.
Kansas - Section 302/313 List: No.
Massachusetts - Substance List: Dichlorodifluoromethane.
Minnesota - List of Hazardous Substances: Dichlorodifluoromethane.
Missouri - Employer Information/Toxic Substance List: Dichlorodifluoromethane.
New Jersey - Right to Know Hazardous Substance List: Dichlorodifluoromethane.
North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.
Pennsylvania - Hazardous Substance List: Dichlorodifluoromethane.
Rhode Island - Hazardous Substance List: Dichlorodifluoromethane.
Texas - Hazardous Substance List: No.
West Virginia - Hazardous Substance List: No.
Wisconsin - Toxic and Hazardous Substances: No.

15. REGULATORY INFORMATION (Continued)

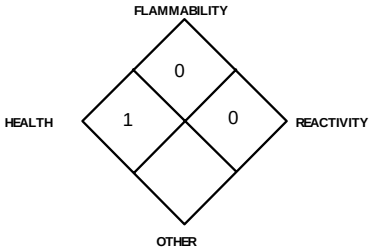
OTHER U.S. FEDERAL REGULATIONS:

- Dichlorodifluoromethane is not listed in Appendix A as a highly hazardous chemical, per 29 CFR 1910.119: Process Safety Management of Highly Hazardous Chemicals.
  Dichlorodifluoromethane is subject to the reporting requirements of CFR 29 1910.1000.
- Dichlorodifluoromethane is subject to the reporting requirements under Title VI of the Clean Air Act Amendments of 1990: "Stratospheric Ozone Protection". Dichlorodifluoromethane is listed as a Class II ozone-depleting chemical. This product may be required to bear the following label:
  Warning: Contains Dichlorodifluoromethane, a substance which harms public health and environment by destroying ozone in the upper atmosphere.
- This gas is not subject to the reporting requirements of Section 112(r) of the Clean Air Act.
- Dichlorodifluoromethane is not listed as a Regulated Substance, per 40 CFR, Part 68, of the Risk Management for Chemical Accidental Release Prevention.

OTHER CANADIAN REGULATIONS: Dichlorodifluoromethane is categorized as a Controlled Product, Hazard Class A, as per the Controlled Product Regulations.

16. OTHER INFORMATION

NFPA RATING



HAZARDOUS MATERIAL INFORMATION SYSTEM

HEALTH	(BLUE)	1
FLAMMABILITY	(RED)	0
REACTIVITY	(YELLOW)	0
PROTECTIVE EQUIPMENT		B

EYES RESPIRATORY HANDS BODY

See Section 8

For routine industrial applications

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Further information can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 4221 Walney Road 5th floor, Chantilly, VA 20151-2923. Telephone: (703) 788-2700.

P-1	*"Safe Handling of Compressed Gases in Containers"*
P-14	*"Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmospheres"*
SB-2	*"Oxygen Deficient Atmospheres"*
AV-1	*"Safe Handling and Storage of Compressed Gases"*
	"Handbook of Compressed Gases"

16. OTHER INFORMATION (Continued)

PREPARED BY:

CHEMICAL SAFETY ASSOCIATES, Inc.
9163 Chesapeake Drive, San Diego, CA 92123-1002
619/565-0302

Fax on Demand: 1-800/231-1366

AIR LIQUIDE

MSDS Number: **T5100** * * * * * *Effective Date:* ***08/03/05*** * * * * * *Supercedes:* ***05/08/03***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

1,1,2-TRICHLORO- 1,2,2-TRIFLUOROETHANE

1. Product Identification

Synonyms: Freon® TF Solvent; Freon® 113; Fluorocarbon 113; 1,1,2-Trichlorotrifluoroethane
CAS No.: 76-13-1
Molecular Weight: 187.38
Chemical Formula: CCl2FCClF2
Product Codes:
J.T. Baker: 491D, 9347, W591
Mallinckrodt: 2793

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF INHALED. AFFECTS CARDIOVASCULAR AND CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. MAY CAUSE IRRITATION TO SKIN.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Green (General Storage)

Potential Health Effects

Inhalation:
Causes irritation to upper respiratory tract. Symptoms may include coughing, chest pain, and difficult breathing. Acts as an anesthetic. Inhalation of high concentrations can produce asphyxiation. Air concentrations above 2500 ppm may cause interference with psychological and psychomotor functions expressed as excitement and incoordination. Fatal cardiac arrhythmias are possible at high concentrations.
Ingestion:
Large oral doses may cause irritation to the gastrointestinal tract.
Skin Contact:
May cause irritation with redness and pain.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
Repeated or prolonged skin contact may have a defatting action and produce a dermatitis. Chronic exposure may have central nervous system effects.
Aggravation of Pre-existing Conditions:

Persons with pre-existing skin, central nervous system or cardiovascular system disorders may be more susceptible to the effects of this substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Call a physician if irritation develops.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Do not give epinephrine or adrenergic activator as they will further sensitize the heart to development of arrhythmias.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. When involved in fire, however, emits suffocating and toxic decomposition products.

Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer!

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Isolate from incompatible substances. Store below boiling point. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
1000 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
1000 ppm (TWA), 1250 ppm (STEL)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. The cartridges recommended for this material have a predicted service of less than 30 minutes at concentrations of ten times (10x) the exposure limits. Actual service life will vary considerbly, depending on concentration levels, temperature, humidity, and work rate.
Skin Protection:
Wear protective gloves and clean body-covering clothing.
Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Slight ethereal odor.
Solubility:
Insoluble in water.
Specific Gravity:
1.56 @ 25C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
47 - 48C (117 - 118F)
Melting Point:
-35C (-31F)
Vapor Density (Air=1):
6.5
Vapor Pressure (mm Hg):
284 @ 20C (68F)
Evaporation Rate (BuAc=1):
1.3 (Ether = 1)

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Hydrogen fluoride, hydrogen chloride, phosgene, carbonyl fluoride, chloride and fluoride gases may be released when this material is heated to decomposition..
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Alkali or alkaline earth metals, powdered aluminum, zinc, beryllium, magnesium, other chemically active metals, acids, heat and open flame.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 43 gm/Kg; Inhalation rat LC50: 110pph/5-hour.

--------\Cancer Lists\----------			
	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
----------	-----	-----------	-------------
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material has an estimated bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released to the atmosphere, this material remains inert for decades.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\--------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)   Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\--------------------------------
                                                  --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)   Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
--------------------------------------  ---   -----   ----  --------------
1,1,2-Trichloro-1,2,2-trifluoroethane   No    No      Yes        No
(76-13-1)

--------\Federal, State & International Regulations - Part 2\----------------
                                                  -RCRA-    -TSCA-
Ingredient                              CERCLA    261.33     8(d)
--------------------------------------  ------    ------    ------
1,1,2-Trichloro-1,2,2-trifluoroethane   No        No         No
(76-13-1)


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF INHALED. AFFECTS CARDIOVASCULAR AND CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. MAY CAUSE IRRITATION TO SKIN.
Label Precautions:

Avoid breathing vapor.
Keep container closed.
Use only with adequate ventilation.
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.
Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician. In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes while lifting lower and upper eyelids. Call a physician. In case of skin contact, immediately flush skin with plenty of water for at least 15 minutes. Call a physician if irritation develops. NOTE TO PHYSICIAN: Do not use epinephrine or adrenergic activators.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 3.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Genetron 114
MSDS Number	:	000000009900
Product Use Description	:	Aerosol propellant, Refrigerant, Carrier gas
Company	:	Honeywell International, Inc. 101 Columbia Road Morristown, NJ 07962-1057
For more information call	:	800-522-8001 (Monday-Friday, 9:00am-5:00pm)
In case of emergency call	:	**Medical: 1-800-498-5701**
	:	**Transportation: 1-800-424-9300 or 703-527-3887**
	:	(24 hours/day, 7 days/week)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Form	:	Liquefied gas
Color	:	colourless
Odor	:	slight
Hazard Summary	:	Warning! Container under pressure. This product is not flammable at ambient temperatures and atmospheric pressure. Gas reduces oxygen available for breathing. Causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating. Inhalation may cause central nervous system effects. May cause cardiac arrhythmia. May cause drowsiness and dizziness. Do not breathe vapour. Irritating to eyes and skin. Avoid contact with skin, eyes and clothing. At higher temperatures, (>250°C), decomposition products may include hydrochloric acid (HCl), hydrofluoric acid (HF) and carbonyl halides. The ACGIH Threshold Limit Values (2007) for Hydrogen Fluoride are TLV-TWA 0.5 ppm and Ceiling Exposure Limit 2 ppm.

Potential Health Effects

Skin	:	Avoid skin contact with leaking liquid (danger of frostbite). May cause frostbite. Irritating to skin.
Eyes	:	Causes severe eye irritation. May cause frostbite.
Ingestion	:	Unlikely route of exposure.

Effects due to ingestion may include:
Gastrointestinal discomfort

Inhalation : Gas reduces oxygen available for breathing.
Causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating.
Inhalation may cause central nervous system effects.
May cause cardiac arrhythmia.
Vapours may cause drowsiness and dizziness.

Chronic Exposure : None known.

Carcinogenicity

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP, IARC, or OSHA.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Cryofluorane	76-14-2	100.00

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. If breathing is irregular or stopped, administer artificial respiration. If breathing is difficult, give oxygen. Use oxygen as required, provided a qualified operator is present. Call a physician. Do not give drugs from adrenaline-ephedrine group.

Skin contact : After contact with skin, wash immediately with plenty of water. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. If symptoms persist, call a physician.

Eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In case of frostbite water should be lukewarm, not hot. If symptoms persist, call a physician.

Ingestion : Unlikely route of exposure. As this product is a gas, refer to the inhalation section. Do not induce vomiting without medical advice. Call a physician immediately.

Notes to physician

Treatment : Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of

symptoms and the clinical conditions. Treat frost-bitten areas as needed.

SECTION 5. FIRE-FIGHTING MEASURES

Flash point	:	not applicable
Lower explosion limit	:	None
Upper explosion limit	:	None
Suitable extinguishing media	:	The product is not flammable. ASHRAE 34 Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Specific hazards during fire fighting	:	Contents under pressure. This product is not flammable at ambient temperatures and atmospheric pressure. However, this material can ignite when mixed with air under pressure and exposed to strong ignition sources. Container may rupture on heating. Cool closed containers exposed to fire with water spray. Do not allow run-off from fire fighting to enter drains or water courses. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Rapid evaporation of the liquid may cause frostbite. In case of fire hazardous decomposition products may be produced such as: Carbon monoxide Carbon dioxide (CO2) Carbonyl halides Hydrogen fluoride Gaseous hydrogen chloride (HCl).
Special protective equipment for fire-fighters	:	In the event of fire and/or explosion do not breathe fumes. Wear self-contained breathing apparatus and protective suit. No unprotected exposed skin areas.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions	:	Immediately evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Wear personal protective equipment. Unprotected persons must be kept away. Remove all sources of ignition. Avoid skin contact with leaking liquid (danger of frostbite). Ventilate the area.

After release, disperses into the air.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Unprotected personnel should not return until air has been tested and determined safe.
Ensure that the oxygen content is >= 19.5%.

Environmental precautions : Prevent further leakage or spillage if safe to do so.
The product evaporates readily.

Methods for cleaning up : Ventilate the area.

SECTION 7. HANDLING AND STORAGE

Handling

Handling : Handle with care.
Avoid inhalation of vapour or mist.
Do not get in eyes, on skin, or on clothing.
Wear personal protective equipment.
Use only in well-ventilated areas.
Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.
Follow all standard safety precautions for handling and use of compressed gas cylinders.
Use authorized cylinders only.
Protect cylinders from physical damage.
Do not puncture or drop cylinders, expose them to open flame or excessive heat.
Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material.
Do not remove screw cap until immediately ready for use.
Always replace cap after use.

Advice on protection against fire and explosion : The product is not flammable.
Can form a combustible mixture with air at pressures above atmospheric pressure.

Storage

Requirements for storage areas and containers : Pressurized container: Protect from sunlight and do not expose to temperatures exceeding 50°C. Do not pierce or burn, even after use.
Keep containers tightly closed in a dry, cool and well-ventilated place.
Storage rooms must be properly ventilated.
Ensure adequate ventilation, especially in confined areas.
Protect cylinders from physical damage.
Store away from incompatible substances.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective measures	:	Do not breathe vapour. Avoid contact with skin, eyes and clothing. Ensure that eyewash stations and safety showers are close to the workstation location.
Engineering measures	:	General room ventilation is adequate for storage and handling. Perform filling operations only at stations with exhaust ventilation facilities.
Eye protection	:	Wear as appropriate: Safety glasses with side-shields If splashes are likely to occur, wear: Goggles or face shield, giving complete protection to eyes
Hand protection	:	Leather gloves In case of contact through splashing: Protective gloves Neoprene gloves Polyvinyl alcohol or nitrile- butyl-rubber gloves
Skin and body protection	:	Avoid skin contact with leaking liquid (danger of frostbite). Wear cold insulating gloves/face shield/eye protection.
Respiratory protection	:	In case of insufficient ventilation wear suitable respiratory equipment. Wear a positive-pressure supplied-air respirator. Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. For rescue and maintenance work in storage tanks use self-contained breathing apparatus.
Hygiene measures	:	Handle in accordance with good industrial hygiene and safety practice. Ensure adequate ventilation, especially in confined areas. Avoid contact with skin, eyes and clothing. Remove and wash contaminated clothing before re-use. Keep working clothes separately.

Exposure Guidelines

1,2-Dichloro-1,1,2,2-tetrafluoroethane	76-14-2	ACGIH	TWA		1,000 ppm
		NIOSH	REL	1,000 ppm	7,000 mg/m3
		US CA OEL	TWA PEL	1,000 ppm	7,000 mg/m3
		OSHA Z1	PEL	1,000 ppm	7,000 mg/m3
		OSHA Z1A	TWA	1,000 ppm	7,000 mg/m3

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquefied gas
Color	:	colourless
Odor	:	slight
Molecular Weight	:	170.92 g/mol
Melting point/range	:	-94 °C (-137 °F)
Boiling point/boiling range	:	4 °C (39 °F)
Vapor pressure	:	1.9 kPa at 20 °C (68 °F)
Relative vapour density	:	6
Density	:	1.5 g/cm3
Water solubility	:	0.13 g/l
Partition coefficient: n-octanol/water	:	log Pow: 2.82 The product is more soluble in octanol.
Solubility in other solvents	:	Medium: Methanol partly soluble
	:	Medium: Diethylether partly soluble

SECTION 10. STABILITY AND REACTIVITY

Conditions to avoid	:	Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. Decomposes under high temperature. Some risk may be expected of corrosive and toxic decomposition products. Can form a combustible mixture with air at pressures above atmospheric pressure. Do not mix with oxygen or air above atmospheric pressure.
Materials to avoid	:	Finely divided aluminium Potassium Calcium Powdered metals Aluminium Magnesium Zinc

Hazardous decomposition products	:	Halogenated compounds Hydrogen fluoride Carbonyl halides Carbon oxides
Thermal decomposition	:	>260 °C
Hazardous reactions	:	Hazardous polymerisation does not occur. Stable under normal conditions.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity	:	LC50 rat Dose: > 600000 ppm Exposure time: 2 h
Repeated dose toxicity	:	rat NOEL: 10000 ppm
Additional advice	:	May cause cardiac arrhythmia. Cardiac sensitisation threshold (dog): 45000 ppm.

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information	:	This product contains greenhouse gases which may contribute to global warming. Do NOT vent to the atmosphere. To comply with provisions of the U.S. Clean Air Act, any residual must be recovered. This product is subject to U.S. Environmental Protection Agency Clean Air Act Regulations at 40 CFR Part 82. Section 611 requires the following label text on all shipments of this product: Warning: Contains Dichlorotetrafluoroethane (CFC-114), a substance which harms public health and environment by destroying ozone in the upper atmosphere.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Information: Avoid contact of spilled material and runoff with soil and surface waterways. Consult an environmental professional to determine if local, regional or national regulations would classify spilled or contaminated materials as hazardous waste. Use only approved transporters, recyclers, treatment, storage or disposal facilities. Dispose of according to all federal, state and local applicable regulations.

Other Disposal Considerations: Observe all Federal, State, and Local Environmental regulations.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

Additional advice : This product is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Section 608 in 40 CFR Part 82 regarding refrigerant recycling.

SECTION 14. TRANSPORT INFORMATION

DOT	Proper shipping name	:	1,2-Dichloro-1,1,2,2-tetrafluoroethane
	UN-Number	:	1958
	Class	:	2.2
	Packing group	:	
IATA	UN Number	:	1958
	Description of the goods	:	1,2-Dichloro-1,1,2,2-tetrafluoroethane
	Class	:	2.2
	Hazard Label	:	2.2
	Packing instruction (cargo aircraft)	:	200
	Packing instruction (passenger aircraft)	:	200
IMDG	Substance No.	:	UN 1958
	Description of the goods	:	1,2-Dichloro-1,1,2,2-tetrafluoroethane
	Class	:	2.2
	Hazard Label	:	2.2
	EmS Number	:	F-C
	Marine pollutant	:	no

SECTION 15. REGULATORY INFORMATION

Inventories

EU. EINECS	:	On or in compliance with the inventory
US. Toxic Substances Control Act	:	On TSCA Inventory
Australia. AICS	:	On or in compliance with the inventory
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL). (Can. Gaz. Part II, Vol. 133)	:	All components of this product are on the Canadian DSL list.
Japan. ENCS	:	On or in compliance with the inventory
Korea. KECI	:	On or in compliance with the inventory
Philippines. PICCS	:	On or in compliance with the inventory

China. IECSC : On or in compliance with the inventory

National regulatory information

SARA 313 Components : 1,2-Dichloro-1,1,2,2-tetrafluoroetha ne 76-14-2

SARA 311/312 Hazards : Acute Health Hazard
Sudden Release of Pressure Hazard

California Prop. 65 : This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

Massachusetts RTK : 1,2-Dichloro-1,1,2,2-tetrafluoroetha ne 76-14-2

New Jersey RTK : 1,2-Dichloro-1,1,2,2-tetrafluoroetha ne 76-14-2

Pennsylvania RTK : 1,2-Dichloro-1,1,2,2-tetrafluoroetha ne 76-14-2

WHMIS Classification : A

Global warming potential : 9,000

Ozone depletion potential (ODP) : 1

SECTION 16. OTHER INFORMATION

		HMIS III	NFPA
Health Hazard	:	1	2
Flammability	:	1	1
Physical Hazard	:	0	
Instability	:		0

For R&D use only. Not for drug, household or other uses.
Click http://www.lookchem.com/cas-76/76-44-8.html for suppliers of this product.
Composition/Information on Ingredient
Cas:
76-44-8
Code:
M
RTECS:
PC0700000
Code:
M
Name:
HEPTACHLOR INTENDED CHANGE (IC)
Other REC Limits:
N/K 3
OSHA PEL:
0.5 MG/CUM (SKIN)
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
0.5 MG/CUM (SKIN) A2
Code:
M
ACGIHSTEL:
N/P
Code:
Control Measures
Respiratory Protection:
N/K
Ventilation:
N/K
Protective Gloves:
RECOMMENDED
Eye Protection:
RECOMMENDED
Other Protective Equipment:
Equipment USE APPROPRIATE OSHA/MSHA SAFETY EQUIPMENT.
Work Hygienic Practices:
N/K
Supplemental Safety and Health:
N/K
Health Hazards Data
LD50LC50Mixture:
ORAL (RAT) LD50: 5000 MG/KG (TOLUENE)
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
EYES/SKIN/INHALATION/INGESTION: IRRITATION.
Explanation Of Carcinogenicity:

LINDANE, DDT ISOMERS, & DIELDRIN ARE SUSPECTED HUMAN CARCINOGENS. HEPTACHLOR IS AN A2 CARCINOGEN.

Signs And Symptions Of Overexposure:

EYES/SKIN/INGESTION/INHALATION: TOXIC & IRRITATION.

Medical Cond Aggravated By Exposure:

N/K

First Aid:

EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN IF NECESSARY. OBTAIN
MEDICAL ATTENTION IN ALL CASES.

Spill Release Procedures:

DUE TO THE SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. A LEAKING BOTTLE MAY BE
PLACED IN A PLASTIC BAG & NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE OR
SAND.

Neutralizing Agent:

N/K

Waste Disposal Methods:

BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCUBBER. OBSERVE ALL FEDERAL, STATE, & LOCAL LAWS
CONCERNING DISPOSAL.

Handling And Storage Precautions:

AVOID CONTACT W/EYES, SKIN, & CLOTHING. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE.

Other Precautions:

THIS MATERIAL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN THE SAFE HANDLING OF HAZARDOUS CHEMICALS.

Fire and Explosion Hazard Information

Flash Point Method:

N/P 6

Flash Point:

Flash Point Text:

COMBUSTIBLE

Autoignition Temp:

Autoignition Temp Text:

N/A

Lower Limits:

N/K

Upper Limits:

N/K

Extinguishing Media:

CO2, DRY CHEMICAL POWDER, OR WATER SPRAY

Fire Fighting Procedures:

N/K

Unusual Fire/Explosion Hazard:

COMBUSTIBLE.

Physical/Chemical Properties

HCC:

NRC/State LIC No:

Net Prop WT For Ammo:

Boiling Point:

B.P. Text:

N/K

Melt/Freeze Pt:

M.P/F.P Text:

N/K

Decomp Temp:

Decomp Text:

N/K

Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K 7
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
N/K
Appearance and Odor:
LIQUID W/BENZENE-LIKE ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K
Reactivity Data
Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
STRONG OXIDIZERS
Hazardous Decomposition Products:
N/R
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K
Toxicological Information
Information:N/P
MSDS Transport Information
Information:N/P
Regulatory Information
Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P
Other Information
Other Information:N/P

Material Safety Data Sheet
Hexachlorocyclopentadiene

ACC# 73038

Section 1 - Chemical Product and Company Identification

MSDS Name: Hexachlorocyclopentadiene
Catalog Numbers: AC120440000, AC120440010, AC120442500
Synonyms: 1,2,3,4,5,5-Hexachloro-1,3-cyclopentadiene; Perchlorocyclopentadiene.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
77-47-4	Hexachlorocyclopentadiene	98+	201-029-3

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear yellow liquid.
Danger! Toxic if absorbed through the skin. May be fatal if inhaled. Causes burns by all exposure routes. Harmful if swallowed. Lachrymator (substance which increases the flow of tears). Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. May cause allergic skin reaction. May cause central nervous system effects. May cause liver and kidney damage.
Target Organs: Blood, kidneys, central nervous system, liver, spleen, respiratory system, gastrointestinal system, eyes, skin.

Potential Health Effects

Eye: Causes eye burns. Lachrymator (substance which increases the flow of tears).
Skin: Causes skin burns. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Toxic in contact with skin.
Ingestion: Harmful if swallowed. Causes gastrointestinal tract burns. May cause liver and kidney damage.
Inhalation: May be fatal if inhaled. Causes chemical burns to the respiratory tract. May cause central nervous system effects.
Chronic: Repeated exposure may cause damage to the spleen. Adverse reproductive effects have been reported in animals. Laboratory experiments have resulted in mutagenic effects. Chronic exposure may cause blood effects. Repeated or prolonged exposure may cause allergic reactions in sensitive individuals.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion: Do not induce vomiting. Get medical aid immediately. Call a poison control center.
Inhalation: Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. SPEED IS ESSENTIAL, OBTAIN MEDICAL AID IMMEDIATELY. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Substance may react with water, and may release corrosive and/or toxic gases.
Extinguishing Media: Do NOT use water directly on fire. Use foam, dry chemical, or carbon dioxide.
Flash Point: 109 deg C (228.20 deg F)
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 4; Flammability: 1; Instability: 1

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Provide ventilation. Do not expose spill to water. Do not get water inside containers. Evacuate unnecessary personnel. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Do not allow contact with water. Container should be opened by a technically qualified person. Use only in a chemical fume hood. Keep from contact with moist air and steam.
Storage: Store in a cool, dry place. Store in a tightly closed container. Corrosives area. Store protected from moisture. Store protected from light.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Hexachlorocyclopentadiene	0.01 ppm TWA	0.01 ppm TWA; 0.1 mg/m3 TWA	none listed

OSHA Vacated PELs: Hexachlorocyclopentadiene: 0.01 ppm TWA; 0.1 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear yellow
Odor: Pungent odor.
pH: Not available.
Vapor Pressure: 0.1 mbar @ 20 deg C
Vapor Density: 9.42 (air=1)
Evaporation Rate: Not available.
Viscosity: 5.6 cPs 30 deg C
Boiling Point: 239 deg C @ 753.00 mmHg
Freezing/Melting Point:-10 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:1.702
Molecular Formula:C5Cl6
Molecular Weight:272.76

Section 10 - Stability and Reactivity

Chemical Stability: May decompose on exposure to moist air or water. Light sensitive.
Conditions to Avoid: Incompatible materials, light, excess heat, exposure to moist air or water.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Hydrogen chloride, carbon monoxide, carbon dioxide, hydrogen gas.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 77-47-4: GY1225000
LD50/LC50:
CAS# 77-47-4:
Draize test, rabbit, eye: 20 mg/24H Moderate;

Draize test, rabbit, eye: 100 mg/5M Severe;
Draize test, rabbit, skin: 500 mg/4H Severe;
Draize test, rabbit, skin: 500 uL/24H Severe;
Inhalation, rat: LC50 = 1600 ppb/4H;
Inhalation, rat: LC50 = 23 mg/m3/2H;
Oral, mouse: LD50 = 505 mg/kg;
Oral, rat: LD50 = 200 mg/kg;
Skin, rabbit: LD50 = 430 mg/kg;
.

Carcinogenicity:
CAS# 77-47-4: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: Adverse reproductive effects have occurred in experimental animals.
Mutagenicity: Mutagenic effects have occurred in experimental animals.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. LC50(fathead minnows, early juvenile):6.7 æg/L/30 days LC50(fathead minnows, larval):7 æg/L/96H Water danger/protection: WGK=2
Environmental: No information available.
Physical: No information available.
Other: Do not empty into drains.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 77-47-4: waste number U130.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	HEXACHLOROCYCLOPENTADIENE	HEXACHLOROCYCLOPENTADIENE
Hazard Class:	6.1	6.1
UN Number:	UN2646	UN2646
Packing Group:	I	I

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 77-47-4 is listed on the TSCA inventory.

Health & Safety Reporting List

CAS# 77-47-4: Effective 10/4/82, Sunset 10/4/92

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 77-47-4: 10 lb final RQ; 4.54 kg final RQ

SARA Section 302 Extremely Hazardous Substances

CAS# 77-47-4: 100 lb TPQ

Section 313

This material contains Hexachlorocyclopentadiene (CAS# 77-47-4, 98+%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40

Clean Air Act:

CAS# 77-47-4 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 77-47-4 is listed as a Hazardous Substance under the CWA. CAS# 77-47-4 is listed as a Priority Pollutant under the Clean Water Act. CAS# 77-47-4 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 77-47-4 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T+ N

Risk Phrases:

R 22 Harmful if swallowed.
R 24 Toxic in contact with skin.
R 26 Very toxic by inhalation.
R 34 Causes burns.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 25 Avoid contact with eyes.
S 39 Wear eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.
S 60 This material and its container must be disposed of as hazardou
s waste

S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 77-47-4: 3

Canada - DSL/NDSL

CAS# 77-47-4 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1A, D2B, E.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 77-47-4 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #7 Date: 5/22/2008

PACIFIC RARE SPECIALTY METALS & CHEMICALS, INC.
A SUBSIDIARY OF II-VI INCORPORATED

Lot 6 Block 1, Phase 2, Cavite Economic Zone, Rosario, Cavite, Philippines
Webpage : www.pacificrarespecialty.com E-mail : prmcav@info.com.ph
Tel. No. : (63-02) 784-4000 Fax No. (63-46) 437-2524

MSDS

MATERIAL SAFETY DATA SHEET

Selenium

MSDS Number : 001 Effective Date : 01/20/09

I. Product Identification

Trade Name	:	Selenium
Synonyms	:	Elemental Selenium; Selen
Chemical Formula	:	Se
Molecular Weight	:	78.96

Manufacturer :

Pacific Rare Specialty Metals And Chemicals, Inc. (PRSMCI)
Lot 6 Blk 1, Phase II, West Avenue, Cavite Economic Zone,
Rosario, Cavite, Philippines, 4106
Emergency Phone : (+63-02) 784 - 4000
Web Site : www.pacificrarespecialty .com

II. Composition / Information on Components

Selenium (CAS# 7782-49-2); 100%
Identification number(s):
EINECS Number: 231-957-4
EU Number: 034-001-00-2

III. Hazard Identification

Flammability Rating	:	0 (Not combustible)
Reactivity Rating	:	0 (Not reactive when mixed with water)
Health Rating	:	1 (Maybe harmful if swallowed)
Contact Rating	:	1 (Causes eye irritation)
Lab Protective Equip	:	Goggles, Lab coat, Gloves

IV. First –Aid Measures

Inhalation : Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion : DO NOT induce vomiting. Give large amounts of water. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact : Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact : Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

V. Fire Fighting Measures

Fire	**:**	Not considered to be a fire hazard.
Explosion	**:**	Not considered to be an explosion hazard.
Fire Extinguishing Media:		Use any means suitable for extinguishing surrounding fire.
Special Information	**:**	In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

VI. Accidental Release Measures

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

VII. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

VIII. Exposure Controls / Personal Protection

Airborne Exposure Limits	**:**	OSHA PEL : 0.2 mg/m3, Se Compounds, as Se ACGIH TLV : 0.2 mg/m3, Se Compounds, as Se
Ventilation System	**:**	Local exhaust ventilation is preferred to control emissions at the source.
Respiratory Protection	**:**	NIOSH Approved Gas / Vapor respirators
Skin Protection	**:**	Wear chemical resistant clothing, boots, gloves, lab coat, apron or coveralls
Eye Protection	**:**	safety glasses or goggles, full face shields
Work / Hygienic Practices	**:**	No food should be allowed in the work area.

Maintain eye wash fountain and quick-drench facilities in work area.

IX. Physical and Chemical Properties

Form	: Solid	Specific Gravity	: 4.79
Color	: Grey	Melting Point	: 217 °C
Odor	: Odorless	Boiling Point	: 685 °C
Solubility	: Insoluble in Water		

X. Stability and Reactivity

Stability	**:**	Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:		Toxic oxides of selenium form when heated to decomposition.
Hazardous Polymerization	**:**	Will not occur.
Incompatibilities	**:**	Strong oxidizers, strong acids, and a wide range of other

materials.

Conditions to Avoid : Moisture and incompatibles.

XI. Toxicological Information

Toxicological Data : Oral Rat LD50: > 5000 mg/kg. Investigated as a tumorigen and a reproductive effector.

Carcinogenicity : EPA / IRIS classification: Group D1 - Not classifiable as a human carcinogen.

XII. Ecological Information

No information found.

General Note : Do not allow material to be released to the environment without proper governmental permits.

XIII. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to an approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

XIV. Transport Information

Not a hazardous material for transportation.

DOT regulations Hazard Class : None
Land transport ADR / RID class : None
Maritime Transport IMDG Class : None
Air transport ICAO-TI and IATA-DGR Class : None

XV. Regulatory Information

Chemical Inventory Status - Part 1

Ingredient	TSCA	EC	Japan	Australia
Selenium (7782-49-2)	Yes	Yes	No	Yes

Chemical Inventory Status - Part 2

Ingredient	Korea	Canada DSL	Canada NDSL	Phil.
Selenium (7782-49-2)	Yes	Yes	No	Yes

Federal, State & International Regulations - Part 1

Ingredient	SARA 302 RQ	SARA 302 TPQ	SARA 313 List	SARA 313 Chemical	SARA 313 Catg.
Selenium (7782-49-2)	No	No	No	Selenium cmp	

Federal, State & International Regulations - Part 2

Ingredient	CERCLA	RCRA 261.33	TSCA 8(d)
Selenium (7782-49-2)	100	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No Pure / Solid)

Australian Hazchem Code: 2Z
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR
.

XVI. Other Information

NFPA Ratings: Health: **2** Flammability: **0** Reactivity: **0**

Disclaimer:
****

Pacific Rare Specialty Metals and Chemicals Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. PRSMCI MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, PRSMCI WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

COSMOS PLASTICS & CHEMICALS
3, PURSHOTTAM BHAVAN, 1/3, ISSAJI STREET, MUMBAI – 400 003. (INDIA)
TEL: (91-22) 2342 1967, 6631 2886 – TELEFAX: (91-22) 2343 800
E-MAIL: cpcchemicals@gmail.com
WEB: www.cosmoschemicals.com

Material Safety Data Sheet
Isophorone

ACC# 23994

Section 1 - Chemical Product and Company Identification

MSDS Name: Isophorone
Catalog Numbers: AC122640000, AC122640010, AC122640025, AC122640050, AC122640200, AC122645000 AC122645000
Synonyms: 3,5,5-Trimethyl-2-cyclohexene-1-one.

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
78-59-1	Isophorone	98	201-126-0

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear pale yellow liquid. Flash Point: 84 deg C.
Warning! Causes eye and respiratory tract irritation. **Combustible liquid and vapor.** May be harmful if swallowed or absorbed through the skin. May cause cancer based on animal studies.
Target Organs: Central nervous system, respiratory system, eyes.

Potential Health Effects

Eye: Contact with eyes may cause severe irritation, and possible eye burns. Lachrymator (substance which increases the flow of tears).
Skin: May cause skin irritation. May be harmful if absorbed through the skin.
Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed.
Inhalation: Causes narcotic effects including headache, dizziness, weakness, unconsciousness.
Chronic: Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated exposure may cause adverse reproductive effects.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Containers may explode when heated. Combustible liquid and vapor.
Extinguishing Media: In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam. Use water spray to cool fire-exposed containers.
Flash Point: 84 deg C (183.20 deg F)
Autoignition Temperature: Not applicable.
Explosion Limits, Lower:0.8
Upper: 3.8
NFPA Rating: (estimated) Health: 2; Flammability: 2; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Scoop up with a nonsparking tool, then place into a suitable container for disposal. Remove all sources of ignition. Provide ventilation. Clean up residual material by washing area with a 2-5% solution of soda ash.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use only in a well-ventilated area. Avoid contact with skin and eyes. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Isophorone	5 ppm Ceiling	4 ppm TWA; 23 mg/m3 TWA 200 ppm IDLH	25 ppm TWA; 140 mg/m3 TWA

OSHA Vacated PELs: Isophorone: 4 ppm TWA; 23 mg/m3 TWA

Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance: clear pale yellow

Odor: peppermint odor - camphor

pH: Not available.

Vapor Pressure: Not available.

Vapor Density: 4.8 (air=1)

Evaporation Rate: Not available.

Viscosity: Not available.

Boiling Point: 213-214 deg C

Freezing/Melting Point:-8 deg C

Decomposition Temperature: Not available.

Solubility: Slightly soluble in water.

Specific Gravity/Density:0.9200

Molecular Formula:C9H14O

Molecular Weight:138.21

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Ignition sources, excess heat, confined spaces.

Incompatibilities with Other Materials: Strong oxidizing agents.

Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 78-59-1: GW7700000
LD50/LC50:
CAS# 78-59-1:
Draize test, rabbit, eye: 920 ug Severe;
Draize test, rabbit, eye: 100 mg/24H Moderate;
Draize test, rabbit, skin: 100 mg/24H Mild;
Draize test, rabbit, skin: 0.5 mL/24H Moderate;
Inhalation, rat: LC50 = 7 gm/m3;
Oral, mouse: LD50 = 2690 mg/kg;
Oral, rabbit: LD50 = 1420 mg/kg;
Oral, rat: LD50 = 1870 mg/kg;
Skin, rabbit: LD50 = 1500 uL/kg;
Skin, rat: LD50 = 1390 mg/kg;

Carcinogenicity:
CAS# 78-59-1:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** Not listed.
- **NTP:** Not listed.
- **IARC:** Not listed.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	MERCURIC IODIDE
Hazard Class:		6.1
UN Number:		UN1638
Packing Group:		II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 78-59-1 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 78-59-1: Effective 10/4/82, Sunset 10/4/92
Chemical Test Rules
CAS# 78-59-1: Testing required by manufacturers, processors
Section 12b
CAS# 78-59-1: Section 4
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 78-59-1: 5000 lb final RQ; 2270 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 78-59-1: immediate, delayed, fire, reactive.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:
CAS# 78-59-1 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 78-59-1 is listed as a Priority Pollutant under the Clean Water Act. CAS# 78-59-1 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 78-59-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN

Risk Phrases:

R 21/22 Harmful in contact with skin and if swallowed.
R 36/37 Irritating to eyes and respiratory system.
R 40 Limited evidence of a carcinogenic effect.

Safety Phrases:

S 13 Keep away from food, drink and animal feeding stuffs.
S 23 Do not inhale gas/fumes/vapour/spray.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face pr
otection.
S 46 If swallowed, seek medical advice immediately and show this con
tainer or label.

WGK (Water Danger/Protection)

CAS# 78-59-1: 1

Canada - DSL/NDSL

CAS# 78-59-1 is listed on Canada's DSL List.

Canada - WHMIS

WHMIS: Not available.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 78-59-1 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 3/16/1999
Revision #4 Date: 10/03/2005

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 78-87-5
Date: 04/18/2006

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: 1,2-DICHLOROPROPANE SYNONYMS: Propylene dichloride, propylene chloride

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	**Formula**	**CAS #**	**Concentration**	**ACGIH TLV**	**OSHA PEL**	**MAC**	**Other STEL**
1,2-DICHLOROPROPANE	C3H6Cl2	78-87-5	99+%	10	75	75	110

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.
Can cause Central Nervous System depression.
May cause liver, kidney and heart damage.
May cause irritation to the eyes, skin and respiratory tract.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation, Ingestion

ACUTE EFFECTS: Irritation to the eyes, mucous membranes, and upper respiratory tract.Skin contact may cause irritation.Skin contact can cause defatting and dermatitis.Overexposure may cause nausea, headache, dizziness, vomiting and weakness.Central nervous system (CNS) depression and pulmonary edema may occur.Material may also cause damages to liver, kidney and heart.

CHRONIC EFFECTS: Possible dermatitis from skin contact.Kidney and liver damage.Heart damage.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Liver, kidney, skin, and central nervous system diseases or disorders.

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - No
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air.If breathing has stopped, give artificial respiration.If breathing is difficult, give oxygen.

EYE CONTACT: Do not allow victim to rub or keep eyes tightly shut.Flush with large amounts of water lifting upper and lower lids.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Never give anything by mouth to an unconscious person.Have conscious and alert person drink 1 to 2 glasses of water.Induce vomiting after victim drinks water.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: 16 deg.C

AUTOIGNITION TEMPERATURE: 557 deg.C

FLAMMABLE LIMITS: Vol. %

LOWER: 3.4
UPPER: 14.5

EXTINGUISHING MEDIA: Carbon dioxide, foam, or dry chemical.Water spray or fog.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing.Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide, hydrogen chloride, phosgene, and chlorine gas.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Vapors may travel a considerable distance to the source of ignition and flash back.Cylinder rupture may occur under fire conditions.Emits toxic fumes under fire conditions.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area.Remove all sources of ignition.Use a self-contained breathing apparatus in case of emergency or non-routine use.Absorb with sand or vermiculite and place in closed containers for disposal.

SPECIALIZED EQUIPMENT: Use non-sparking tools.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Keep in a cool, well ventilated place.Use spark-proof tool and explosion-proof equipment.Secure cylinder when using to protect from falling.Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas.Keep valve protection cap on cylinders when not in use.Store away from heat, flame, and sparks.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Goggles.A safety shower and eyewash station should be readily available.

SKIN PROTECTION: Wear suitable protective clothing.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Sweet chloroform odor.

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @19.4 deg.C: 40 mm Hg

VAPOR DENSITY (AIR=1): 3.9

BOILING POINT (C): 96.8

SOLUBILITY IN WATER: @20 deg.C: 0.26% by wt.

SPECIFIC GRAVITY (H2O=1): @20 deg.C: 1.159

EVAPORATION RATE: (BuAc=1): >1

ODOR THRESHOLD: N/Av

10. STABILITY AND REACTIVITY

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Exposure to heat, ignition sources, and incompatibles.

MATERIALS TO AVOID: Strong acids, oxidizers, and active metals.Reacts with aluminum to form aluminum chloride and this reaction, when confined, leads to a violent explosion.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: HCl gas, phosgene gas, CO and oxides of chlorine.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): 8,558 ppm, Rat 1 hour

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Propylene dichloride
HAZARD CLASS: 3 (flammable), Packing Group II
INDENTIFICATION NUMBER: UN1279
REPORTABLE QUANTITIES: 1000 lb.
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): Class 3, 3B

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 201-152-2

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: 11-20/22

S: 16-24

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

MSDS Number: **M4628** * * * * * *Effective Date:* ***09/11/08*** * * * * * *Supercedes:* ***05/19/08***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

METHYL ETHYL KETONE

1. Product Identification

Synonyms: 2-Butanone; ethyl methyl ketone; MEK; Methyl acetone
CAS No.: 78-93-3
Molecular Weight: 72.11
Chemical Formula: CH3COCH2CH3
Product Codes:
J.T. Baker: 5385, 9214, 9319, 9323, 9414, Q531
Mallinckrodt: 6206, 6233, 6240, 6243

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl Ethyl Ketone	78-93-3	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Causes irritation to the nose and throat. Concentrations above the TLV may cause headache, dizziness, nausea, shortness of breath, and vomiting. Higher concentrations may cause central nervous system depression and unconsciousness.
Ingestion:
May produce abdominal pain, nausea. Aspiration into lungs can produce severe lung damage and is a medical emergency. Other symptoms expected to parallel inhalation.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Vapors are irritating to the eyes. Splashes can produce painful irritation and eye damage.
Chronic Exposure:
Prolonged skin contact may defat the skin and produce dermatitis. Chronic exposure may cause central nervous system effects.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention.

5. Fire Fighting Measures

Fire:
Flash point: -9C (16F) CC
Autoignition temperature: 404C (759F)
Flammable limits in air % by volume:
lel: 1.4; uel: 11.4
Extremely Flammable.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. This highly flammable liquid must be kept from sparks, open flame, hot surfaces, and all sources of heat and ignition.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
200 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
200 ppm (TWA), 300 ppm (STEL)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details. Use explosion-proof equipment.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece respirator with organic vapor cartridge may be worn up to 50 times the

exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Butyl rubber is a suitable material for personal protective equipment.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Sharp mint-like odor.
Solubility:
29 g in 100 g of water.
Specific Gravity:
0.81 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
80C (176F)
Melting Point:
-86C (-123F)
Vapor Density (Air=1):
2.5
Vapor Pressure (mm Hg):
78 @ 20C (68F)
Evaporation Rate (BuAc=1):
2.7 (Ether = 1)

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Oxidizing materials, caustics, amines, ammonia, strong bases, chloroform, chlorosulfonic acid, oleum, potassium-t-butoxide, heat or flame, hydrogen peroxide, nitric acid. Can attack many plastics, resins and rubber.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 2737 mg/kg; inhalation rat LC50: 23,500 mg/m3/8-hr; skin rabbit LD50: 6480 mg/kg; investigated as a mutagen, reproductive effector.
Reproductive Toxicity:
Has shown teratogenic effects in laboratory animals.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methyl Ethyl Ketone (78-93-3)	No	No	None

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material is expected to have a half-life between 10 and 30 days. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:

This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ETHYL METHYL KETONE
Hazard Class: 3
UN/NA: UN1193
Packing Group: II
Information reported for product/size: 366LB

International (Water, I.M.O.)

Proper Shipping Name: ETHYL METHYL KETONE
Hazard Class: 3
UN/NA: UN1193
Packing Group: II
Information reported for product/size: 366LB

15. Regulatory Information

F, Xi
R11 - Highly flammable
R36 - Irritating to eyes
R66 - Repeated exposure may cause skin drying or cracking
R67 - Vapours may cause drowsiness or dizziness
S2 - Keep out of the reach of children
S9 - Keep container in a well-ventilated place
S16 - Keep away from sources of ignition - No smoking

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
Methyl Ethyl Ketone (78-93-3)                  Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                       --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
Methyl Ethyl Ketone (78-93-3)                  Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Methyl Ethyl Ketone (78-93-3)           No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                -RCRA-    -TSCA-
Ingredient                              CERCLA     261.33     8(d)
----------------------------------------  ------     ------    ------
Methyl Ethyl Ketone (78-93-3)           5000       U159       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: 2[Y]E
Poison Schedule: S5
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **3** Reactivity: **0**

Label Hazard Warning:

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:

Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.

Label First Aid:

Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 3, 15.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 79-00-5
Date: 03/09/2001

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: 1,1,2-TRICHLOROETHANE

SYNONYMS: Ethane Trichloride, B-Trichloroethane, Vinyl Trichloride

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	OSHA PEL	MAC	Other STEL
1,1,2-TRICHLOROETHANE	C2H3CL3	79-00-5	99+%	10	10	10	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.
Can form explosive mixtures with air.
May cause central nervous system damage.
Can cause damage to eyes, skin, and respiratory tract.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Skin , Ingestion

ACUTE EFFECTS: Vapor exposure can cause irritation of the eyes, nose, throat and respiratory tract. Skin exposure may cause irritation, itching, erythema, swelling, burning and pain. Eye contact may cause irritation, redness, or blurred vision. Possible central nervous system depression. Symptoms include shortness of breath, headache, confusion, nausea, dizziness, and unconsciousness. Can be absorbed through the skin.

CHRONIC EFFECTS: Kidney and liver damage.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Respiratory problems.

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - No
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush with copious amounts of water for at least 15 minutes. Do not allow victim to rub or keep eyes tightly shut.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Never give anything by mouth to an unconscious person. Have conscious and alert person drink 1 to 2 glasses of water.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: N/Av

AUTOIGNITION TEMPERATURE: 460 deg. C

FLAMMABLE LIMITS: Vol. %

LOWER: 8.4
UPPER: 13.3

EXTINGUISHING MEDIA: Extinguish with water spray, water fog, dry chemical, or carbon dioxide.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide, hydrogen chloride and phosgene.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Cylinder rupture may occur under fire conditions. Emits toxic fumes under fire conditions. Vapors may travel a considerable distance to the source of ignition and flash back.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Remove leaking cylinder to exhaust hood or safe outdoor area. Shut off source if possible and remove source of heat. Absorb with sand or vermiculite and place in closed containers for disposal.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders. Use only in a well-ventilated area.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use. Store away from oxidizers, combustible materials, and source of ignition or heat.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Safety glasses

SKIN PROTECTION: Impervious gloves, coveralls, boots, and/or other resistant protective clothing.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Sweet odor.

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @35 deg. C: 40 mm Hg

VAPOR DENSITY (AIR=1): 4.6

BOILING POINT (C): 114

SOLUBILITY IN WATER: Slight

SPECIFIC GRAVITY (H2O=1): @20 deg. C: 1.44

EVAPORATION RATE: N/Av

ODOR THRESHOLD: N/Av

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: Potassium, powdered aluminum, magnesium, zinc, oxidizing agents, amines and amides.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: HCl gas, phosgene gas, CO and oxides of chlorine.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): 4051 ppm, Rat 1 hour.

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Flammable liquid, n.o.s.
HAZARD CLASS: 3 (flammable), Packing Group 1
INDENTIFICATION NUMBER: UN1993
REPORTABLE QUANTITIES: 100 lbs.
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): Class 3, 1A

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 201-166-9

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: 20-21-22

S: 9

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

MSDS Number: **T4940** * * * * * *Effective Date:* ***09/16/09*** * * * * * *Supercedes:* ***12/06/07***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TRICHLOROETHYLENE

1. Product Identification

Synonyms: Trichloroethene; TCE; acetylene trichloride; Ethinyl trichloride
CAS No.: 79-01-6
Molecular Weight: 131.39
Chemical Formula: C2HCl3
Product Codes:
J.T. Baker: 5376, 9454, 9458, 9464, 9473
Mallinckrodt: 8600, 8633

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Trichloroethylene	79-01-6	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Poison)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Vapors can irritate the respiratory tract. Causes depression of the central nervous system with symptoms of visual disturbances and mental confusion, incoordination, headache, nausea, euphoria, and dizziness. Inhalation of high concentrations could cause unconsciousness, heart effects, liver effects, kidney effects, and death.
Ingestion:
Cases irritation to gastrointestinal tract. May also cause effects similar to inhalation. May cause coughing, abdominal pain, diarrhea, dizziness, pulmonary edema, unconsciousness. Kidney failure can result in severe cases. Estimated fatal dose is 3-5 ml/kg.
Skin Contact:
Cause irritation, redness and pain. Can cause blistering. Continued skin contact has a defatting action and can produce rough, dry, red skin resulting in secondary infection.
Eye Contact:
Vapors may cause severe irritation with redness and pain. Splashes may cause eye damage.
Chronic Exposure:

Chronic exposures may cause liver, kidney, central nervous system, and peripheral nervous system effects. Workers chronically exposed may exhibit central nervous system depression, intolerance to alcohol, and increased cardiac output. This material is linked to mutagenic effects in humans. This material is also a suspect carcinogen.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders, cardiovascular disorders, impaired liver or kidney or respiratory function, or central or peripheral nervous system disorders may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.

Skin Contact:

Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:

Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

5. Fire Fighting Measures

Fire:

Autoignition temperature: 420C (788F)

Flammable limits in air % by volume:

lel: 8; uel: 12.5

Explosion:

A strong ignition source, e. g., a welding torch, can produce ignition. Sealed containers may rupture when heated.

Fire Extinguishing Media:

Use water spray to keep fire exposed containers cool. If substance does ignite, use CO_2, dry chemical or foam.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

Trichloroethylene:

-OSHA Permissible Exposure Limit (PEL):

100 ppm (TWA), 200 ppm (Ceiling),

300 ppm/5min/2hr (Max)

-ACGIH Threshold Limit Value (TLV):

10 ppm (TWA) 25 ppm (STEL); A2 Suspected Human Carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has poor warning properties. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Chloroform-like odor.
Solubility:
Practically insoluble in water. Readily miscible in organic solvents.
Specific Gravity:
1.47 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
87C (189F)
Melting Point:
-73C (-99F)
Vapor Density (Air=1):
4.5
Vapor Pressure (mm Hg):
57.8 @ 20C (68F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Will slowly decompose to hydrochloric acid when exposed to light and moisture.
Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong caustics and alkalis, strong oxidizers, chemically active metals, such as barium, lithium, sodium, magnesium, titanium and beryllium, liquid oxygen.
Conditions to Avoid:
Heat, flame, ignition sources, light, moisture, incompatibles

---

11. Toxicological Information

Toxicological Data:
Trichloroethylene: Oral rat LD50: 5650 mg/kg; investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
This material has been linked to mutagenic effects in humans.

--------\Cancer Lists\----------			
	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
----------	-----	-----------	-------------
Trichloroethylene (79-01-6)	No	Yes	2A

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.
Environmental Toxicity:
The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be slightly toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1710
Packing Group: III
Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1710
Packing Group: III
Information reported for product/size: 4L

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
Trichloroethylene (79-01-6)                    Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                       --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
Trichloroethylene (79-01-6)                    Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Trichloroethylene (79-01-6)             No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                    -RCRA-    -TSCA-
Ingredient                              CERCLA     261.33     8(d)
----------------------------------------  ------     ------    ------
Trichloroethylene (79-01-6)             100        U228       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: None allocated.
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor.

Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician. Note to physician: Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **T0760** * * * * * *Effective Date:* ***05/26/09*** * * * * * *Supercedes:* ***08/07/06***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

1,1,2,2-TETRACHLOROETHANE

1. Product Identification

Synonyms: Ethane, 1,1,2,2-tetrachloro-; s-tetrachloroethane; acetylene tetrachloride
CAS No.: 79-34-5
Molecular Weight: 167.85
Chemical Formula: C2H2Cl4
Product Codes: V398

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
1,1,2,2-Tetrachloroethane	79-34-5	100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS LIVER, KIDNEYS, CENTRAL NERVOUS SYSTEM AND GASTROINTESTINAL TRACT. CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Generally considered the most toxic of the common chlorinated hydrocarbons.

Inhalation:
Highly toxic. Strong irritant of the mucous membranes and upper respiratory tract. Initial symptoms may include irritation of the nose and throat, salivation. Continued exposure may produce restlessness, dizziness, nausea, vomiting and narcosis. Symptoms may progress to a more serious illness with jaundice, liver tenderness, lung edema, and possibly convulsions and coma before death.
Ingestion:
Highly toxic via ingestion. Symptoms parallel those from inhalation. Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.
Chronic Exposure:
Chronic exposure can produce the same life threatening health effects noted for inhalation exposure above. Chronic exposure may also affect liver, gastrointestinal tract and blood-forming organs.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin, eye or central nervous system disorders, or impaired liver, kidney, or pulmonary function may be more susceptible to the effects of this substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician immediately.
Eye Contact:
Immediately flush eyes with gentle but large stream of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Call a physician immediately.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit
5 ppm (TWA) skin

-ACGIH Threshold Limit Value (TLV):
1 ppm (TWA) skin, A3 - Confirmed animal carcinogen
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. This substance has poor warning properties.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.
Other Control Measures:
There is insufficient data in the published literature to assign complete numerical SAF-T-DATA* ratings and laboratory protective equipment for this product. Special precautions must be used in storage, use and handling. Protective equipment for laboratory bench use should be chosen using professional judgment based on the size and type of reaction or test to be conducted and the available ventilation, with overriding consideration to minimize contact with the chemical.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Chloroform-like odor.
Solubility:
Slight, 0.3 g/100g water @ 25C (77F)
Specific Gravity:
1.59 @ 20C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
147C (297F)
Melting Point:
-43C (-45F)
Vapor Density (Air=1):
5.8
Vapor Pressure (mm Hg):
8 @ 20C (68F)
Evaporation Rate (BuAc=1):
0.65

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Unusual exposure to light in the presence of air may form small amounts of phosgene.
Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Reacts with chemically active metals, fuming sulfuric acid and strong caustics. Attacks most plastics and rubber.
Conditions to Avoid:
No information found.

---

11. Toxicological Information

Oral rat LD50: 250 mg/kg; investigated as a tumorigen, mutagen.

--------\Cancer Lists\----------			
	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
1,1,2,2-Tetrachloroethane (79-34-5)	No	No	3

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into water, this material is expected to have a half-life between 10 and 30 days. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material is not expected to react with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of greater than 30 days.
Environmental Toxicity:
This material may be toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l. The EC50/48-hour values for daphnia are between 1 and 10 mg/l.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: 1,1,2,2-TETRACHLOROETHANE
Hazard Class: 6.1
UN/NA: UN1702
Packing Group: II
Information reported for product/size: 1KG

International (Water, I.M.O.)

Proper Shipping Name: 1,1,2,2-TETRACHLOROETHANE
Hazard Class: 6.1
UN/NA: UN1702
Packing Group: II
Information reported for product/size: 1KG

International (Air, I.C.A.O.)

Proper Shipping Name: 1,1,2,2-TETRACHLOROETHANE
Hazard Class: 6.1
UN/NA: UN1702
Packing Group: II
Information reported for product/size: 1KG

---

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
1,1,2,2-Tetrachloroethane (79-34-5)              Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                        --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
1,1,2,2-Tetrachloroethane (79-34-5)              Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
1,1,2,2-Tetrachloroethane (79-34-5)     No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                  -RCRA-    -TSCA-
Ingredient                              CERCLA    261.33     8(d)
----------------------------------------  ------    ------    ------
1,1,2,2-Tetrachloroethane (79-34-5)     100       U209       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2XE
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS LIVER, KIDNEYS, CENTRAL NERVOUS SYSTEM AND GASTROINTESTINAL TRACT. CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT.
Label Precautions:
Do not breathe vapor.
Do not get in eyes, on skin, or on clothing.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician immediately.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Composition/Information on Ingredient

Cas:
8001-35-2
Code:
M
RTECS:
XW5250000
Code:
M
Name:
CHLORINATED CAMPHENE (SARA III)
Other REC Limits:
N/K
OSHA PEL:
S,0.5MG/M3/1STEL
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
S,0.5MG/M3/1 STEL;93
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
USE APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.
Ventilation:
HANDLE ONLY IN A HOOD
Protective Gloves:
AS REQUIRED
Eye Protection:
EYE SHIELDS
Other Protective Equipment:
Equipment N/K
Work Hygienic Practices:
REMOVE/WASH CONTAMINATED CLOTHING BEFORE REUSE. ONLY TRAINED PERSONNEL SHOULD HANDLE THIS
CHEMICAL OR ITS CONTAINER.
Supplemental Safety and Health:
N/K

Health Hazards Data

LD50LC50Mixture:
LD50 (RAT OR MOUSE): 69 MG/KG.

Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
YES
IARC:
YES
OSHA:
NO
Health Hazards Acute And Chronic:
SKIN: HARMFUL & FATAL IF ABSORBED. INHALATION: HARMFUL, LIVER/KIDNEY/NERVOUS SYSTEM INJURY, & FATAL. INGESTION: FATAL.
Explanation Of Carcinogenicity:
TOXAPHENE/CAMPHECLOR IS A SUSPECTED HUMAN CARCINOGEN.
Signs And Symptions Of Overexposure:
SKIN: HARMFUL & FATAL IF ABSORBED. INHALATION: HARMFUL, LIVER/KIDNEY/NERVOUS SYSTEM INJURY, & FATAL. INGESTION: FATAL.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES/SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NO BURNS HAVE OCCURED-USE SOAP & WATER TO CLEANSE SKIN. INHALATION:
REMOVE TO FRESH AIR. ADMINISTER OXYGEN IF BREATHING DIFFICULTY. ADMINISTER CPR IF CARDIA C ARREST OCCURS. IF SHOWING
SIGNS OF SHOCK, KEEP WARM/QUIET. INGESTION: INDUCE VOMITING. IF VOMITING, MAKE SURE AIRWAY DOESN'T BECOME
OBSTRUCTED BY VOMIT. OBTAIN MEDICAL ATTENTION IN ALL CASES.
Spill Release Procedures:
EVACUATE AREA. WEAR APPROPRIATE EQUIPMENT. VENTILATE AREA. SWEEP UP & PLACE IN AN APPROPRIATE CONTAINER. HOLD FOR
DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
Neutralizing Agent:
N/K
Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER. DISPOSE OF IN ACCORDANCE W/FEDERAL, STATE, &
LOCAL REGULATIONS.
Handling And Storage Precautions:
KEEP CLOSED IN A COOL DRY PLACE. STORE ONLY W/COMPATIBLE CHEMICALS. FOR LABORATORY USE ONLY. DON'T WEAR CONTACT
LENSES.
Other Precautions:
DON'T USE AS DRUGS, COSMETICS, AGRICULTURAL OR PESTICIDAL PRODUCTS, FOOD ADDITIVES OR AS HOUSEHOLD CHEMICALS.

AVOID DIRECT PHYSICAL CONTACT. AVOID CONTACT W/SKIN, EYES & CLOTHING.
2

Fire and Explosion Hazard Information

Flash Point Method:
N/P
Flash Point:
Flash Point Text:
N/K
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
CO2, DRY CHEMICAL POWDER OR SPRAY.
Fire Fighting Procedures:
N/K
Unusual Fire/Explosion Hazard:
N/K

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
311F 3
Melt/Freeze Pt:
M.P/F.P Text:
149-194F
Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
0.2-0.4
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K

Solubility in Water:
INSOLUBLE
Appearance and Odor:
YELLOW WAXY SOLID W/FRUITY/PLEASANT ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
SENSITIVE TO HEAT, LIGHT, AIR, &MOISTURE.
Materials To Avoid:
IRON, ZINC, OTHER LIGHT METALS, COPPER, MERCURY OR ALKALINE PESTICIDES, &STRONG BASES.
Hazardous Decomposition Products:
N/K
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

handling or from contact with the above product. See reverse side of invoice or packing slip for additional
terms and conditions of sale.

Health	1
Fire	3
Reactivity	0
Personal Protection	J

Material Safety Data Sheet
Alpha-Pinene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Alpha-Pinene

Catalog Codes: SLP3301

CAS#: 80-56-8

RTECS: DT7000000

TSCA: TSCA 8(b) inventory: Alpha-Pinene

CI#: Not available.

Synonym: 2,6,6-Trimethylbicyclo[3,1,1]hept-2-ene

Chemical Name: Not available.

Chemical Formula: C10H16

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
{Alpha-}Pinene	80-56-8	100

Toxicological Data on Ingredients: Alpha-Pinene: ORAL (LD50): Acute: 3700 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

Potential Chronic Health Effects:
Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 255°C (491°F)

Flash Points: CLOSED CUP: 33°C (91.4°F).

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Explosive in the form of vapor when exposed to heat or flame.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid, insoluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label.

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection: Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Strong.

Taste: Not available.

Molecular Weight: 136.23 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 156°C (312.8°F)

Melting Point: -55°C (-67°F)

Critical Temperature: Not available.

Specific Gravity: 0.8592 (Water = 1)

Vapor Pressure: Not available.

Vapor Density: 4.7 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether.

Solubility:
Soluble in methanol, diethyl ether. Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 3700 mg/kg [Rat].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : alpha-Pinene : UN2368 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Alpha-Pinene Massachusetts RTK: Alpha-Pinene TSCA 8(b) inventory: Alpha-Pinene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).

DSCL (EEC):
R10- Flammable. R36- Irritating to eyes.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 3

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Not applicable. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 11:28 AM

Last Updated: 11/01/2010 12:00 PM

ACROS.COM

ACROS ORGANICS

Material Safety Data Sheet

Methyl methacrylate, stabilized, 99%

Section 1 - Chemical Product and Company Identification

MSDS Name:	Methyl methacrylate, stabilized, 99%
Catalog Numbers:	12714-0000, 12714-0010, 12714-0025, 12714-0250
Synonyms:	MMAMethyl 2-methylpropenoate
Company Identification:	Acros Organics BVBA Janssen Pharmaceuticalaan 3a 2440 Geel, Belgium
Company Identification: (USA)	Acros Organics One Reagent Lane Fair Lawn, NJ 07410
For information in the US, call:	800-ACROS-01
For information in Europe, call:	+32 14 57 52 11
Emergency Number, Europe:	+32 14 57 52 99
Emergency Number US:	201-796-7100
CHEMTREC Phone Number, US:	800-424-9300
CHEMTREC Phone Number, Europe:	703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name:	%	EINECS#
80-62-6	Methyl methacrylate	99%	201-297-1

Hazard Symbols: XI F

Risk Phrases: 11 37/38 43

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Highly flammable. Irritating to respiratory system and skin. May cause sensitization by skin contact.

Potential Health Effects

Eye:	Causes eye irritation. Lachrymator (substance which increases the flow of tears).
Skin:	Causes skin irritation. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. May be absorbed through the skin redness and pain.
Ingestion:	May cause severe gastrointestinal tract irritation with nausea, vomiting and possible burns. May cause effects similar to those for inhalation exposure.
Inhalation:	Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respirat irritation. May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. May ca asthmatic attacks due to allergic sensitization of the respiratory tract. May cause narcotic effects in high concentration. Inhalation may be fatal as a result of spasm, infl edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema.
Chronic:	Prolonged or repeated skin contact may cause dermatitis. May cause liver and kidney damage. May cause lung damage.

Section 4 - First Aid Measures

Eyes:	Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin:	Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.
Ingestion:	Do not induce vomiting. Get medical aid. Wash mouth out with water.
Inhalation:	Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:

Section 5 - Fire Fighting Measures

General Information:	As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may explosive mixture with air. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Containers may explode in the heat of a fire.
Extinguishing Media:	Use water spray to cool fire-exposed containers. Use water fog, dry chemical, carbon dioxide, or regular foam.

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool.

Section 7 - Handling and Storage

Handling: Use spark-proof tools and explosion proof equipment. Avoid breathing dust, vapor, mist, or gas. Avoid contact with skin and eyes. Use only in a chemical fume hoo

Storage: Keep away from sources of ignition. Store in a cool, dry place. Store in a tightly closed container. Refrigerator/flammables.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low

Exposure Limits

CAS# 80-62-6:

United Kingdom, WEL - TWA: 50 ppm TWA; 208 mg/m3 TWA United Kingdom, WEL - STEL: 100 ppm STEL; 416 mg/m3 STEL
United States OSHA: 100 ppm TWA; 410 mg/m3 TWA
Belgium - TWA: 100 ppm VLE; 416 mg/m3 VLE
France - VME: 100 ppm VME; 410 mg/m3 VME France - VLE: 200 ppm VLE; 820 mg/m3 VLE
Germany: 50 ppm TWA; 210 mg/m3 TWA
Malaysia: 100 ppm TWA; 410 mg/m3 TWA
Netherlands: 50 ppm MAC; 100 mg/m3 MAC
Russia: 10 mg/m3 TWA (vapour)
Spain: 50 ppm VLA-ED; 208 mg/m3 VLA-ED Spain: 100 ppm VLA-EC; 416 mg/m3 VLA-EC

Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear a chemical apron.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 appro respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Clear liquid
Color: APHA: 10 max
Odor: sharp odor
pH: Not available
Vapor Pressure: 28 mm Hg @ 20 deg C
Viscosity: 0.6 mPas 20 deg C
Boiling Point: 100 deg C @ 760.00mm Hg (212.00°F)
Freezing/Melting Point: -48 deg C (-54.40°F)
Autoignition Temperature: 430 deg C (806.00 deg F)
Flash Point: 8 deg C (46.40 deg F)
Explosion Limits: Lower: 2.10 vol %
Explosion Limits: Upper: 12.50 vol %
Decomposition Temperature: Not available
Solubility in water: 15 g/l (20°C)
Specific Gravity/Density: .9360g/cm3
Molecular Formula: H2C=C(CH3)CO2CH3
Molecular Weight: 100.12

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: High temperatures, incompatible materials, light, ignition sources.

Incompatibilities with Other Materials: Oxidizing agents, reducing agents, acids, bases, amines, halogens, peroxides, carbon.

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.

Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

RTECS#: CAS# 80-62-6: OZ5075000

LD50/LC50:

RTECS:
CAS# 80-62-6: Draize test, rabbit, eye: 150 mg;
Inhalation, mouse: LC50 = 18500 mg/m3/2H;
Inhalation, rat: LC50 = 78000 mg/m3/4H;
Oral, mouse: LD50 = 3625 mg/kg;
Oral, rabbit: LD50 = 8700 mg/kg;

Oral, rat: LD50 = 7872 mg/kg;
Skin, rabbit: LD50 = >5 gm/kg;
.
Other:

Carcinogenicity: Methyl methacrylate - IARC: Group 3 (not classifiable)

Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity: Not available

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

	IATA	IMO	RID/ADR
Shipping Name:	METHYL METHACRYLATE MONOMER, STABILIZED	METHYL METHACRYLATE, MONOMER, STABILIZED	METHYL METHACRYLATE MONOMER STABILIZED
Hazard Class:	3	3	3
UN Number:	1247	1247	1247
Packing Group:	II	II	II

USA RQ: CAS# 80-62-6: 1000 lb final RQ; 454 kg final RQ

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XI F

Risk Phrases:

R 11 Highly flammable.

R 37/38 Irritating to respiratory system and skin.

R 43 May cause sensitization by skin contact.

Safety Phrases:

S 24 Avoid contact with skin.

S 37 Wear suitable gloves.

S 46 If swallowed, seek medical advice immediately and show this container or label.

WGK (Water Danger/Protection)

CAS# 80-62-6: 1

Canada

CAS# 80-62-6 is listed on Canada's DSL List

US Federal

TSCA

CAS# 80-62-6 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date: 7/16/1996

Revision #1 Date 7/05/2002

Revisions were made in Sections: General revision.

MSDS Number: **D3688** * * * * * *Effective Date:* ***09/09/09*** * * * * * *Supercedes:* ***05/17/07***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

DIETHYL PHTHALATE

1. Product Identification

Synonyms: 1,2-Benzenedicarboxylic acid, diethyl ester; Diethyl terephthalate; Ethyl phthalate; Phthalic acid, diethyl ester
CAS No.: 84-66-2
Molecular Weight: 222.24
Chemical Formula: C6H4(CO2C2H5)2
Product Codes: H944

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Diethyl Phthalate	84-66-2	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO EYES AND RESPIRATORY TRACT.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Green (General Storage)

Potential Health Effects

Inhalation:
Low vapor pressure indicates a low inhalation hazard unless this material is heated or misted. If heated, inhalation may cause irritation to respiratory tract. Symptoms may include coughing, chest pain and shortness of breath. Higher exposures may cause central nervous system effects.
Ingestion:
Large oral doses may cause irritation to the gastrointestinal tract.
Skin Contact:
Not expected to be a health hazard from skin exposure.
Eye Contact:
May cause irritation, redness and pain.
Chronic Exposure:
No information found.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Wash exposed area with soap and water. Get medical advice if irritation develops.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.

5. Fire Fighting Measures

Fire:
Flash point: 161C (322F) CC
Autoignition temperature: 457C (855F)
Flammable limits in air % by volume:
lel: 0.7
Lower explosive limit applicable @ 186C (368F).

Explosion:
Above the flash point, explosive vapor-air mixtures may be formed.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Water or foam may cause frothing. Water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-ACGIH Threshold Limit Value (TLV): 5 mg/m3 (TWA), A4 - Not Classifiable as a Human Carcinogen
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type P95 or R95 filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator (NIOSH type P100 or R100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. Please note that N filters are not recommended for this material. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear protective gloves and clean body-covering clothing.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Slight aromatic odor.

Solubility:
Insoluble in water.
Specific Gravity:
1.23 @ 14C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
298 - 299C (568 - 570F)
Melting Point:
-40C (-40F)
Vapor Density (Air=1):
7.66
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizers. Will attack some forms of plastics, rubber and coatings.
Conditions to Avoid:
Incompatibles.

11. Toxicological Information

Oral rat LD50: 8600 mg/kg. Investigated as a mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Diethyl Phthalate (84-66-2)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into water, this material is not expected to evaporate significantly. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released into the air, this material is expected to have a half-life of less than 1 day.
Environmental Toxicity:
This material may be toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l. The LC50/96-hour values for fish are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Diethyl Phthalate (84-66-2)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Diethyl Phthalate (84-66-2)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Diethyl Phthalate (84-66-2)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Diethyl Phthalate (84-66-2)	1000	U088	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **0** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO EYES AND RESPIRATORY TRACT.
Label Precautions:
Avoid breathing vapor.
Avoid contact with eyes.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention. In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation develops or persists.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **D2056** * * * * * *Effective Date:* ***09/15/09*** * * * * * *Supercedes:* ***07/10/07***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

DIBUTYL PHTHALATE

1. Product Identification

Synonyms: 1,2-Benzenedicarboxylic acid dibutyl ester; n-Butyl phthalate; Phthalic acid, dibutyl ester
CAS No.: 84-74-2
Molecular Weight: 278.35
Chemical Formula: C6H4(CO2C4H9)2
Product Codes:
J.T. Baker: G811
Mallinckrodt: 1829

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Di-n-butyl Phthalate	84-74-2	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED. CAUSES SEVERE EYE IRRITATION. CAUSES SKIN IRRITATION. MAY CAUSE ALLERGIC SKIN REACTION. MAY CAUSE RESPIRATORY TRACT IRRITATION. MAY BE HARMFUL IF INHALED.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Green (General Storage)

Potential Health Effects

Inhalation:
Inhalation of vapors or mists is not expected unless this material is heated or misted. If inhaled, material may cause irritation to respiratory tract.
Ingestion:
Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. Accidental ingestion of 10 g (ca. 40 mg/kg) in one person produced nausea and vomiting, dizziness, light sensitivity, swelling of the eyelids, watering of the eyes, and kidney effects (red and white blood cells and oxalate crystals in the urine).
Skin Contact:
Irritation and contact burns are possible, but do not occur frequently. Allergic dermatitis has been reported after using antiperspirants and contact with plastics containing dibutyl phthalate (such as a watchband).
Eye Contact:
Vapor or mist causes eye irritation. Splashes cause severe irritation with stinging pain and tears.
Chronic Exposure:
Workers in the artificial leather industry were studied and it was found that exposure to 1.7 to 66 mg/m3 over a period of 19 years showed central nervous system

toxicity after 6 to 7 years. Symptoms included pain, numbness, weakness and spasms in the extremities. Because there was concurrent exposure to other phthalates and a few adipates and sebacates, dibutyl phthalate cannot be singled out as the direct cause.

Aggravation of Pre-existing Conditions:

No information found.

4. First Aid Measures

Inhalation:

Remove to fresh air. Get medical attention for any breathing difficulty.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Immediately flush skin with plenty of soap and water. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Flash point: 157C (315F) CC

Autoignition temperature: 402C (756F)

Flammable limits in air % by volume:

lel: 0.5; uel: 2.5

Slight fire hazard when exposed to heat or flame. Lower explosive limit was measured at 235C (456F).

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above.

Fire Extinguishing Media:

Dry chemical or carbon dioxide. Water or foam may cause frothing.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container. Store in a cool, dry, ventilated area away from sources of heat or ignition. Protect against physical damage. Store separately from reactive or combustible materials, and out of direct sunlight. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL): 5 mg/m3 (TWA)

-ACGIH Threshold Limit Value (TLV): 5 mg/m3 (TWA)

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a half-face respirator with an organic vapor cartridge and particulate filter (NIOSH type P95 or R95 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an organic vapor cartridge and particulate filter (NIOSH P100 or R100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. Please note that N series filters are not recommended for this material. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. This compound possibly exists in both particulate and vapor phase. A gas/vapor cartridge should be used in addition to the particulate filter (NIOSH type P95 or better filter). If the vapor concentration alone exceeds the exposure limits, use a supplied air respirator, because warning properties are unknown for these compounds. Breathing air quality must meet the requirements of the OSHA respiratory protection standard

(29CFR1910.134).

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Polyvinyl alcohol, butyl rubber and nitrile rubber are suitable materials to use for personal protective equipment.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Colorless to yellow oily liquid.
Odor:
Slight aromatic odor.
Solubility:
Insoluble in water.
Specific Gravity:
1.05 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
340C (644F)
Melting Point:
-35C (-31F)
Vapor Density (Air=1):
9.6
Vapor Pressure (mm Hg):
< 0.01 @ 20C (68F)
Evaporation Rate (BuAc=1):
ca. 0.0

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
May also produce 1-butene, butanol and phthalic anhydride. Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Oxidizing agents, acids, chlorine, nitrates, bases and alkalis.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 8000 mg/kg; inhalation rat LC50: 4250 mg/m3; skin rabbit LD50: > 20 mL/kg. Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
Women working where phthalates are used had higher incidence of miscarriages, menstrual disorders, and reduced gestation periods.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Di-n-butyl Phthalate (84-74-2)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material may leach into groundwater. When released into water, this material is expected to readily biodegrade. When released into water, this material is expected to have a half-life between 10 and 30 days. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material may be removed from the atmosphere to a moderate extent by dry deposition.
Environmental Toxicity:
96 Hr LC50 fathead minnow: 0.85 mg/L (flow-through);
96 Hr LC50 rainbow trout: 1.24 mg/L (flow-through);
96 Hr LC50 bluegill: 0.42 mg/L (flow-through)
Dangerous to the environment. Very toxic to aquatic organisms.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (DI-N-BUTYL PHTHALATE)
Hazard Class: 9
UN/NA: UN3082
Packing Group: III
Information reported for product/size: 20L

International (Water, I.M.O.)

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (DI-N-BUTYL PHTHALATE)
Hazard Class: 9
UN/NA: UN3082
Packing Group: III
Information reported for product/size: 20L

International (Air, I.C.A.O.)

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (DI-N-BUTYL PHTHALATE)
Hazard Class: 9
UN/NA: UN3082
Packing Group: III
Information reported for product/size: 20L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Di-n-butyl Phthalate (84-74-2)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Di-n-butyl Phthalate (84-74-2)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Di-n-butyl Phthalate (84-74-2)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Di-n-butyl Phthalate (84-74-2)	10	U069	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED. CAUSES SEVERE EYE IRRITATION. CAUSES SKIN IRRITATION. MAY CAUSE ALLERGIC SKIN REACTION. MAY CAUSE RESPIRATORY TRACT IRRITATION. MAY BE HARMFUL IF INHALED.

Label Precautions:

Avoid breathing vapor or mist.
Avoid contact with eyes, skin and clothing.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:

In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention. In case of skin contact, immediately flush skin with plenty of soap and water. Remove contaminated clothing and shoes. Wash clothing before reuse. Get medical attention. If inhaled, remove to fresh air. Get medical attention for any breathing difficulty.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

****

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet

Version 4.0
Revision Date 03/14/2010
Print Date 08/17/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Benzyl butyl phthalate
Product Number	:	36927
Brand	:	Fluka
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+18003255832
Fax	:	+18003255052
Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
No known OSHA hazards

Target Organs

Liver, pancreas

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H303	May be harmful if swallowed.
H360	May damage fertility or the unborn child.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P273	Avoid release to the environment.
P308 + P313	IF exposed or concerned: Get medical advice/attention.
P501	Dispose of contents/container to an approved waste disposal plant.

HMIS Classification

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	1
Physical hazards:	0

NFPA Rating

Health hazard:	1
Fire:	1
Reactivity Hazard:	0

Potential Health Effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Ingestion May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : $C_{19}H_{20}O_4$
Molecular Weight : 312.36 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Benzyl butyl phthalate			
85-68-7	201-622-7	607-430-00-3	-

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid inhalation of vapour or mist.
Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
For prolonged or repeated contact use protective gloves.

Eye protection
Safety glasses with side-shields conforming to EN166

Skin and body protection
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	liquid

Safety data

pH	no data available
Melting point	no data available
Boiling point	no data available
Flash point	113.0 °C (235.4 °F) - closed cup
Ignition temperature	232 °C (450 °F)
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	19.2 hPa (14.4 mmHg) at 250.0 °C (482.0 °F) 0.3 hPa (0.2 mmHg) at 150.0 °C (302.0 °F)
Density	1.1 g/cm3 at 25 °C (77 °F)
Water solubility	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents, Strong bases

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 2,330 mg/kg

LD50 Dermal - rabbit - > 10,000 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

no data available

Carcinogenicity

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	3 - Group 3: Not classifiable as to its carcinogenicity to humans (Benzyl butyl phthalate)
ACGIH:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

Presumed human reproductive toxicant

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure (GHS)
no data available

Specific target organ toxicity - repeated exposure (GHS)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Additional Information
RTECS: TH9990000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill) - 1.7 mg/l - 96.0 h
	NOEC - Oncorhynchus mykiss (rainbow trout) - 0.48 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia magna (Water flea) - 1.70 mg/l - 48 h

Persistence and degradability

Biodegradability: Biotic/Aerobic
Result: 88 % - Readily biodegradable.

Bioaccumulative potential

Bioaccumulation: Lepomis macrochirus (Bluegill) - 21 d
Bioconcentration factor (BCF): 663

Mobility in soil

no data available

PBT and vPvB assessment

no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Avoid release to the environment.

13. DISPOSAL CONSIDERATIONS

Product

Observe all federal, state, and local environmental regulations.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN-Number: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, liquid, n.o.s. (Benzyl butyl phthalate)
Reportable Quantity (RQ): 100 lbs
Marine pollutant: Marine pollutant
Poison Inhalation Hazard: No

IMDG

UN-Number: 3082 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Benzyl butyl phthalate)
Marine pollutant: Marine pollutant

IATA

UN-Number: 3082 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, liquid, n.o.s. (Benzyl butyl phthalate)

15. REGULATORY INFORMATION

OSHA Hazards

No known OSHA hazards

DSL Status

All components of this product are on the Canadian DSL list.

SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benzyl butyl phthalate	85-68-7	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benzyl butyl phthalate	85-68-7	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Benzyl butyl phthalate	85-68-7	2007-03-01

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Benzyl butyl phthalate	85-68-7	2007-09-28

16. OTHER INFORMATION

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Composition/Information on Ingredient

Cas:
86-30-6
Code:
M
RTECS:
JJ9800000
Code:
M
Name:
N-NITROSODIPHENYLAMINE (SARA III)
Other REC Limits:
NONE RECOMMENDED
OSHA PEL:
NOT ESTABLISHED
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
NOT ESTABLISHED
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
RESPIRATORY PROTECTION NOT NORMALLY NEEDED.IF SIGNIFICANT DUSTING OCCURS,WEAR A NIOSH/MSHA
APPROVED DUST RESPIRATOR WITH HIGH EFFICIENCY FILTERS.
Ventilation:
LOCAL EXHAUST VENTILATION IS RECOMMENDED IF SIGNIFICANT DUSTING OCCURS.OTHERWISE,USE GENERAL
EXHAUST VENTILATION.
Protective Gloves:
IMPERMEABLE GLOVES
Eye Protection:
SAFETY GLASSES WITH SIDE SHIELDS.
Other Protective Equipment:
Equipment IMPERVIOUS BOOT,APRON,PROTECTIVE SUIT AND HARD HAT.
Work Hygienic Practices:
UPON CONTACT WITH SKIN OR EYES,WASH OFF WITH WATER.REMOVE CONTAMINATED CLOTHING IMMED LAUNDER BEFORE REUSE.

Supplemental Safety and Health:
CONTRACT DAAA09-91-C-0494.BULK DENSITY:0.5-1 G/CC.FIRE FIGHT PROC:OR EXPLOSIVE RESISTANT BUNKER.SPILL PROC:OVERFLOW DAM W/ FILTRATION CAPABILITIES TO RETAIN MATL.DIVERT WATER FLOW OR S IF POSSIBLE.
GATHER WET MATL.KEEP MATL DAMP.OTHER PREC:SHELF LIFE INDEFINITE WHEN KEPT UNDER 100F.

Health Hazards Data

LD50LC50Mixture:
NOT KNOWN
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
DIPHENYLAMINE MAY CAUSE KIDNEY DAMAGE.THE LOW CONCENTRATION OF THIS MATERIAL IN,AND NATURE OF,THE PRODUCT WOULD PRECLUDE DEVELOPMENT OF SUCH AN EFFECT.
Explanation Of Carcinogenicity:
NONE
Signs And Symptions Of Overexposure:
EYES:IRRITATION WITH INFLAMMATION OF CONJUNCTIVA.SKIN:IRRITATION.INGESTION:IRRITATION TO GI TRACT.INHALATION:IRRITATION TO NOSE,MOUTH,THROAT,LUNGS.NITROGLYCERIN MAY CAUSE DILATION OF BLOOD VESSELS W/ DROP IN BLOOD PRESSURE,HEADACHE,CYCNOSIS,MENTAL CONFUSION.NAUSEA,VOMITING & ABDOMINAL PAIN MAY ALSO OCCUR.
Medical Cond Aggravated By Exposure:
ANEMIA AND CARDIOVASCULAR DISEASE.
First Aid:
EYES:IMMED FLUSH W/ LGE AMTS OF WATER FOR AT LEAST 15 MIN.IF IRRIT DEVELOPS,CALL MD. SKIN:IMMED FLUSH W/ WATER FOR 15 MIN.CALL MD. INGESTION:IMMED DRINK LGE QTIES OF WATER.INDUCE VOMITING.CALL MD.DO N OT GIVE ANYTHING BY MOUTH IF UNCON OR IF HAVING 8 CONVL. INHALATION:REMOVE TO FRESH AIR.IF BREATHING IS DIFFICULT,ADMIN O*2,KEEP PATIENT WARM & AT REST.CALL MD.IF UNCON,ARTF RESP SHOULD BE GIVEN IMMED.
Spill Release Procedures:

PROD MAY REPRESENT EXPLO HAZ.REMOVE SOURCES OF IGNIT.S SPILL & NOTIFY APPROP PERS.WET SPILL MATL PRIOR TO CLEAN
UP.USE NON-SPARKING/PLASTIC UTENSILS.WEAR FLAME RETARDANT CLOTHING & SELF-CONTAINED B REATHING APPRATUS.WATER
RELEASE:CREATE (SEE SUPP)

Neutralizing Agent:
NOT KNOWN

Waste Disposal Methods:
DISP MUST BE IAW FED,STATE,& LOC REGS.COORDINATE W/ SUPPORTING INSTALLATION/MACOM ENVIRON OFFICE PRIOR TO DISP (FP
A).HAZ WASTE NO.D003.CAN BE DISP BY CONTROLLED OPEN BURNING IN SMALL QTIES.SPREAD MAT L IN THIN LAYERS & IGNITE FROM
REMOTE LOCATION.

Handling And Storage Precautions:
STORE IN A COOL,DRY,WELL-VENTILATED PLACE AWAY FROM ALL SOURCES OF IGNIT.DO NOT STORE AT TEMP >38C,SUBJECT TO MECH
SHOCK,EXPOSE TO DIRECT LIGHT.

Other Precautions:
STORE IN ORIGINAL SHIPPING CONTAINERS FOR EXPLOSION VENTING PURPOSES.CARE MUST BE TAKEN TO PREVENT ENVIRONMENTAL CONTAMINATION FROM THE USE OF THIS MATERIAL.DO NOT TAKE INTERNALLY.AVOID CONTACT WITH S KIN,EYES,AND CLOTHING. (SEE SUPP DATA)

Fire and Explosion Hazard Information

Flash Point Method:
N/P

Flash Point:

Flash Point Text:
NOT APPLICABLE

Autoignition Temp:

Autoignition Temp Text:
N/A

Lower Limits:
N/A

Upper Limits:
N/A

Extinguishing Media:
USE EXTINGUISHING MEDIA COMPATIBLE FOR SURROUNDING PRODUCTS.IF MATERIAL ITSELF IS ON FIRE,DELUGE WITH WATER.

Fire Fighting Procedures:
IN CASE OF FIRE,USE NORMAL FIRE FIGHTING EQUIP.RESPONSE TO MATL REQUIRES USE OF SELF-CONTAINED BREATHING
APPARATUS.FIGHT FIRES FROM REMOTE LOCATION (SEE SUPP) 9

Unusual Fire/Explosion Hazard:
CAN IGNITE DUE TO IMPACT OR STATIC DISCHARGE.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
N/R
Net Prop WT For Ammo:
10
Boiling Point:
B.P. Text:
N/A
Melt/Freeze Pt:
M.P/F.P Text:
NOT KNOWN
Decomp Temp:
Decomp Text:
>122F,>50C
Vapor Pres:
<1 MMHG
Vapor Density:
N/A
Volatile Org Content %:
Spec Gravity:
1.2-1.6
VOC Pounds/Gallon:
PH: N/A
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
NEGLIGIBLE
Solubility in Water:
NEGLIGIBLE
Appearance and Odor:
ODORLESS,GRANULAR SOLID.
Percent Volatiles by Volume:
<2
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
TEMP ABOVE 120C,IMPACT,STATIC DISCHARGE,DIRECT SUNLIGHT,OPEN FLAME.
Materials To Avoid:
STRONG ACIDS,BASES,AMINES,OXIDIZERS.
Hazardous Decomposition Products:
CARBON MONOXIDE,CARBON DIOXIDE,OXIDES OF NITROGEN.
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
WILL NOT OCCUR.

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

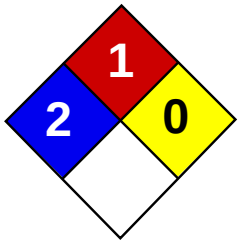
Other Information:N/P

www.lookchem.com

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Lookchem shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.



Material Safety Data Sheet
Carbazole MSDS

Section 1: Chemical Product and Company Identification

Product Name: Carbazole

Catalog Codes: SLC4801

CAS#: 86-74-8

RTECS: FE3150000

TSCA: TSCA 8(b) inventory: Carbazole

CI#: Not available.

Synonym: 9-Azaflluorene; 9H-Carbazole; Dibenzo(b,d)ppyrrole; Dibenzopyrrole; Diphenyleneimine; Diphenylenimide; Diphenylenimine

Chemical Name: Carbazole

Chemical Formula: C12-H9-N

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Carbazole	86-74-8	100

Toxicological Data on Ingredients: Not applicable.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of ingestion. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Slightly explosive in presence of open flames and sparks. Non-explosive in presence of shocks.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
As with most organic solids, fire is possible at elevated temperatures. When heated to decomposition it emits toxic fumes of nitrogen oxides

Special Remarks on Explosion Hazards:
Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystals solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 167.21 g/mole

Color: White.

pH (1% soln/water): Not applicable.

Boiling Point: 355°C (671°F)

Melting Point: 245°C (473°F)

Critical Temperature: Not available.

Specific Gravity: Density: 1.1 @ 18 deg. C(Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, acetone.

Solubility:
Partially soluble in acetone. Very slightly soluble in diethyl ether. Insoluble in cold water, hot water. 1 gram is soluble in 3 ml Quinoline, 6 ml Pyridine, 9 ml Acetone, 2 ml Acetone @ 50 deg. C., 35 ml Ether, 120 ml Benzene, 135 ml absolute alcohol. Slightly soluble in Petroleum Ether, chlorinated hydrocarbons, Acetic acid, Carbon Disulfide. Soluble in hot Chloroform, Toluene.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials, dust generation

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not available.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): >5000 mg/kg [Rat].

Chronic Effects on Humans: CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.

Other Toxic Effects on Humans:
Hazardous in case of ingestion. Slightly hazardous in case of skin contact (irritant), of inhalation.

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose: LDL [Rat] - Route: Oral; Dose: 500 mg/kg Lethal Dose/Conc 50% Kill: LD50 [Mouse] - Intraperitoneal; Dose: 200 mg/kg Lethal Dose/Conc: LD [Mouse] - Route: Oral; Dose: >400 mg/kg

Special Remarks on Chronic Effects on Humans:
May affect genetic material (mutagenic). May cause cancer based on animal test data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: May cause skin irritation. Eyes: May cause eye irritation. Inhalation: May cause respiratory tract irritation. Ingestion: May cause gastrointestinal tract irritation with nausea, vomiting and diarrhea. Chronic Potential Health Effects: Ingestion: Prolonged or repeated ingestion may affect the liver and cause weight loss.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Carbazole California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Carbazole California Director's List of Hazardous Substances: Carbazole TSCA 8(b) inventory: Carbazole TSCA 8(d) H and S data reporting: Carbazole: Effective date: 3/07/86; Sunset date: 3/07/96

Other Regulations: EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):
R40- Limited evidence of carcinogenic effect S24/25- Avoid contact with skin and eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 04:34 PM

Last Updated: 11/01/2010 12:00 PM

Honeywell
Burdick & Jackson™

1,2,4-Trichlorobenzene (348)

Version 1 | Revision Date 02/21/2008 | Print Date 02/21/2008

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	1,2,4-Trichlorobenzene
MSDS Number	:	000000011217
Product Use Description	:	Solvent
Company	:	Honeywell International Inc. 1953 South Harvey Street Muskegon, MI 49442
For more information call	:	1-800-368-0050 (Monday-Friday, 9:00am-5:00pm)
In case of emergency call	:	**Medical: 1-800-498-5701**
	:	**Transportation: 1-800-424-9300 or 703-527-3887**
	:	(24 hours/day, 7 days/week)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Form	:	liquid, clear
Color	:	colourless
Odor	:	aromatic
Hazard Summary	:	Harmful by inhalation. May be harmful if swallowed. Irritating to eyes, respiratory system and skin. May cause irritation of the gastrointestinal tract. Repeated exposure may cause skin dryness or cracking. Do not swallow. Avoid breathing vapors, mist or gas. Avoid contact with skin, eyes and clothing.

Potential Health Effects

Skin	:	Irritating to skin. May cause burns or external ulcers. Prolonged or repeated skin contact with liquid may cause defatting resulting in drying, redness and possible blistering.
Eyes	:	Irritating to eyes. Causes itching, burning, redness and tearing.
Ingestion	:	May be harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

Inhalation	:	Harmful by inhalation. Irritating to respiratory system.
Chronic Exposure	:	Prolonged or repeated skin contact with liquid may cause defatting resulting in drying, redness and possible blistering. Repeated or prolonged exposure to the substance can produce liver damage. Repeated or prolonged exposure to the substance can produce kidney damage.
Aggravated Medical Condition	:	Skin disorders Liver disorders Kidney disorders Respiratory disorders
Target Organs	:	Skin Eyes Respiratory system Liver Kidney

Carcinogenicity

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP, IARC, or OSHA.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
1,2,4-Trichlorobenzene	120-82-1	98.00
1,3,5-Trichlorobenzene	108-70-3	<2.00
1,2,3-Trichlorobenzene	87-61-6	<2.00

SECTION 4. FIRST AID MEASURES

Inhalation	:	Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Use oxygen as required, provided a qualified operator is present. Call a physician.
Skin contact	:	Wash off immediately with plenty of water for at least 15 minutes. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use. Call a physician.
Eye contact	:	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Call a physician.

Ingestion	:	Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Call a physician.

Notes to physician

Treatment	:	Treat symptomatically.

SECTION 5. FIRE-FIGHTING MEASURES

Flash point	:	105 °C (221 °F) closed cup
Ignition temperature	:	571 °C (1,060 °F)
Lower explosion limit	:	2.5 %(V)
Upper explosion limit	:	6.6 %(V)
Suitable extinguishing media	:	Carbon dioxide (CO2) Dry chemical Foam
Specific hazards during fire fighting	:	Cool closed containers exposed to fire with water spray. Do not allow run-off from fire fighting to enter drains or water courses. In case of fire hazardous decomposition products may be produced such as: Carbon monoxide Carbon dioxide (CO2) Gaseous hydrogen chloride (HCl).
Special protective equipment for fire-fighters	:	In the event of fire and/or explosion do not breathe fumes. Wear self-contained breathing apparatus and protective suit.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions	:	Immediately evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Wear personal protective equipment. Unprotected persons must be kept away. Ensure adequate ventilation. Remove all sources of ignition. Do not swallow. Avoid breathing vapors, mist or gas. Avoid contact with skin, eyes and clothing.

Environmental precautions	:	Discharge into the environment must be avoided. Prevent further leakage or spillage if safe to do so. Do not flush into surface water or sanitary sewer system. Prevent product from entering drains.
Methods for cleaning up	:	Ventilate the area. Contain and collect spillage with non-combustible absorbent materials, e.g. sand, earth, vermiculite, diatomaceous earth and place in container for disposal according to local regulations (see section 13).

SECTION 7. HANDLING AND STORAGE

Handling

Handling	:	Handle with care. Wear personal protective equipment. Use only in well-ventilated areas. Keep container tightly closed. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Keep away from fire, sparks and heated surfaces. Do not smoke. Do not swallow. Avoid contact with skin, eyes and clothing. Avoid breathing vapors, mist or gas.
Advice on protection against fire and explosion	:	Normal measures for preventive fire protection.

Storage

Requirements for storage areas and containers	:	Storage rooms must be properly ventilated. Keep containers tightly closed in a dry, cool and well-ventilated place. Containers should be protected against falling down. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Keep away from heat and sources of ignition. Keep away from direct sunlight. Store away from incompatible substances.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective measures	:	Ensure that eyewash stations and safety showers are close to the workstation location. Do not swallow. Avoid breathing vapors, mist or gas.

Avoid contact with skin, eyes and clothing.

Engineering measures : Use with local exhaust ventilation.
Prevent vapor buildup by providing adequate ventilation during and after use.

Eye protection : Do not wear contact lenses.
Wear as appropriate:
Safety glasses with side-shields
If splashes are likely to occur, wear:
Goggles or face shield, giving complete protection to eyes

Hand protection : Solvent-resistant gloves
Gloves must be inspected prior to use.
Replace when worn.

Skin and body protection : Wear as appropriate:
Solvent-resistant apron and boots
If splashes are likely to occur, wear:
Protective suit

Respiratory protection : When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.
For rescue and maintenance work in storage tanks use self-contained breathing apparatus.
Use NIOSH approved respiratory protection.

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice.
When using, do not eat, drink or smoke.
Wash hands before breaks and immediately after handling the product.
Keep working clothes separately.
Remove and wash contaminated clothing before re-use.
Do not swallow.
Avoid breathing vapors, mist or gas.
Avoid contact with skin, eyes and clothing.

Exposure Guidelines

1,2,4-Trichlorobenzene	120-82-1	ACGIH	Ceiling		5 ppm
		NIOSH	Ceil_Time	5 ppm	40 mg/m3
		OSHA Z1A	Ceiling	5 ppm	40 mg/m3
		US CA OEL	Ceiling	5 ppm	40 mg/m3
		TX ESL	ST ESL	50 ppm	400 ug/m3
		TX ESL	AN ESL	5 ppm	40 ug/m3

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	liquid, clear
Color	:	colourless
Odor	:	aromatic
Molecular Weight	:	181.46 g/mol
pH	:	not applicable
Melting point/range	:	17 °C (63 °F)
Boiling point/boiling range	:	213.5 °C (416.3 °F)
Vapor pressure	:	1.33 hPa at 20 °C (68 °F)
Relative vapour density	:	6.25 (Air = 1.0)
Density	:	1.454 g/cm3 at 20 °C (68 °F)
Water solubility	:	31.3 mg/l negligible
Partition coefficient: n-octanol/water	:	log Pow: 4.02

SECTION 10. STABILITY AND REACTIVITY

Conditions to avoid	:	Heat, flames and sparks. Keep away from direct sunlight. Protect from extreme heat and cold.
Materials to avoid	:	Oxidizing agents Acids Steam
Hazardous decomposition products	:	In case of fire hazardous decomposition products may be produced such as: Carbon monoxide Carbon dioxide (CO2) Gaseous hydrogen chloride (HCl).
Hazardous reactions	:	Hazardous polymerisation does not occur.

Stable under normal conditions.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute oral toxicity : LD50 rat
Dose: 756 mg/kg

Acute oral toxicity : LD50 mouse
Dose: 300 mg/kg

Acute dermal toxicity : LD50 rat
Dose: 6,139 mg/kg

SECTION 12. ECOLOGICAL INFORMATION

Toxicity to fish : flow-through test LC50
Species: Pimephales promelas (fathead minnow)
Dose: 2.990 mg/l
Exposure time: 96 h

Toxicity to fish : LC50
Species: Oncorhynchus mykiss (rainbow trout)
Dose: 1.95 mg/l
Exposure time: 48 h

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Information: Observe all Federal, State, and Local Environmental regulations.

SECTION 14. TRANSPORT INFORMATION

DOT	UN-Number	: 2321
	Proper shipping name	: Trichlorobenzenes, liquid
	Class	6.1
	Packing group	III
	Hazard Label	6.1
IATA	UN Number	: 2321
	Description of the goods	: Trichlorobenzenes, liquid
	Class	: 6.1
	Packaging group	: III
	Hazard Label	: 6.1

	Packing instruction (cargo aircraft)	:	618
	Packing instruction (passenger aircraft)	:	611
	Packing instruction (passenger aircraft)	:	Y611
IMDG	Substance No.	:	UN 2321
	Description of the goods	:	Trichlorobenzenes, liquid
	Class	:	6.1
	Packaging group	:	III
	Hazard Label	:	6.1
	EmS Number	:	F-A
	Marine pollutant	:	yes

SECTION 15. REGULATORY INFORMATION

Inventories

EU. EINECS	:	On or in compliance with the inventory
US. Toxic Substances Control Act	:	On TSCA Inventory
Australia. Industrial Chemical (Notification and Assessment) Act	:	On or in compliance with the inventory
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL). (Can. Gaz. Part II, Vol. 133)	:	All components of this product are on the Canadian DSL list.
Japan. Kashin-Hou Law List	:	On or in compliance with the inventory
Korea. Toxic Chemical Control Law (TCCL) List	:	On or in compliance with the inventory
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	:	On or in compliance with the inventory
China. Inventory of Existing Chemical Substances	:	On or in compliance with the inventory
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New	:	On or in compliance with the inventory

Zealand

National regulatory information

SARA 313 Components	:	1,2,4-Trichlorobenzene	120-82-1
CERCLA Reportable Quantity	:	100 lbs	
California Prop. 65	:	This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.	
Massachusetts RTK	:	1,2,3-Trichlorobenzene	87-61-6
	:	1,2,4-Trichlorobenzene	120-82-1
New Jersey RTK	:	1,2,4-Trichlorobenzene	120-82-1
	:	1,3,5-Trichlorobenzene	108-70-3
	:	1,2,3-Trichlorobenzene	87-61-6
Pennsylvania RTK	:	1,2,4-Trichlorobenzene	120-82-1
	:	1,3,5-Trichlorobenzene	108-70-3
	:	1,2,3-Trichlorobenzene	87-61-6
WHMIS Classification	:	D1B D2B	

SECTION 16. OTHER INFORMATION

		HMIS III	**NFPA**
Health Hazard	:	-	2
Flammability	:	-	1
Physical Hazard	:	-	
Instability	:		0

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 87-68-3
Date: 03/09/2001

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: HEXACHLORO-1,3-BUTADIENE SYNONYMS: Hexachlorobutadiene, perchlorobutadiene

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	**Formula**	**CAS #**	**Concentration**	**ACGIH TLV**	**OSHA PEL**	**MAC**	**Other STEL**
HEXACHLORO-1,3-BUTADIENE	C4CL6	87-68-3	99+%	.02	NE	.02	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Poisonous, flammable liquid and vapor.
May be fatal by inhalation.
May irritate eyes, nose, throat and respiratory tract.
May cause kidney and central nervous system damage.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Skin , Ingestion

ACUTE EFFECTS: Extremely destructive of the tissue of the mucous membranes and upper respiratory tract. Skin and eye irritation may occur. Can be absorbed through the skin. Inhalation of vapors may cause pulmonary edema, circulatory collapse, damage to upper respiratory tract, coughing, difficulty breathing and choking. Symptoms include burning sensation, coughing, wheezing, shortness of breath, headache, nausea, and vomiting.

CHRONIC EFFECTS: Bronchitis. Cardiac disease , Hepatitis .

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No

IARC MONOGRAPHS - No
OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Do not allow victim to rub or keep eyes tightly shut.

SKIN CONTACT: Immediately flush with copious amounts of water for at least 15 minutes while removing contaminated clothing.

INGESTION: Never give anything by mouth to an unconscious person. Have conscious and alert person drink 1 to 2 glasses of water. Induce vomiting after victim drinks water. Contact a poison control center.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: N/Av

AUTOIGNITION TEMPERATURE: 610 deg.C

FLAMMABLE LIMITS: N/Av

LOWER: N/Av
UPPER: N/Av

EXTINGUISHING MEDIA: Dry chemical, carbon dioxide, or alcohol foam.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Keep fire exposed cylinders cool with water spray.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide and hydrogen chloride may be given off.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Cylinder rupture may occur under fire conditions. Emits toxic fumes under fire conditions.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Remove leaking cylinder to exhaust hood or safe outdoor area. Remove sources of ignition and combustibles. Absorb with sand or vermiculite and place in closed containers for disposal.

SPECIALIZED EQUIPMENT: Use non-sparking tools.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders. Use only in a well-ventilated area.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Goggles. A safety shower and eyewash station should be readily available.

SKIN PROTECTION: Impervious gloves, coveralls, boots, and/or other resistant protective clothing.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Mild turpentine

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @ 0 deg.C:.05 mm Hg

VAPOR DENSITY (AIR=1): 8.99

BOILING POINT (C): 215

SOLUBILITY IN WATER: Insoluble

SPECIFIC GRAVITY (H2O=1): @20 deg.C: 1.682

EVAPORATION RATE: N/Av

ODOR THRESHOLD: 1 ppm

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: Strong oxidizers.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide and hydrogen chloride.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): NONE ESTABLISHED

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Hexachlorobutadiene
HAZARD CLASS: 6.1, Packing Group III
INDENTIFICATION NUMBER: UN2279
REPORTABLE QUANTITIES: 1 lb.
LABELING: KEEP AWAY FROM FOOD

ADR / RID (EU Only): Class 6.1, 15(c)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 201-765-5

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: N/Av

S: N/Av

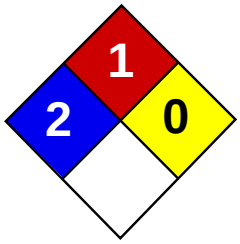
16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

ScienceLab.com
Chemicals & Laboratory Equipment



Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
2,4,6-Trichlorophenol MSDS

Section 1: Chemical Product and Company Identification

Product Name: 2,4,6-Trichlorophenol

Catalog Codes: SLT3727

CAS#: 88-06-2

RTECS: SN1575000

TSCA: TSCA 8(b) inventory: 2,4,6-Trichlorophenol

CI#: Not available.

Synonym: Dowcide 2S, Dowicide 2S, OMAL, Phenchlor,;

Chemical Name: Phenol, 2,4,6-trichloro-

Chemical Formula: C6-H3-Cl3-O

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
{2,4,6-}Trichlorophenol	88-06-2	100

Toxicological Data on Ingredients: 2,4,6-Trichlorophenol: ORAL (LD50): Acute: 820 mg/kg [Rat]. 1000 mg/kg [Guinea pig].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified 2 (Some evidence.) by NTP. IARC: IARC Agent Not Assigned an Overall Evaluation; IARC Evidence of Carcinogenicity in Animal is L (Limited data). MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, the nervous system, liver, bone marrow. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: CLOSED CUP: 99°C (210.2°F).

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2), halogenated compounds.

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance:
Solid. (Crystalline solid. Crystalline granules solid.)

Odor: Phenolic (Strong.)

Taste: Not available.

Molecular Weight: Not available.

Color: Off-white. Beige. (Light.)

pH (1% soln/water): Not available.

Boiling Point: 246°C (474.8°F) @ 760 mmHg

Melting Point: 69°C (156.2°F)

Critical Temperature: Not available.

Specific Gravity: 1.4901 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.7

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether, acetone.

Solubility:
Easily soluble in methanol, diethyl ether, acetone. Partially soluble in hot water. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not available.

Special Remarks on Reactivity: Incompatible with oxidizing materials, acid chlorides, acid anhydrides

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 820 mg/kg [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2 (Some evidence.) by NTP; IARC: IARC Agent Not Assigned an Overall Evaluation; IARC Evidence of Carcinogenicity in Animal is L (Limited data). MUTAGENIC EFFECTS : Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: blood, the nervous system, liver, bone marrow.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects. May cause cancer. May affect genetic material (mutagenic).

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes moderate skin irritation. Eyes: Causes severe eye irritation. May casue chemial conjunctivitis and corneal injury, and iritis. Inhalation: Causes respiratory tract (nose, throat, lungs), and mucous membrane irritation. Symptoms may include coughing, wheezing, and/or shortness of breath. Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation with nausea, vomiting, diarrhea. May affect behavior/central nervous system/nervous system (tremor, convulsions, restlessness, shaking, weakness), and respiration (dyspnea, increased rate of respiration). Chronic Potential Health Effects: Skin: Prolonged skin contact may cause mild to moderate chemical burns of the skin. Ingestion: Prolonged or repeated ingestion may affect the liver, blood (leukocytosis, monocytosis), bone marrow (hyperplasia of bone marrow), urinary system (bladder), and behavior/central nervou system/nervous system(symptoms similar to that of acute ingestion) Inhalation: Prolonged or repeated exposure may cause bronchitis to develop with cough, phlegm, and/or shortness of breath.

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 0.7 ppm 24 hours [Fish (Blue Gill)]. 0.3 ppm 96 hours [Fish (Blue Gill)]. 10 ppm 24 hours [Fish (Goldfish)]. 9.2ppm any hours [Fish (Flathead Minnow)]. 4.5 ppm any hours [Fish (Flathead Minnow)]. 2.8 mg/l 96 hours [Fish (Flathead Minnow)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the product itself.

Special Remarks on the Products of Biodegradation:

Terrestial Fate: It is expected to dissociate somewhat in moist soil. It is expected to have low mobility in soil. Volatilization is expected to be slow from moist soil surfaces. It is not expected to volitalize from dry soil surfaces given its vapor pressure of 0.008 mm Hg at 25 deg. C. This compound is expected to biodegrade in soils with aerobic and anaerobic biodegradation half-lives of about 5 and 20 days, respectively. Aquatic Fate: It is expected to dissociate somewhat to 2,4,6-trichlorophenolate in water. It is expected to volatilize from water surfaces. Estimated volatilization half-lives for a model river and model lake are 20 and 150 days, respectively. It is expected to under photolysis in surface waters based on an aqueous photodegradation half-life of 2.1hours when irradiated with light at environmentally relevant wavelengths. The potential for bioconcentratoin in aquatic organisms is considered high based upon BCF valued of 250-310 measured in fish. It is expected to biodegrade in water based on a biodegradation half-life 6.3 days determined from a river die-away test. Atmospheric Fate: It is expected to exist solely as a vapor in the ambient atmosphere. Vapor-phase 2,4,6-trichlorophenol is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals. The half-life for this reaction in air is estimated to be about 26 days. 2,4,6-trichlorophenol exhibits a UV maximum absorbance at 311 nm; therefore, degradation by natural sunlight is possible.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: 2,4,6-Trichlorophenol California prop. 65 (no significant risk level): 2,4,6-Trichlorophenol: 0.01 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: 2,4,6-Trichlorophenol Connecticut hazardous material survey.: 2,4,6-Trichlorophenol Illinois toxic substances disclosure to employee act: 2,4,6-Trichlorophenol Illinois chemical safety act: 2,4,6-Trichlorophenol New York release reporting list: 2,4,6-Trichlorophenol Rhode Island RTK hazardous substances: 2,4,6-Trichlorophenol

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R22- Harmful if swallowed. R36/38- Irritating to eyes and skin. R40- Limited evidence of a carcinogenic effect. R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S36/37- Wear suitable protective clothing and gloves. S60- This material and its container must be disposed of as hazardous waste. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 12:08 AM

Last Updated: 11/01/2010 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Material Safety Data Sheet
2-Nitroaniline, 98%

ACC# 71554

Section 1 - Chemical Product and Company Identification

MSDS Name: 2-Nitroaniline, 98%
Catalog Numbers: AC128350000, AC128350050, AC128351000, AC128355000
Synonyms: 1-amino-2-nitrobenzene; CI 37025; Azoic Diazo Component 6; Fast Orange O Base; O-nitraniline; Orange Base CIBA II; o-Nitroaniline
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
88-74-4	2-Nitroaniline	98	201-855-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: yellow orange crystals.
Caution! Causes eye and skin irritation. May be harmful if swallowed, inhaled, or absorbed through the skin. Causes digestive and respiratory tract irritation. May cause eye and skin irritation. May cause respiratory and digestive tract irritation. May cause methemoglobinemia.
Target Organs: Blood, liver, blood forming organs.

Potential Health Effects

Eye: May cause eye irritation.
Skin: May cause skin irritation. If absorbed, causes symptoms similar to those of ingestion. Substance is readily absorbed through the skin.
Ingestion: May cause irritation of the digestive tract. May cause methemoglobinemia, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), convulsions, and death. May be harmful if swallowed.
Inhalation: May cause respiratory tract irritation. May cause methemoglobinemia, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), convulsions, tachycardia, dyspnea (labored breathing), and death. The toxicological properties of this substance have not been fully investigated.
Chronic: Chronic ingestion may cause liver damage. May cause methemoglobinemia, which is characterized by chocolate-brown colored blood, headache, weakness, dizziness, breath shortness, cyanosis (bluish skin due to deficient oxygenation of blood), rapid heart rate, unconsciousness and possible death.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician: Effects may be delayed. Treat symptomatically and supportively. For methemoglobinemia, administer oxygen alone or with Methylene Blue depending on the methemoglobin concentration in the blood.
Antidote: Methylene blue, alone or in combination with oxygen is indicated as a treatment in nitrite induced methemoglobinemia.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. May polymerize explosively when involved in a fire. May decompose explosively when heated or involved in a fire. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Combustible material; may burn but does not ignite readily.
Extinguishing Media: Cool containers with flooding quantities of water until well after fire is out. Use water spray, dry chemical, carbon dioxide, or alcohol-resistant foam.
Flash Point: 168 deg C (334.40 deg F)
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation. Use only in a chemical fume hood.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Poison room locked. Keep containers tightly closed.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
2-Nitroaniline	none listed	none listed	none listed

OSHA Vacated PELs: 2-Nitroaniline: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Crystals
Appearance: yellow orange
Odor: None reported.
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: 4.76
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 284 deg C
Freezing / Melting Point:71.0 - 73.0 deg C
Decomposition Temperature:280 deg C
Solubility: 1.1 g/l (20 c)
Specific Gravity / Density: Not available.
Molecular Formula:C6H6N2O2
Molecular Weight:138.13

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. May explode when heated.
Conditions to Avoid: High temperatures, incompatible materials, dust generation.
Incompatibilities with Other Materials: Acids, nitric acid, sulfuric acid, acetylene, chloroformates, acid chlorides.
Hazardous Decomposition Products: Nitrogen oxides, carbon monoxide, carbon dioxide, nitrogen gas.
Hazardous Polymerization: Has not been reported

Section 11 - Toxicological Information

RTECS#:
CAS# 88-74-4: BY6650000
LD50/LC50:
CAS# 88-74-4:
Inhalation, rat: LC50 = >2529 mg/m3/4H;
Oral, mouse: LD50 = 1070 mg/kg;
Oral, rat: LD50 = 1600 mg/kg;
.

Carcinogenicity:
CAS# 88-74-4: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	NITROANILINES	O NITROANILINE
Hazard Class:	6.1	6.1
UN Number:	UN1661	UN1661
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 88-74-4 is listed on the TSCA inventory.
Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 88-74-4: immediate, delayed, reactive.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 88-74-4 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T

Risk Phrases:

R 23/24/25 Toxic by inhalation, in contact with skin and if swallowed.
R 33 Danger of cumulative effects.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 36/37 Wear suitable protective clothing and gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 28B After contact with skin, wash immediately with plenty of water and soap.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 88-74-4: 2

Canada - DSL/NDSL

CAS# 88-74-4 is listed on Canada's DSL List.

Canada - WHMIS

not available

not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 88-74-4 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/11/1998
Revision #5 Date: 9/26/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

MSDS Number: **N5980** * * * * * *Effective Date:* ***11/17/99*** * * * * * *Supercedes:* ***12/08/96***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

2-NITROPHENOL

1. Product Identification

Synonyms: o-Nitrophenol; 2-hydroxynitrobenzene
CAS No.: 88-75-5
Molecular Weight: 139.11
Chemical Formula: C6H5NO3
Product Codes: Product Codes: 2607

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Phenol, 2-nitro-	88-75-5	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. ABSORPTION INTO THE BODY LEADS TO FORMATION OF METHEMOGLOBIN.

Potential Health Effects

Information on the human health effects from exposure to this substance is limited.

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. Can be a route of absorption by the body with symptoms like ingestion.

Ingestion:
Toxic. Harmful if swallowed. Can cause formation of methemoglobin, resulting in cyanosis (blue lips), headaches, dizziness and collapse. Exposure to high concentrations may cause breathing trouble, a slow pulse, fall in blood pressure, convulsions and even death.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
Chronic exposure may damage the liver and kidneys.
Aggravation of Pre-existing Conditions:
No information found.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.
Explosion:
Not considered to be an explosion hazard. Sealed containers may rupture when heated.
Fire Extinguishing Media:
Dry chemical, alcohol foam or carbon dioxide. Do not allow water runoff to enter sewers or waterways.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the dust or mist is apparent, a half-face dust/mist respirator may be worn. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Light yellow crystals.
Odor:
Aromatic odor.
Solubility:
Soluble in water.
Specific Gravity:
1.49
pH:
No information found.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
214 - 216C (417 - 421F)
Melting Point:
44 - 45C (111 - 113F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
1 @ 49.3C (120F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Burning may produce carbon monoxide, carbon dioxide, nitrogen oxides.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Halogen acids and strong oxidizing agents. In liquid/molten state, reacts violently with potassium hydroxide.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Oral rat LD50: 334 mg/Kg; Skin rabbit LD50: > 7940 mg/Kg.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Phenol, 2-nitro- (88-75-5)	No	No	None

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be moderately degraded by photolysis.
Environmental Toxicity:
No information found.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: NITROPHENOLS
Hazard Class: 6.1
UN/NA: UN1663
Packing Group: III

Information reported for product/size: 1KG

International (Water, I.M.O.)

Proper Shipping Name: NITROPHENOLS
Hazard Class: 6.1
UN/NA: UN1663
Packing Group: III
Information reported for product/size: 1KG

---

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
Phenol, 2-nitro- (88-75-5)                     Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                       --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
Phenol, 2-nitro- (88-75-5)                     Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                          -SARA 302-    ------SARA 313------
Ingredient                                RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Phenol, 2-nitro- (88-75-5)                No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                  -RCRA-    -TSCA-
Ingredient                                CERCLA     261.33     8(d)
----------------------------------------  ------     ------    ------
Phenol, 2-nitro- (88-75-5)                100        No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Solid)
```

Australian Hazchem Code: 2X
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. ABSORPTION INTO THE BODY LEADS TO FORMATION OF METHEMOGLOBIN.
Label Precautions:

Avoid breathing dust.
Avoid contact with eyes, skin and clothing.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No changes.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **N0090** * * * * * *Effective Date:* ***08/10/04*** * * * * * *Supercedes:* ***11/02/01***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

NAPHTHALENE

1. Product Identification

Synonyms: Naphthene; mothballs; tar camphor; naphthaliin; white-tar
CAS No.: 91-20-3
Molecular Weight: 128.16
Chemical Formula: C10H8
Product Codes:
J.T. Baker: 2718
Mallinckrodt: 6348

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Naphthalene	91-20-3	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY CAUSE ALLERGIC SKIN REACTION. MAY AFFECT LIVER, KIDNEY, BLOOD AND CENTRAL NERVOUS SYSTEM. COMBUSTIBLE.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 2 - Moderate
Reactivity Rating: 0 - None
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of dust or vapors can cause headache, nausea, vomiting, extensive sweating, and disorientation. The predominant reaction is delayed intravascular hemolysis with symptoms of anemia, fever, jaundice, and kidney or liver damage.
Ingestion:
Toxic. Can cause headache, profuse perspiration, listlessness, dark urine, nausea, vomiting and disorientation. Intravascular hemolysis may also occur with symptoms similar to those noted for inhalation. Severe cases may produce coma with or without convulsions. Death may result from renal failure.
Skin Contact:
Can irritate the skin and, on prolonged contact, may cause rashes and allergy. "Sensitized" individuals may suffer a severe dermatitis.
Eye Contact:
Vapors and solid causes irritation, redness and pain. Very high exposures can damage the nerves of the eye.
Chronic Exposure:
Has led to cataract formation in eyes. May cause skin allergy.
Aggravation of Pre-existing Conditions:

Persons with pre-existing skin, blood or vascular disorders or impaired respiratory function may be more susceptible to the effects of the substance. Particularly susceptible individuals are found in the general population, most commonly in dark skinned races.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Wash skin with soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: 87C (189F) CC
Autoignition temperature: 526C (979F)
Combustible. May be ignited by heat, sparks or flame. May burn rapidly with flare-burning effect. Fire may produce irritating or poisonous gases.
Explosion:
Explosive limits, volume % in air: lel: 0.9; uel: 5.9. Above flashpoint, vapor-air mixtures are explosive within flammable limits noted above. Closed containers exposed to heat may explode. Contact with strong oxidizers may cause fire or explosion.
Fire Extinguishing Media:
Dry chemical, foam, water or carbon dioxide. Foam or direct water spray on molten naphthalene may cause extensive foaming. Molten napthalene spatters in contact with water; apply water from as far a distance as possible.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Vapors can flow along surfaces to distant ignition source and flash back.

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Keep away from moisture and oxidizers. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
10 ppm, 50 mg/m3.

- ACGIH Threshold Limit Value (TLV):
TWA= 10 ppm, 52 mg/m3
STEL= 15 ppm, 79 mg/m3.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face respirator with an organic vapor cartridge and particulate filter (NIOSH type P95 or R95 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an organic vapor cartridge and particulate filter (NIOSH P100 or R100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. Please note that N series filters are not recommended for this material. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
White crystals.
Odor:
Strong coal tar odor (moth balls).
Solubility:
Insoluble in water.
Specific Gravity:
1.2
pH:
No information found.
% Volatiles by volume @ 21C (70F):
No information found.
Boiling Point:
218C (424F)
Melting Point:
80C (176F)
Vapor Density (Air=1):
4.4
Vapor Pressure (mm Hg):
1 @ 53C (127F)
Evaporation Rate (BuAc=1):
< 1

10. Stability and Reactivity

Stability:
Stable at room temperature in sealed containers. Sublimes appreciably at temperatures above melting point.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizers, strong alkalis and strong mineral acids, mixtures of aluminum trichloride and benzoyl chloride. Reacts violently with chromic anhydride. Melted naphthalene will attack some forms of plastics, rubber, and coatings.
Conditions to Avoid:
Avoid heat, sparks, flames and other ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 490 mg/kg;
Inhalation rat LC50: 340 mg/m3, 1 hour;
Skin rabbit LD50: > 20 g/kg;
Irritation data: skin (open Draize) rabbit 495 mg, mild; eye (standard Draize) rabbit 100 mg, mild;
Investigated as a tumorigen, mutagen and reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Naphthalene (91-20-3)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. When released into water, this material may biodegrade to a moderate extent. When released into the water, this material is expected to have a half-life between 1 and 10 days. This material may bioaccumulate to some extent. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: NAPHTHALENE, REFINED
Hazard Class: 4.1
UN/NA: UN1334
Packing Group: III
Information reported for product/size: 1KG

International (Water, I.M.O.)

Proper Shipping Name: NAPHTHALENE, REFINED
Hazard Class: 4.1
UN/NA: UN1334
Packing Group: III
Information reported for product/size: 1KG

International (Air, I.C.A.O.)

Proper Shipping Name: NAPHTHALENE, REFINED
Hazard Class: 4.1
UN/NA: UN1334
Packing Group: III
Information reported for product/size: 1KG

---

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
Naphthalene (91-20-3)                          Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                      --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
Naphthalene (91-20-3)                          Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                      -SARA 302-    ------SARA 313------
Ingredient                            RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Naphthalene (91-20-3)                 No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                -RCRA-    -TSCA-
Ingredient                            CERCLA    261.33     8(d)
----------------------------------------  ------    ------    ------
Naphthalene (91-20-3)                 100       U165       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Solid)
```

Australian Hazchem Code: 2Z
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **2** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY CAUSE

ALLERGIC SKIN REACTION. MAY AFFECT LIVER, KIDNEY, BLOOD AND CENTRAL NERVOUS SYSTEM. COMBUSTIBLE.

Label Precautions:

Avoid contact with eyes, skin and clothing.
Avoid prolonged or repeated contact with skin.
Avoid breathing dust.
Avoid breathing vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat, sparks and flame.

Label First Aid:

In all cases call a physician. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

SIGMA-ALDRICH

sigma-aldrich.com

Material Safety Data Sheet

Version 4.0
Revision Date 08/05/2010
Print Date 10/18/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	3,3′-Dichlorobenzidine
Product Number	:	48525
Brand	:	Supelco
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+18003255832
Fax	:	+18003255052
Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Carcinogen, Target Organ Effect, Harmful by skin absorption., Skin sensitiser

Target Organs

Bladder, Liver

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H312	Harmful in contact with skin.
H317	May cause an allergic skin reaction.
H350	May cause cancer.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P501	Dispose of contents/ container to an approved waste disposal plant.

HMIS Classification

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical hazards:	0

NFPA Rating

Health hazard:	2
Fire:	0
Reactivity Hazard:	0

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.

Skin	May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	May be harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : $C_{12}H_{10}Cl_2N_2$
Molecular Weight : 253.13 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
3,3'-Dichlorobenzidine			
91-94-1	202-109-0	612-068-00-4	-

4. FIRST AID MEASURES

General advice
Move out of dangerous area.Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	solid

Safety data

pH	no data available
Melting point	no data available
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Water solubility	no data available

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
no data available

Materials to avoid
Strong oxidizing agents

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, nitrogen oxides (NOx), Hydrogen chloride gas

11. TOXICOLOGICAL INFORMATION

Acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
May cause sensitization by skin contact.

Germ cell mutagenicity
May alter genetic material.

Carcinogenicity

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC:	2B - Group 2B: Possibly carcinogenic to humans (3,3'-Dichlorobenzidine)
NTP:	Reasonably anticipated to be a human carcinogenThe reference note has been added by TD based on the background information of the NTP. (3,3'-Dichlorobenzidine)

Reproductive toxicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May cause skin irritation.
Eyes	May cause eye irritation.

Additional Information
RTECS: DD0525000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to daphnia and other aquatic invertebrates.	mortality EC50 - Daphnia magna (Water flea) - 1.05 mg/l - 48 h

Persistence and degradability
According to the results of tests of biodegradability this product is not readily biodegradable.

Bioaccumulative potential

Bioaccumulation	Leuciscus idus (Golden orfe) - 3 d Bioconcentration factor (BCF): 610

Mobility in soil

no data available

PBT and vPvB assessment
no data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life with long lasting effects.

13. DISPOSAL CONSIDERATIONS

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (3,3'-Dichlorobenzidine)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (3,3'-Dichlorobenzidine)
Marine pollutant: No

IATA
UN-Number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (3,3'-Dichlorobenzidine)

15. REGULATORY INFORMATION

OSHA Hazards
Carcinogen, Target Organ Effect, Harmful by skin absorption., Skin sensitiser

DSL Status
This product contains the following components listed on the Canadian NDSL list. All other components are on the Canadian DSL list.

	CAS-No.
3,3'-Dichlorobenzidine	91-94-1

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

	CAS-No.	Revision Date
3,3'-Dichlorobenzidine	91-94-1	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
3,3'-Dichlorobenzidine	91-94-1	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date

3,3'-Dichlorobenzidine	91-94-1	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
3,3'-Dichlorobenzidine	91-94-1	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
3,3'-Dichlorobenzidine	91-94-1	2007-09-28

16. OTHER INFORMATION

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

MSDS Number: **B2347** * * * * * *Effective Date:* ***11/17/99*** * * * * * *Supercedes:* ***12/08/96***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MBI

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

BIPHENYL

1. Product Identification

Synonyms: Diphenol; 1,1'biphenyl; phenylbenzene
CAS No.: 92-52-4
Molecular Weight: 154.21
Chemical Formula: C12H10

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Biphenyl	92-52-4	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY AFFECT LIVER, CENTRAL AND PERIPHERAL NERVOUS SYSTEMS. MAY CAUSE ALLERGIC SKIN REACTION.

Potential Health Effects

Inhalation:
Inhalation of dust or vapors can irritate the mucous membranes and respiratory tract. Other symptoms may parallel those from ingestion exposure.
Ingestion:
Exerts toxic effects on the central nervous system and liver. Symptoms may include headache, diffuse gastro-intestinal pain, nausea, numbness, body aches, and general fatigue.
Skin Contact:
May cause irritation. May be absorbed through the skin with symptoms paralleling those from ingestion exposure. May cause allergic reaction in sensitive individuals.
Eye Contact:
Vapors and dust cause eye irritation.
Chronic Exposure:
Chronic exposure may cause peripheral nerve damage and liver injury.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: 113C (235F) CC
Autoignition temperature: 540C (1004F)
Flammable limits in air % by volume:
lel: 0.6; uel: 5.8
Explosion:
Above the flash point, explosive vapor-air mixtures may be formed. Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Water or foam may cause frothing.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
0.2 ppm (TWA).
-ACGIH Threshold Limit Value (TLV):
0.2 ppm (TWA)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face respirator with an organic vapor cartridge and particulate filter (NIOSH type N95 or better filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an organic vapor cartridge and particulate filter (NIOSH N 100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P particulate filter. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
White crystals.
Odor:
Pleasant, peculiar odor.
Solubility:
Insoluble in water.
Specific Gravity:
1.041
pH:
No information found.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:

254 - 255C (489 - 491F)
Melting Point:
69 - 70C (156 - 158F)
Vapor Density (Air=1):
5.31
Vapor Pressure (mm Hg):
0.005 @ 20.4C (68F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizers.
Conditions to Avoid:
Heat, flame, ignition sources, dusting and incompatibles.

11. Toxicological Information

Toxicological Data:
Oral rat LD50 2400 mg/kg; Skin rabbit LD50: > 5010 mg/kg; Irritation (std Draize) rabbit: eye = 100 mg, mild. Investigated as a tumorigen and mutagen.
Carcinogenicity:
EPA / IRIS classification: Group D1 - Not classifiable as a human carcinogen.

```
--------\Cancer Lists\----------------------------------------------------
                                  ---NTP Carcinogen---
Ingredient                        Known    Anticipated    IARC Category
-----------------------------------   -----    -----------    -------------
Biphenyl (92-52-4)                 No          No             None
```

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

International (Water, I.M.O.)

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S. (DIPHENYL)
Hazard Class: 9
UN/NA: UN3077
Packing Group: III
Information reported for product/size: 1KG

International (Air, I.C.A.O.)

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S. (DIPHENYL)
Hazard Class: 9
UN/NA: UN3077
Packing Group: III
Information reported for product/size: 1KG

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\--------------------------------
Ingredient                                  TSCA  EC   Japan  Australia
---------------------------------------------  ----  ---  -----  ---------
Biphenyl (92-52-4)                           Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\--------------------------------
                                                       --Canada--
Ingredient                                  Korea  DSL   NDSL  Phil.
---------------------------------------------  -----  ---   ----  -----
Biphenyl (92-52-4)                           Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Biphenyl (92-52-4)                      No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                    -RCRA-    -TSCA-
Ingredient                              CERCLA      261.33     8(d)
----------------------------------------  ------      ------    ------
Biphenyl (92-52-4)                      100         No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Solid)
```

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY AFFECT LIVER, CENTRAL AND PERIPHERAL NERVOUS SYSTEMS. MAY CAUSE ALLERGIC SKIN REACTION.
Label Precautions:
Avoid contact with eyes, skin and clothing.
Avoid breathing dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 8.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **X2200** * * * * * *Effective Date:* ***09/15/09*** * * * * * *Supercedes:* ***07/03/07***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

O-XYLENE

1. Product Identification

Synonyms: o-Dimethyl benzene; 1,2 dimethyl benzene; 1,2 xylene; o-xylol
CAS No.: 95-47-6
Molecular Weight: 106.18
Chemical Formula: C6H4(CH3)2
Product Codes: X518

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
o-Xylene	95-47-6	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT. CHRONIC EXPOSURE CAN CAUSE ADVERSE LIVER, KIDNEY, AND BLOOD EFFECTS. FLAMMABLE LIQUID AND VAPOR.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 2 - Moderate
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors may be irritating to the nose and throat. Inhalation of high concentrations may result in nausea, vomiting, headache, ringing in the ears, and severe breathing difficulties which may be delayed in onset. Substernal pain, cough, and hoarseness are also reported. High vapor concentrations are anesthetic and central nervous system depressants.

Ingestion:
Ingestion causes burning sensation in mouth and stomach, nausea, vomiting and salivation. Minute amounts aspirated into the lungs can produce a severe hemorrhagic pneumonitis with severe pulmonary injury or death.

Skin Contact:
Skin contact results in loss of natural oils and often results in a characteristic dermatitis. May be absorbed through the skin.

Eye Contact:
Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.

Chronic Exposure:
Chronic inhalation can cause headache, loss of appetite, nervousness and pale skin. Repeated or prolonged skin contact may cause a skin rash. Repeated exposure of the eyes to high concentrations of vapor may cause reversible eye damage. Repeated exposure can damage bone marrow, causing low blood cell count. May damage the liver and kidneys.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney, blood, or respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately. If vomiting occurs, keep head below hips to prevent aspiration into lungs.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: 32C (90F) CC
Autoignition temperature: ca. 463C (ca. 865F)
Flammable limits in air % by volume:
lel: 1.0; uel: 7.0
Flammable.

Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Vapors can flow along surfaces to distant ignition source and flash back.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do Not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limits (Xylene)
100 ppm (TWA)
-ACGIH Threshold Limit Value (TLV):
100 ppm (TWA), 150 ppm (STEL)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details. Use explosion-proof equipment.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Characteristic odor.
Solubility:
Insoluble in water.
Specific Gravity:
0.88 @ 20C / 4 C
pH:
Not applicable.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
144C (291F)
Melting Point:
-25C (-13F)
Vapor Density (Air=1):
3.7
Vapor Pressure (mm Hg):
7 @ 20C (68F)
Evaporation Rate (BuAc=1):
1

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Involvement in a fire causes formation of carbon monoxide and unidentified organic components.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizing agents and strong acids.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Toxicological Data:
O-Xylene:investigated as a reproductive effector.

Mixed Xylenes: Oral rat LD50: 4300 mg/kg; Inhalation rat LC50: 5000 ppm/4H; Skin Rabbit LD50: > 1700 mg/kg; Irritation, skin rabbit: 500 mg/24-hour, moderate (Standard Draize); Irritation, eye rabbit 87 mg, mild (Standard Draize). Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
May cause teratogenic effects.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
o-Xylene (95-47-6)	No	No	3

---

12. Ecological Information

Environmental Fate:
Following data for xylene: When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate

extent. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly bioaccumulate. (mixed xylenes: octanol / water partition coefficient 3.1 - 3.2; bioconcentration factor = 1.3, eels)

Environmental Toxicity:

For xylene: This material is expected to be slightly toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: XYLENES
Hazard Class: 3
UN/NA: UN1307
Packing Group: III
Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: XYLENES
Hazard Class: 3
UN/NA: UN1307
Packing Group: III
Information reported for product/size: 4L

International (Air, I.C.A.O.)

Proper Shipping Name: XYLENES
Hazard Class: 3
UN/NA: UN1307
Packing Group: III
Information reported for product/size: 4L

---

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
----------------------------------------------  ----  ---  -----  ---------
o-Xylene (95-47-6)                             Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                       --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
----------------------------------------------  -----  ---   ----  -----
o-Xylene (95-47-6)                             Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                        -SARA 302-    ------SARA 313------
Ingredient                              RQ    TPQ     List  Chemical Catg.
--------------------------------------  ---   -----   ----  --------------
o-Xylene (95-47-6)                      No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                -RCRA-    -TSCA-
Ingredient                              CERCLA     261.33     8(d)
--------------------------------------  ------     ------    ------
o-Xylene (95-47-6)                      1000       No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: 3[Y]
Poison Schedule: S6
WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **0**

Label Hazard Warning:

DANGER! HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT. CHRONIC EXPOSURE CAN CAUSE ADVERSE LIVER, KIDNEY, AND BLOOD EFFECTS. FLAMMABLE LIQUID AND VAPOR.

Label Precautions:

Keep away from heat, sparks and flame.
Avoid contact with eyes, skin and clothing.
Keep container closed.
Use only with adequate ventilation.
Avoid breathing vapor.
Wash thoroughly after handling.

Label First Aid:

Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet
o-Cresol

ACC# 95809

Section 1 - Chemical Product and Company Identification

MSDS Name: o-Cresol
Catalog Numbers: AC110550010, AC110550050, AC110555000, AC110560010, C536-250, C536-500, NC9231111
Synonyms: 2-Methylphenol; 2-Hydroxytoluene; 2-Cresol; o-Cresylic acid.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
95-48-7	o-Cresol	>99	202-423-8

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: white to pale yellow solid. Flash Point: 81 deg C.
Danger! Causes eye and skin burns. Causes digestive and respiratory tract burns. May be fatal if inhaled. Harmful if absorbed through the skin. Harmful if swallowed. May cause allergic skin reaction. May cause liver and kidney damage. Material is a solid at room temperature that melts upon moderate heating into a combustible liquid with a flash point below 200°F(93.3°C). Light sensitive. Hygroscopic (absorbs moisture from the air).
Target Organs: Kidneys, central nervous system, liver.

Potential Health Effects
Eye: May result in corneal injury. Causes eye irritation and burns. May cause conjunctivitis and keratitis.
Skin: May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Causes severe skin irritation and burns. Initial contact may cause prickling and intense burning. Affected tissue may initially show white discoloration, wrinkling, and softening, which subsequently may become gangrenous.
Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Causes gastrointestinal tract burns. May cause vascular collapse and damage. May cause kidney, liver and spleen damage. Rapidly absorbed from the gastrointestinal tract. Cresols may cause abnormalities of the central nervous system, respiratory system, spleen and pancreas.
Inhalation: May be fatal if inhaled. Causes severe irritation of upper respiratory tract with coughing,

burns, breathing difficulty, and possible coma. May cause headache. May cause nausea and possible vomiting. Exposure to vapors or aerosols produced by high temperature processes may cause systemic absorption. If sufficient amounts are absorbed vascular collapse, shock, hypothermia, unconciousness and respiratory failure are possible.
Chronic: May cause liver and kidney damage. Repeated exposure may cause sensitization dermatitis. May cause appetite loss, diarrhea, skin abnormalities, and digestive tract disturbances.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Discard contaminated clothing in a manner which limits further exposure. Destroy contaminated shoes.
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Material is a solid at room temperature that melts upon moderate heating into a combustible liquid with a flash point below 200°F(93.3°C).
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, or water spray. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray.
Flash Point: 81 deg C (177.80 deg F)
Autoignition Temperature: 555 deg C (1,031.00 deg F)
Explosion Limits, Lower:1.4 vol %
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 2; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Provide ventilation. Evacuate unnecessary personnel.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Ground and bond containers when transferring material. Do not get

in eyes, on skin, or on clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Do not ingest or inhale. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Keep away from heat and flame.
Storage: Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. If the water content is below approximately 0.3% and the temperature exceeds 268°F (120°C), violent corrosion of aluminum and its alloys may occur.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
o-Cresol	5 ppm TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	2.3 ppm TWA; 10 mg/m3 TWA 250 ppm IDLH	5 ppm TWA; 22 mg/m3 TWA (listed under Cresol).

OSHA Vacated PELs: o-Cresol: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: white to pale yellow
Odor: Phenolic.
pH: Not available.
Vapor Pressure: .25 mm Hg @ 25 deg C
Vapor Density: 3.72 (air=1)
Evaporation Rate: Not available.
Viscosity: 4.75 cP 35 deg C
Boiling Point: 191 deg C @ 760 mmHg
Freezing/Melting Point:30 - 32 deg C
Decomposition Temperature: Not available.
Solubility: 30.8 g/L @ 40°C
Specific Gravity/Density:1.04g/cm3
Molecular Formula:C7H8O
Molecular Weight:108.14

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. Low melting point solid.
Conditions to Avoid: High temperatures, light, ignition sources, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents, strong acids, bases, active metals, nitric acid, aliphatic amines, chlorosulfonic acid, oleum.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 95-48-7: GO6300000
LD50/LC50:
CAS# 95-48-7:

Draize test, rabbit, eye: 105 mg Severe;
Draize test, rabbit, skin: 524 mg/24H Severe;
Inhalation, mouse: LC50 = 179 mg/m3/2H;
Inhalation, mouse: LC50 = 179 mg/m3;
Inhalation, rat: LC50 = >1220 mg/m3/1H;
Inhalation, rat: LC50 = 29 mg/m3;
Oral, mouse: LD50 = 344 mg/kg;
Oral, mouse: LD50 = 344 mg/kg;
Oral, rabbit: LD50 = 940 mg/kg;
Oral, rat: LD50 = 121 mg/kg;
Oral, rat: LD50 = 1350 mg/kg;
Skin, rabbit: LD50 = 890 mg/kg;
Skin, rabbit: LD50 = 890 mg/kg;
Skin, rat: LD50 = 620

Carcinogenicity:
CAS# 95-48-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Goldfish (soft water) TLm=49.1-19ppm/24-96H Bluegill (soft water) TLm=22.2-20.8ppm/24-96H Fathead minnow (hard water) TLm=18-13.4ppm/24-96H Guppy (hard water) TLm=18-50ppm/24-96H
Environmental: In air, substance will react with photochemically-produced hydroxyl radicals (day) and nitrate radicals (night). In water, substance will biodegrade within days. Substance is mobile in most soils and will biodegrade.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	CRESOLS, SOLID	CRESOLS, SOLID
Hazard Class:	6.1	6.1(8)
UN Number:	UN3455	UN3455
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 95-48-7 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 95-48-7: Effective 10/4/82, Sunset 10/4/92
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 95-48-7: 100 lb final RQ; 45.4 kg final RQ
SARA Section 302 Extremely Hazardous Substances
CAS# 95-48-7: 1000 lb TPQ (lower threshold); 10000 lb TPQ (upper thres hold)
SARA Codes
CAS # 95-48-7: immediate, fire.
Section 313
This material contains o-Cresol (CAS# 95-48-7, >99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 95-48-7 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 95-48-7 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 95-48-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Cresol), Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T C

Risk Phrases:

R 34 Causes burns.
R 24/25 Toxic in contact with skin and if swallowed.

Safety Phrases:

S 36/37/39 Wear suitable protective clothing, gloves and eye/face pr
otection.
S 45 In case of accident or if you feel unwell, seek medical advice
immediately (show the label where possible).

WGK (Water Danger / Protection)

CAS# 95-48-7: 2

Canada - DSL / NDSL

CAS# 95-48-7 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1B, E, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 95-48-7 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/20/2001
Revision #5 Date: 6/07/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet
2-Chlorotoluene

ACC# 90988

Section 1 - Chemical Product and Company Identification

MSDS Name: 2-Chlorotoluene
Catalog Numbers: AC150200000, AC150200010, AC150200025, AC150200050, AC150205000
Synonyms: OCT, 1-Chloro-2-methylbenzene.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
95-49-8	2-Chlorotoluene	98	202-424-3

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: APHA: 15 max liquid. Flash Point: 49 deg C.
Warning! Flammable liquid and vapor. Causes eye irritation. Harmful if inhaled. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. May cause skin and respiratory tract irritation. May cause central nervous system effects.
Target Organs: Kidneys, central nervous system, liver, eyes.

Potential Health Effects

Eye: Causes eye irritation.
Skin: May cause skin irritation. May be harmful if absorbed through the skin.
Ingestion: May cause irritation of the digestive tract. May be harmful if swallowed. May cause central nervous system effects.
Inhalation: Harmful if inhaled. May cause respiratory tract irritation. May cause central nervous system effects.
Chronic: May cause liver and kidney damage.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.

Ingestion: Do not induce vomiting. Get medical aid.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Containers may explode in the heat of a fire. Flammable liquid and vapor.
Extinguishing Media: Use water spray to cool fire-exposed containers. Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: 49 deg C (120.20 deg F)
Autoignition Temperature: > 600 deg C (> 1,112.00 deg F)
Explosion Limits, Lower:1.0 vol %
Upper: 12.6 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 2; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Remove all sources of ignition. Use a spark-proof tool. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Use spark-proof tools and explosion proof equipment. Do not get in eyes, on skin, or on clothing. Take precautionary measures against static discharges. Keep away from heat, sparks and flame. Do not ingest or inhale. Use only in a chemical fume hood.
Storage: Keep away from sources of ignition. Store in a cool, dry place. Store in a tightly closed container. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
2-Chlorotoluene	50 ppm TWA	50 ppm TWA; 250 mg/m3 TWA	none listed

OSHA Vacated PELs: 2-Chlorotoluene: 50 ppm TWA; 250 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless - APHA: 15 max
Odor: none reported
pH: Not available.
Vapor Pressure: 3.5 mbar @ 20 deg C
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 157 - 159 deg C @ 760 mmHg
Freezing/Melting Point:-36 deg C
Decomposition Temperature: Not available.
Solubility: Slightly soluble.
Specific Gravity/Density:1.080
Molecular Formula:C7H7Cl
Molecular Weight:126.59

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, ignition sources, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Hydrogen chloride, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 95-49-8: XS9000000
LD50/LC50:
CAS# 95-49-8:
Draize test, rabbit, eye: 50 uL Moderate;
Oral, mouse: LD50 = 2500 mg/kg;
Oral, rat: LD50 = 3900 mg/kg;
.
Oral, Rat:LD50 = 3900
Carcinogenicity:
CAS# 95-49-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found.
Teratogenicity: No information found.
Reproductive Effects: No information found.
Mutagenicity: No information found.
Neurotoxicity: No information found.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. BCF values from 20-112, measured in carp, indicate that 2-chlorotoluene may moderately bioconcentrate in acquatic organisms according to a recommended classification scheme.
Environmental: Estimated half-lives for a model river and a model lake are 4 hours and 5 days.
Physical: 2-chlorotoluene is inert to chemical hydrolysis under environmental conditions.
Other: Do not empty into drains.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	CHLOROTOLUENES	CHLOROTOLUENES
Hazard Class:	3	3
UN Number:	UN2238	UN2238
Packing Group:	III	III
Additional Info:		FLASHPOINT 49 C

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 95-49-8 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 95-49-8: Effective 4/29/83, Sunset 4/29/93
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 95-49-8: immediate, fire.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 95-49-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN N

Risk Phrases:

R 20 Harmful by inhalation.
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 24/25 Avoid contact with skin and eyes.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 95-49-8: 2

Canada - DSL/NDSL

CAS# 95-49-8 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B3, D1B, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 95-49-8 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 11/04/1998
Revision #5 Date: 6/24/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 95-50-1
Date: 03/09/2001

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: 1,2-DICHLOROBENZENE

SYNONYMS: Orthodichlorobenzene, o-Dichlorobenzene
Dizene, o-Dichlor Benzol, Chloroben

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	Formula	CAS #	Concentration	ACGIH TLV	OSHA PEL	MAC	Other STEL
1,2-DICHLOROBENZENE	C6H4CL2	95-50-1	99+%	50	50	50	50

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Poisonous, flammable liquid and vapor.
May cause damage to liver, kidneys, skin, and eyes.
May cause central nervous system depression.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Skin , Ingestion

ACUTE EFFECTS: If inhaled, severe irritation of the nose, throat and upper respiratory tract will result. May cause irritation of the eyes and mucous membranes. Can be absorbed through the skin. Liquid contact with skin causes irritation, prolonged contact may lead to the formation of blisters. Ingestion causes burning pain in the stomach, nausea, vomiting, and diarrhea. May cause allergic reaction. May damage liver and kidney.

CHRONIC EFFECTS: Suspected human carcinogen. May lead to anorexia, weight loss, jaundice, and cirrhosis.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Toxic effects can include hematological (blood) disorders, and liver and kidney damage.

OTHER EFFECTS OF OVEREXPORSURE: NONE

CARCINOGENICITY (US ONLY):

NTP - NO
IARC MONOGRAPHS - NO
OSHA REGULATED - NO

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

EYE CONTACT: Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes.

SKIN CONTACT: Immediately remove contaminated clothing. Rinse the affected area with flooding amounts of water and then wash it with soap and water.

INGESTION: If ingested have conscious person drink 2 to 3 glasses of milk or water. Do not induce vomiting. If vomiting occurs naturally, have victim lean forward to reduce the risk of aspiration to the victim. Contact physician immediately.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: There is a chemical aspiration hazard if vomiting is induced; treat symptomatically.

5. FIRE FIGHTING MEASURES

FLASH POINT: 66 deg.C

AUTOIGNITION TEMPERATURE: 648 deg.C

FLAMMABLE LIMITS: Vol. %

LOWER: 2.20
UPPER: 9.20

EXTINGUISHING MEDIA: Water spray. Carbon dioxide, foam, or dry chemical.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Use water spray to cool fire and exposed cylinders, disperse vapors, and to flush spill away from exposures.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide, hydrogen chloride gas, phosgene, and chloro carbons.

UNUSUAL FIRE AND EXPLOSION HAZARDS: May form explosive mixture in air. Emits toxic fumes under fire conditions.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Wear SCBA, rubber boots, and heavy rubber gloves. Evacuate and ventilate area. Remove

all sources of ignition. Absorb with sand or vermiculite and place in closed containers for disposal. Prevent release of material to surface water or sewers.

SPECIALIZED EQUIPMENT: NONE

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Use only in a chemical fume hood. Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Keep in a cool, well ventilated place. Store away from heat, flame, and sparks. Keep away from oxidizing agents.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Goggles. A safety shower and eyewash station should be readily available.

SKIN PROTECTION: Impervious gloves, coveralls, boots, and/or other resistant protective clothing.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless to pale yellow

ODOR: Pleasant aromatic odor

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @20 deg.C: 1.2 mm Hg

VAPOR DENSITY (AIR=1): 5.1

BOILING POINT (C): 180.5

SOLUBILITY IN WATER: Practically insoluble

SPECIFIC GRAVITY (H2O=1): 1.3

EVAPORATION RATE: (BuAC=1): <1

ODOR THRESHOLD: 2-4 ppm

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: Oxidizing agents. Heated aluminums and aluminum alloys.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Oxides of carbon, hydrogen chloride, and chlorine.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): NONE ESTABLISHED

LETHAL DOSE 50 (LD50): N/AV

TERATOGENICITY: N/AV

REPRODUCTIVE EFFECTS: N/AV

MUTAGENICITY: N/AV

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Non-returnable cylinders must not be refilled. Dispose of non-refillable cylinders in accordance with federal, state, and local regulations. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection cap in place. Waste can be burned in a chemical incinerator. Follow federal, state and local regulations.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: o-DICHLOROBENZENE
HAZARD CLASS: 6.1 (poison), Packing Group III
INDENTIFICATION NUMBER: UN1591
REPORTABLE QUANTITIES: 100

LABELING: KEEP AWAY FROM FOOD

ADR / RID (EU Only): 6.1, 15(c)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 202-425-9

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/AV

R: 22-36/37/38

S: 23

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

ScienceLab.com
Chemicals & Laboratory Equipment

Health	2
Fire	2
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
o-Chlorophenol MSDS

Section 1: Chemical Product and Company Identification

Product Name: o-Chlorophenol

Catalog Codes: SLC2281

CAS#: 95-57-8

RTECS: SK2625000

TSCA: TSCA 8(b) inventory: o-Chlorophenol

CI#: Not available.

Synonym: 2-Chlorophenol

Chemical Name: o-Chlorophenol

Chemical Formula: C6-H5-Cl-O

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
{o-}Chlorophenol	95-57-8	100

Toxicological Data on Ingredients: o-Chlorophenol: ORAL (LD50): Acute: 40 mg/kg [Rat]. 345 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of ingestion, of inhalation. Hazardous in case of eye contact (irritant). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance may be toxic to kidneys, liver, upper respiratory tract, skin, central nervous system (CNS), legs. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Combustible.

Auto-Ignition Temperature: Not available.

Flash Points: CLOSED CUP: 64°C (147.2°F).

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2), halogenated compounds.

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Combustible material. Poisonous liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:
Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Unpleasant.

Taste: Not available.

Molecular Weight: 128.6 g/mole

Color: Yellow. (Light.)

pH (1% soln/water): Not available.

Boiling Point: 174.9°C (346.8°F)

Melting Point: 9.8 (49.6°F)

Critical Temperature: Not available.

Specific Gravity: Not available.

Vapor Pressure: 0.3 kPa (@ 20°C)

Vapor Density: 4.4 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.24 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.1

Ionicity (in Water): Not available.

Dispersion Properties:
Dispersed in methanol. Partially dispersed in diethyl ether. See solubility in water, methanol, diethyl ether.

Solubility:

Soluble in methanol. Partially soluble in diethyl ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not available.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 40 mg/kg [Rat].

Chronic Effects on Humans:
DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. May cause damage to the following organs: kidneys, liver, upper respiratory tract, skin, central nervous system (CNS), legs.

Other Toxic Effects on Humans: Very hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Chlorophenols, liquid UNNA: 2021 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: o-Chlorophenol Minnesota: o-Chlorophenol Massachusetts RTK: o-Chlorophenol New Jersey: o-Chlorophenol TSCA 8(b) inventory: o-Chlorophenol TSCA 8(d) H and S data reporting: o-Chlorophenol: June 1999

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F). CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R25- Toxic if swallowed. R36/38- Irritating to eyes and skin. R40- Possible risks of irreversible effects. R63- Possible risk of harm to the unborn child.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 04:53 PM

Last Updated: 11/01/2010 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Material Safety Data Sheet

1. Product and Company Identification

Catalog Numbers:	2CF2-0

Product Name

Trade Name:	1,2,4-Trimethylbenzene
Synonyms:	asym-Trimethylbenzene;Pseudocumene

Manufacturer & Distributor

Company Name:	Reagent World, Inc.
Address:	2048 E. Francis Street
City:	Ontario
State:	California
Postal Code:	91761
Country:	USA

Business/Emergency

Phone:	909-947-7779
Fax:	909-947-9595
URL:	http://www.ReagentWorld.com

2. Hazards Identification

Emergency Overview:	Flammable. Irritating to eyes, respiratory system and skin. Harmful by inhalation. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Potential Health Effects

Eye:	Causes eye irritation. Causes redness and pain.
Skin:	Causes skin irritation. Causes redness and pain. May be harmful if absorbed through the skin.
Ingestion:	May cause irritation of the digestive tract. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal. May be harmful if swallowed. May cause central nervous system depression
Inhalation:	Harmful if inhaled. Causes respiratory tract irritation. May cause drowsiness, unconsciousness, and central nervous system depression.
Chronic:	Prolonged or repeated skin contact may cause dermatitis. May cause anemia and other blood cell abnormalities. Prolonged exposure may produce a narcotic effect. Prolonged or repeated exposure may cause nausea, dizziness, and headache.

3. Composition/Information on Ingredients

Chemical Name:	1,2,4-Trimethylbenzene
Molecular Formula:	C9H12
Molecular Weight:	120.19
Content:	98%
CAS Number:	95-63-6
EINECS NO. [EC No]:	202-436-9

4. First Aid Measures

Eye:	Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin:	Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion:	Do not induce vomiting. Get medical aid. Wash mouth out with water.
Inhalation:	Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

5. Fire Fighting Measures

General Information:	As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Containers may explode in the heat of a fire. Flammable liquid and vapor.
Extinguishing:	Use water spray to cool fire-exposed containers. Use water spray, dry chemical, carbon dioxide, or chemical foam.

6. Accidental Release Measures

General Information:	Use proper personal protective equipment as listed in Section 8.
Spills/Leaks:	Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. Do not let this chemical enter the environment.

7. Handling and Storage

Handling:	Refer to section 8
Storage:	1.Keep away from sources of ignition and combustible material 2.Keep container tightly closed 3.Keep away from heat,sparks,and flame

8. Exposure Controls/Personal Protection

Engineering Controls:	Facilities storing or utilizing this material should be equipped with an eyewash and a safety shower facility.

Personal Protective Equipment

Eyes:	Wear chemical safety goggles.
Skin:	Wear appropriate protective gloves.
Clothing:	Wear appropriate protective clothing.
Respirators:	Wear NIOSH/MSHA - approved respirator

Respirators: wear NIOSH/MSHA approved respirator

9. Physical and Chemical Properties

Physical State:	Clear liquid
Color:	colorless
Odor:	aromatic odor
Boiling Point:	168
Melting Point :	-44
Vapor Pressure :	-
Specific Gravity :	0.88
PH:	-
Solubility in Water :	insoluble
Flash Point:	48 deg C (118.40 deg F)
Autoignition Temperature :	500 deg C (932.00 deg F)
Decomposition Temperature :	-

10. Stability and Reactivity

Chemical Stability:	Stable under normal temperatures and pressures
Conditions to Avoid:	Incompatible materials, ignition sources.
Incompatibilities with Other:	Strong oxidizing agents
Hazardous Decomposition Products :	Carbon monoxide, carbon dioxide
Polymerization :	Will not occur

11. Toxicological Information

RTECS#:	DC3325000
Toxicity Data[LD50/LC50]:	Inhalation, rat: LC50 = 18000 mg/m3/4H; Oral, mouse: LD50 = 6900 mg/kg; Oral, rat: LD50 = 5 gm/kg.
Carcinogenicity:	-
Other:	See actual entry in RTECS for complete information.

12. Ecological Information

Ecotoxicity:	Fish: Fathead Minnow: LC50: 7.72 mg/L; 96h; .Daphnia: Daphnia: EC50: 3.6 mg/L; 48h; .Log Pow: 3.78
Other:	See "The dictionary of substances and their effects" (editor: M.L. Richardson) for more information.

13. Disposal Considerations

Disposal considerations:	Contact a licensed professional waste disposal service to dispose of this material in a manner consistent with federal, state and local environmental regulations

14. Transport Information

Shipping Name:	FLAMMABLE LIQUID, N.O.S.*
Hazard Class:	3
UN Number:	1993
Packing Group:	III

15. Regulatory Information

European/International Regulations:	-

European Labeling in Accordance with EC Directives

Hazard Symbols:	1.Xn 2.N
R-Phrases:	1.Flammable. 2.Harmful by inhalation. 3.Irritating to eyes. 4.Irritating to respiratory system. 5.Irritating to skin. 6.Toxic to aquatic organisms. 7.May cause long-term adverse effects in aquatic environment.
S-Phrases:	1.In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. 2.Avoid release to the environment. Refer to special instructions/Safety data sheets.
WGK(Water Danger/Protection):	3
US Federal TSCA:	CAS# 95-63-6 is listed on the TSCA inventory.

16. Other Information

Other information:	The above information is believed to be accurate but does not suppose to be all inclusive and shall be used only as a guide. Reagent World makes no warranty of merchantability or any other warranty, express or implied, with respect to such information. Users should make their own investigations to determine the accountability of the information for their purposes in particular. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential of exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

Material Safety Data Sheet
1,2,4,5-Tetramethylbenzene

ACC# 75500

Section 1 - Chemical Product and Company Identification

MSDS Name: 1,2,4,5-Tetramethylbenzene
Catalog Numbers: AC138370000, AC138370050, AC138372500, AC409390000, AC409390050, AC409391000 AC409391000, AC409395000
Synonyms: Durene.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
95-93-2	1,2,4,5-Tetramethylbenzene	98	202-465-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: brown crystals. Flash Point: 73 deg C.
Danger! Highly flammable. Flammable solid.
Target Organs: None known.

Potential Health Effects
Eye: May cause eye irritation.
Skin: May cause skin irritation. May be harmful if absorbed through the skin.
Ingestion: May cause irritation of the digestive tract. May be harmful if swallowed.
Inhalation: May cause respiratory tract irritation. May be harmful if inhaled.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If irritation develo ps, get medical aid.
Skin: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.
Ingestion: Do not induce vomiting. Get medical aid if irritation or symptoms occur.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.

Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Will burn if involved in a fire. Flammable solid.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: 73 deg C (163.40 deg F)
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 1; Flammability: 2; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Remove all sources of ignition. Use a spark-proof tool. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Use with adequate ventilation. Minimize dust generation and accumulation. Use spark-proof tools and explosion proof equipment. Do not get in eyes, on skin, or on clothing. Keep away from heat, sparks and flame. Do not ingest or inhale.
Storage: Keep away from sources of ignition. Store in a cool, dry place. Store in a tightly closed container. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
1,2,4,5-Tetramethylbenzene	none listed	none listed	none listed

OSHA Vacated PELs: 1,2,4,5-Tetramethylbenzene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant

respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Crystals
Appearance: white - brown
Odor: camphor
pH: Not available.
Vapor Pressure: 160 mm Hg @ 140 deg C
Vapor Density: 4.6 (air=1)
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 196 - 197 deg C @ 760 mmHg
Freezing/Melting Point:78 - 82 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:0.838 g/cm3
Molecular Formula:C10H14
Molecular Weight:134.22

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, ignition sources, dust generation, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 95-93-2: DC0500000
LD50/LC50:
CAS# 95-93-2:
Oral, mouse: LD50 = 3400 mg/kg;
Oral, rat: LD50 = 6989 mg/kg;
Oral, rat: LD50 = 6700 mg/kg;
.

Carcinogenicity:
CAS# 95-93-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: No information available.
Physical: No information available.
Other: Do not empty into drains.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	FLAMMABLE SOLIDS, ORGANIC, N.O.S.	FLAMMABLE SOLIDS, ORGANIC, N.O.S.
Hazard Class:	4.1	4.1
UN Number:	UN1325	UN1325
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 95-93-2 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 95-93-2: fire.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 95-93-2 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

F

Risk Phrases:

R 11 Highly flammable.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.

WGK (Water Danger/Protection)

CAS# 95-93-2: 1

Canada - DSL/NDSL

CAS# 95-93-2 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B4, D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 8/24/1997
Revision #5 Date: 8/30/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
95-94-3	1,2,4,5-Tetrachlorobenzene	98	202-466-2

Hazard Symbols: XN
Risk Phrases: 22

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW
Harmful if swallowed.

Potential Health Effects
Eye:
May cause eye irritation.
Skin:
May cause skin irritation.
Ingestion:
May cause irritation of the digestive tract. May be harmful if swallowed.
Inhalation:
May cause respiratory tract irritation.
Chronic:
No information found.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin:
Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation:
Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician:
Treat symptomatically and supportively.
Antidote:
None reported.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Flammable when exposed to flame. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.
Extinguishing Media:
In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated

in Section 8.
Spills/Leaks:
Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Provide ventilation.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.
Storage:
Store in a cool, dry, well-ventilated area away from incompatible substances. Keep containers tightly closed.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate ventilation to keep airborne concentrations low.
Exposure Limits
CAS# 95-94-3:

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin:
Wear appropriate protective gloves to prevent skin exposure.
Clothing:
Wear appropriate protective clothing to prevent skin exposure.
Respirators:
Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Flakes
Color: white
Odor: None reported.
pH: Not available.
Vapor Pressure: 40 mm Hg @ 146C
Viscosity: Not available.
Boiling Point: 240 deg C @ 760.00mm Hg
Freezing/Melting Point: 138.0 - 140.0 deg C
Autoignition Temperature: Not available.
Flash Point: > 112 deg C (> 233.60 deg F)
Explosion Limits, lower: Not available.
Explosion Limits, upper: Not available.
Decomposition Temperature:
Solubility in water: 0.3 ppm in water @22C
Specific Gravity/Density: 1.734
Molecular Formula: C6H2Cl4
Molecular Weight: 215.89

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, dust generation.
Incompatibilities with Other Materials:
Strong oxidizing agents - strong bases.
Hazardous Decomposition Products:
Hydrogen chloride, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 95-94-3: DB9450000
LD50/LC50:
CAS# 95-94-3: Oral, mouse: LD50 = 1035 mg/kg; Oral, rabbit: LD50 = 1500 mg/kg; Oral, rat: LD50 = 1500 mg/kg; Oral, rat: LD50 = 1727 mg/kg.
Carcinogenicity:
1,2,4,5-Tetrachlorobenzene -
Not listed by ACGIH, IARC, or NTP.
Other:
See actual entry in RTECS for complete information.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Fish: Bluegill/Sunfish: 5.69 mg/L; 24 hr.; unspecified bioassayFish: Goldfish: 0.30 ppm; 14 days.; unspecified bioassay

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.

**** SECTION 14 - TRANSPORT INFORMATION ****

IATA
Not regulated as a hazardous material.
IMO
Not regulated as a hazardous material.
RID/ADR
Not regulated as a hazardous material.
USA RQ: CAS# 95-94-3: 5000 lb final RQ; 2270 kg final RQ

**** SECTION 15 - REGULATORY INFORMATION ****

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN
Risk Phrases:
R 22 Harmful if swallowed.
Safety Phrases:
WGK (Water Danger/Protection)
CAS# 95-94-3: 3
Canada
CAS# 95-94-3 is listed on Canada's DSL List.
CAS# 95-94-3 is not listed on Canada's Ingredient Disclosure List.
US FEDERAL
TSCA
CAS# 95-94-3 is listed on the TSCA inventory.

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 2/23/1999 Revision #3 Date: 3/18/2003

ScienceLab.com
Chemicals & Laboratory Equipment

Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
2,4,5-Trichlorophenol MSDS

Section 1: Chemical Product and Company Identification

Product Name: 2,4,5-Trichlorophenol

Catalog Codes: SLT1144

CAS#: 95-95-4

RTECS: SN1400000

TSCA: TSCA 8(b) inventory: 2,4,5-Trichlorophenol

CI#: Not available.

Synonym:

Chemical Name: 2,4,5-Trichlorophenol

Chemical Formula: C6-H3-Cl3-O

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
{2,4,5-}Trichlorophenol	95-95-4	100

Toxicological Data on Ingredients: 2,4,5-Trichlorophenol: ORAL (LD50): Acute: 820 mg/kg [Rat]. 600 mg/kg [Mouse]. 1000 mg/kg [Guinea pig].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation (lung irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance may be toxic to gastrointestinal tract, skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2), halogenated compounds.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Phenolic-like.

Taste: Not available.

Molecular Weight: 197.45 g/mole

Color: White to Tan.

pH (1% soln/water): Not available.

Boiling Point: 248°C (478.4°F)

Melting Point: 68°C (154.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.678 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.7

Ionicity (in Water): Not available.

Dispersion Properties:
Partially dispersed in methanol. Very slightly dispersed in cold water, hot water. See solubility in methanol, acetone.

Solubility:
Partially soluble in methanol, acetone. Very slightly soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Slightly reactive to reactive with oxidizing agents, acids.

Corrosivity: Not available.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation.

Toxicity to Animals: Acute oral toxicity (LD50): 600 mg/kg [Mouse].

Chronic Effects on Humans:
DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. May cause damage to the following organs: gastrointestinal tract, skin, central nervous system (CNS).

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant), of inhalation (lung irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification:

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
Rhode Island RTK hazardous substances: 2,4,5-Trichlorophenol Pennsylvania RTK: 2,4,5-Trichlorophenol Michigan critical material: 2,4,5-Trichlorophenol Massachusetts RTK: 2,4,5-Trichlorophenol New Jersey: 2,4,5-Trichlorophenol TSCA 8(b) inventory: 2,4,5-Trichlorophenol TSCA 8(d) H and S data reporting: 2,4,5-Trichlorophenol: June 1999 TSCA 12(b) one time export: 2,4,5-Trichlorophenol

Other Regulations: EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):
R20/21/22- Harmful by inhalation, in contact with skin and if swallowed. R36/37/38- Irritating to eyes, respiratory system and skin. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 12:48 PM

Last Updated: 11/01/2010 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Composition/Information on Ingredient

Cas:
959-98-8
Code:
M
RTECS:
RB9275100
Code:
M
Name:
ENDOSULFAN I
Other REC Limits:
N/K
OSHA PEL:
N/K
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
N/K
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
N/K
Ventilation:
N/K
Protective Gloves:
RECOMMENDED
Eye Protection:
RECOMMENDED
Other Protective Equipment:
Equipment USE APPROPRIATE OSHA/MSHA SAFETY EQUIPMENT.
Work Hygienic Practices:
N/K
Supplemental Safety and Health:
N/K

Health Hazards Data

LD50LC50Mixture:
ORAL (RAT) LD50: 5000 MG/KG (TOLUENE)
Route Of Entry Inds - Inhalation:
YES
Skin:
YES
Ingestion:
YES
Carcinogenicity Inds - NTP:
NO
IARC:
NO
OSHA:
NO
Health Hazards Acute And Chronic:
EYES/SKIN/INHALATION/INGESTION: IRRITATION.

Explanation Of Carcinogenicity:
LINDANE, DDT ISOMERS, & DIELDRIN ARE SUSPECTED HUMAN CARCINOGENS. HEPTACHLOR IS AN A2 CARCINOGEN.
Signs And Symptions Of Overexposure:
EYES/SKIN/INGESTION/INHALATION: TOXIC & IRRITATION.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN IF NECESSARY. OBTAIN
MEDICAL ATTENTION IN ALL CASES.
Spill Release Procedures:
DUE TO THE SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. A LEAKING BOTTLE MAY BE
PLACED IN A PLASTIC BAG & NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE OR
SAND.
Neutralizing Agent:
N/K
Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCUBBER. OBSERVE ALL FEDERAL, STATE, & LOCAL LAWS
CONCERNING DISPOSAL.
Handling And Storage Precautions:
AVOID CONTACT W/EYES, SKIN, & CLOTHING. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE.
Other Precautions:
THIS MATERIAL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN THE SAFE HANDLING OF HAZARDOUS CHEMICALS.

Fire and Explosion Hazard Information

Flash Point Method:
N/P 6
Flash Point:
Flash Point Text:
COMBUSTIBLE
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
N/K
Upper Limits:
N/K
Extinguishing Media:
CO2, DRY CHEMICAL POWDER, OR WATER SPRAY
Fire Fighting Procedures:
N/K
Unusual Fire/Explosion Hazard:
COMBUSTIBLE.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
N/K
Melt/Freeze Pt:
M.P/F.P Text:
N/K
Decomp Temp:
Decomp Text:

N/K
Vapor Pres:
N/K
Vapor Density:
N/K
Volatile Org Content %:
Spec Gravity:
N/K 7
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
N/K
Solubility in Water:
N/K
Appearance and Odor:
LIQUID W/BENZENE-LIKE ODOR.
Percent Volatiles by Volume:
N/K
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
N/K
Materials To Avoid:
STRONG OXIDIZERS
Hazardous Decomposition Products:
N/R
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

Composition/Information on Ingredient

Cas:
96-12-8
Code:
M
RTECS:
TX8750000
Code:
M
Name:
1,2-DIBROMO-3-CHLOROPROPANE (DBCP)
Other REC Limits:
0.1 MG/CUM NIOSH TWA
OSHA PEL:
0.001 PPM CANCER HAZ
Code:
M
OSHA STEL:
Code:
ACGIH TLV:
NONE
Code:
M
ACGIHSTEL:
N/P
Code:

Control Measures

Respiratory Protection:
WEAR FACE MASK W/ORGANIC VAPOR CANISTER.
Ventilation:
ADEQUATE
Protective Gloves:
RUBBER
Eye Protection:
PROTECTIVE GLASSES
Other Protective Equipment:
Equipment N/K
Work Hygienic Practices:
REMOVE &WASH CONTAMINATED CLOTHES BEFORE REUSE. WASH HANDS THOROUGHLY AFTER HANDLING.
Supplemental Safety and Health:
PRODUCT SHOULD BE HANDLED ONLY BY QUALIFIED PERSONS TRAINED IN LABORATORY PROCEDURES & GOOD
SAFETY PRACTICES.

Health Hazards Data

LD50LC50Mixture:
LD50 ORAL (RAT): 5628 MG/KG METHANOL
Route Of Entry Inds - Inhalation:
YES
Skin:
NO
Ingestion:
YES
Carcinogenicity Inds - NTP:
YES
IARC:
YES
OSHA:

YES
Health Hazards Acute And Chronic:
INHALATION: HARMFUL, HEADACHE, NAUSEA & GASTROINTESTINAL DISTURBANCES. INGESTION: FATAL, BLINDNESS.
Explanation Of Carcinogenicity:
SEE INGREDIENTS
Signs And Symptions Of Overexposure:
INGESTION: MAY CAUSE CANCER.
Medical Cond Aggravated By Exposure:
N/K
First Aid:
EYES: FLUSH W/WATER FOR AT LEAST 15 MINS. SKIN: WASH W/LARGE AMOUNTS OF WATER. INHALATION: REMOVE TO FRESH AIR. IF
BREATHING SS, GIVE ARTIFICIAL RESPIRATION. INGESTION: NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. NEVER
TRY TOMAKE AN UNCONSCIOUS PERSON VOMIT. GIVE 2 TABLESPOONS OF BAKING SODA IN A GLASS OF WATER, PRESS FINGERS BACK
OF TONGUE TO INDUCE VOMIT. OBTAIN MEDICAL ATTENTION.
Spill Release Procedures:
TAKE UP W ABSORBENT MATERIAL. VENTILATE AREA. ELIMINATE ALL IGNITION SOURCES.
Neutralizing Agent:
N/K
Waste Disposal Methods:
DISPOSE OF IN ACCORDANCE W/FEDERAL, STATE & LOCAL REGULATIONS.
Handling And Storage Precautions:
STORE IN SEALED CONTAINERS IN COOL, DRY LOCATION. KEEP AWAY FROM OXIDIZERS. KEEP AWAY FROM IGNITION SOURCES.
Other Precautions:
AVOID EYE/SKIN CONTACT. AVOID BREATHING VAPORS.

Fire and Explosion Hazard Information

Flash Point Method:
N/P 4
Flash Point:
Flash Point Text:
50F
Autoignition Temp:
Autoignition Temp Text:
N/A
Lower Limits:
6.0%
Upper Limits:
36.5%
Extinguishing Media:
CO2, DRY CHEMICAL, ALCOHOL FOAM
Fire Fighting Procedures:
WEAR SELF-CONTAINED BREATHING APPARATUS WHEN FIGHTING A CHEMICAL FIRE.
Unusual Fire/Explosion Hazard:
THE FOLLOWING TOXIC VAPORS ARE FORMED WHEN THIS MATERIAL IS HEATED TO DECOMPOSITION. HYDROCHLORIC ACID, HYDROGEN
BROMIDE.

Physical/Chemical Properties

HCC:
NRC/State LIC No:
Net Prop WT For Ammo:
Boiling Point:
B.P. Text:
65C
Melt/Freeze Pt:
M.P/F.P Text:
-98C

Decomp Temp:
Decomp Text:
N/K
Vapor Pres:
100
Vapor Density:
1.1 5
Volatile Org Content %:
Spec Gravity:
0.79
VOC Pounds/Gallon:
PH: N/K
VOC Grams/Liter:
Viscosity:
N/P
Evaporation Rate & Reference:
(ETHER = 1) >1
Solubility in Water:
COMPLETE
Appearance and Odor:
CLEAR COLORLESS LIQUID
Percent Volatiles by Volume:
100
Corrosion Rate:
N/K

Reactivity Data

Stability Indicator:
YES
Stability Condition To Avoid:
ALL IGNITION SOURCES.
Materials To Avoid:
OXIDIZING AGENTS, CHROMIC ANHYDRIDE, LEAD PERCHLORATE, PERCHLORIC ACIDS.
Hazardous Decomposition Products:
HYDROCHLORIC ACID, HYDROGEN BROMIDE
Hazardous Polymerization Indicator:
NO
Conditions To Avoid Polymerization:
N/K

Toxicological Information

Information:N/P

MSDS Transport Information

Information:N/P

Regulatory Information

Sara Title III Information: N/P
Federal Regulatory Information: N/P
State Regulatory Information: N/P

Other Information

Other Information:N/P

www.lookchem.com

Material Safety Data Sheet

1. Product and Company Identification

Catalog Numbers:	2CCF-0
Product Name	
Trade Name:	1,2,3-Trichloropropane
Synonyms:	Glycerol trichlorohydrin;Trichlorohydrin
Manufacturer & Distributor	
Company Name:	Reagent World, Inc.
Address:	2048 E. Francis Street
City:	Ontario
State:	California
Postal Code:	91761
Country:	USA
Business/Emergency	
Phone:	909-947-7779
Fax:	909-947-9595
URL:	http://www.ReagentWorld.com

2. Hazards Identification

Emergency Overview:	Harmful by inhalation, in contact with skin and if swallowed. May cause cancer. May impair fertility.
Potential Health Effects	
Eye:	May cause eye irritation. Causes redness and pain.
Skin:	Harmful if absorbed through the skin. Causes redness and pain.
Ingestion:	Harmful if swallowed. May cause severe irritation of the digestive tract. May cause central nervous system effects.
Inhalation:	Harmful if inhaled. May cause nausea, dizziness, and headache.
Chronic:	Possible cancer hazard based on tests with laboratory animals. May cause cancer in humans. Repeated exposure may cause damage to the spleen. Chronic exposure may cause lung damage. May impair fertility.

3. Composition/Information on Ingredients

Chemical Name:	1,2,3-Trichloropropane
Molecular Formula:	CH2ClCHClCH2Cl
Molecular Weight:	147.43
Content:	99+%
CAS Number:	96-18-4
EINECS NO. [EC No]:	202-486-1

4. First Aid Measures

Eye:	Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin:	Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion:	Get medical aid. Wash mouth out with water.
Inhalation:	Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

5. Fire Fighting Measures

General Information:	wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Will burn if involved in a fire. Combustible liquid.
Extinguishing:	Use water spray, dry chemical, carbon dioxide, or chemical foam.

6. Accidental Release Measures

General Information:	Use proper personal protective equipment as listed in Section 8.
Spills/Leaks:	Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container.

7. Handling and Storage

Handling:	Refer to section 8
Storage:	1.Keep in a cool,dry place 2.Keep container tightly closed 3.Keep away from heat,sparks,and flame

8. Exposure Controls/Personal Protection

Engineering Controls:	Facilities storing or utilizing this material should be equipped with an eyewash and a safety shower facility.
Personal Protective Equipment	
Eyes:	Wear chemical safety goggles.
Skin:	Wear appropriate protective gloves.
Clothing:	Wear appropriate protective clothing.
Repirators:	Wear NIOSH/MSHA - approved respirator

9. Physical and Chemical Properties

Physical State:	Clear liquid
Color:	light yellow
Odor:	characteristic odor
Boiling Point:	153-156

Boiling Point:	152-156
Melting Point :	-14
Vapor Pressure :	-
Specific Gravity :	1.386
PH:	-
Solubility in Water :	2g/l(25degC)
Flash Point:	74degC(165.20degF)
Autoignition Temperature :	304degC(579.20degF)
Decomposition Temperature :	-

10. Stability and Reactivity

Chemical Stability:	Stable under normal temperatures and pressures.
Conditions to Avoid:	Incompatible materials.
Incompatibilities with Other:	Oxidizing agents, strong bases, aluminum, plastics, metals as powders (e.g. hafnium, raney nickel).
Hazardous Decomposition Products :	Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Polymerization :	Will not occur.

11. Toxicological Information

RTECS#:	TZ9275000
Toxicity Data[LD50/LC50]:	Draize test, rabbit, eye: 100 uL Moderate; Draize test, rabbit, skin: 500 uL/24H Mild; Inhalation, mouse: LC50 = 3400 mg/m3/2H; Oral, mouse: LD50 = 369 mg/kg; Oral, rabbit: LD50 = 380 mg/kg; Oral, rat: LD50 = 108 uL/kg; Skin, rabbit: LD50 = 372 uL/kg.
Carcinogenicity:	1,2,3-Trichloropropane - ACGIH: A3 - Confirmed animal carcinogen with unknown relevance to humans California: carcinogen, initial date 10/1/92 NTP: Suspect carcinogen IARC: Group 2A carcinogen
Other:	See actual entry in RTECS for complete information.

12. Ecological Information

Ecotoxicity:	Log Pow: 2.3
Other:	-

13. Disposal Considerations

Disposal considerations:	Contact a licensed professional waste disposal service to dispose of this material in a manner consistent with federal, state and local environmental regulations

14. Transport Information

Shipping Name:	TOXIC LIQUID, ORGANIC, N.O.S.*
Hazard Class:	6.1
UN Number:	2810
Packing Group:	III

15. Regulatory Information

European/International Regulations:	-

European Labeling in Accordance with EC Directives

Hazard Symbols:	1.T
R-Phrases:	1.Harmful by inhalation. 2.Harmful in contact with skin. 3.Harmful if swallowed. 4.May cause cancer. 5.May impair fertility.
S-Phrases:	1.In case of accident or if you feel unwell, seek medical advice immediately (show the lable where possible). 2.Avoid exposure - obtain special instructions before use.
WGK(Water Danger/Protection):	2
US Federal TSCA:	CAS# 96-18-4 is listed on the TSCA inventory.

16. Other Information

Other information:	The above information is believed to be accurate but does not suppose to be all inclusive and shall be used only as a guide. Reagent World makes no warranty of merchantability or any other warranty, express or implied, with respect to such information. Users should make their own investigations to determine the accountability of the information for their purposes in particular. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential of exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

Company Info . Contact Reagent World . Terms of Use . Privacy Policy

Material Safety Data Sheet
Tert.-Butylbenzene, 99%

ACC# 23143

Section 1 - Chemical Product and Company Identification

MSDS Name: Tert.-Butylbenzene, 99%
Catalog Numbers: AC107870000, AC107870010, AC107870250, AC107871000, AC107875000
Synonyms: 2-Methyl-2-phenylpropane; (1,1-Dimethylethyl)benzene
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
98-06-6	Tert-Butylbenzene	99	202-632-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless clear liquid. Flash Point: 60 deg C.
Warning! Flammable liquid and vapor. May cause eye and skin irritation. May cause respiratory and digestive tract irritation. The toxicological properties of this material have not been fully investigated.
Target Organs: None known.

Potential Health Effects

Eye: May cause eye irritation. The toxicological properties of this material have not been fully investigated.
Skin: May cause skin irritation. The toxicological properties of this material have not been fully investigated.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. The toxicological properties of this substance have not been fully investigated.
Inhalation: May cause respiratory tract irritation. The toxicological properties of this substance have not been fully investigated. Vapors may cause dizziness or suffocation.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.

Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire. Flammable liquid and vapor. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. Do NOT use straight streams of water.
Flash Point: 60 deg C (140.00 deg F)
Autoignition Temperature: 450 deg C (842.00 deg F)
Explosion Limits, Lower:0.7
Upper: 5.7
NFPA Rating: 1 - health, 3 - flammability, 0 - instability

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use with adequate ventilation. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low. Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Tert-Butylbenzene	none listed	none listed	none listed

OSHA Vacated PELs: Tert-Butylbenzene: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Clear liquid
Appearance: clear, colorless
Odor: benzene-like
pH: Not available.
Vapor Pressure: 5.7 mm Hg @ 38C
Vapor Density: 4.6
Evaporation Rate: Not available.
Viscosity: 1.15 mPas 20 deg C
Boiling Point: 169 deg C @ 760.00mm Hg
Freezing/Melting Point:-58 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:.8670g/cm3
Molecular Formula:C10H14
Molecular Weight:134.22

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, ignition sources, excess heat, strong oxidants.
Incompatibilities with Other Materials: Oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 98-06-6: CY9120000

LD50/LC50:
CAS# 98-06-6:
Oral, mouse: LD50 = 8700 mg/kg;
Oral, rat: LD50 = 3045 mg/kg;
Oral, rat: LD50 = 6300 mg/kg;
.

Carcinogenicity:
CAS# 98-06-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: Rapidly volatilizes into the atmosphere.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	BUTYL BENZENES	No information available.
Hazard Class:	3	
UN Number:	UN2709	
Packing Group:	III	

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 98-06-6 is listed on the TSCA inventory.
Health & Safety Reporting List

CAS# 98-06-6: Effective 6/1/87, Sunset 12/19/95

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 98-06-6: immediate, fire.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 98-06-6 can be found on the following state right to know lists: Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

Not available.

Risk Phrases:

R 10 Flammable.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.
S 33 Take precautionary measures against static discharges.
S 37 Wear suitable gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 9 Keep container in a well-ventilated place.
S 28A After contact with skin, wash immediately with plenty of water
.

WGK (Water Danger/Protection)

CAS# 98-06-6: 1

Canada - DSL/NDSL

CAS# 98-06-6 is listed on Canada's DSL List.

Canada - WHMIS

not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

Section 16 - Additional Information

MSDS Creation Date: 4/14/1998
Revision #3 Date: 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Scott Specialty Gases

AIR LIQUIDE

Material Safety Data Sheets
MSDS No: 98-82-8
Date: 03/09/2001

SUPPLIER ADDRESS: 6141 Easton Road, Bldg. 1
PO Box 310
Plumsteadville, PA 18949-0310

EMERGENCY PHONE NUMBER: (215) 766-8861

1. CHEMICAL PRODUCT

PRODUCT NAME: ISOPROPYL BENZENE SYNONYMS: Cumene, Cumol, 2-phenyl propane

2. COMPOSITION, INFORMATION ON INGREDIENTS

				Exposure Limits (PPM)			
Ingredient Name	**Formula**	**CAS #**	**Concentration**	**ACGIH TLV**	**OSHA PEL**	**MAC**	**Other STEL**
ISOPROPYL BENZENE	C9H12	98-82-8	99+%	50	50	50	NE

Note: NE = NONE ESTABLISHED S/A = SIMPLE ASPHYXIANT

3. HAZARD INDENTIFICATION

* * * EMERGENCY OVERVIEW * * *
Flammable liquid and vapor.
Can cause irritation to eyes, skin, and respiratory tract.
Can form explosive mixtures with air.

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation , Skin , Ingestion

ACUTE EFFECTS: Irritation to the eyes, mucous membranes, and upper respiratory tract. Can be absorbed through the skin. Possible central nervous system depression. It is an aspiration hazard. This material is narcotic in high concentrations. Symptoms include irritation, dizziness, nausea, lack of coordination and narcosis. Skin contact can cause defatting and dermatitis. Ingestion of the liquid causes gastrointestinal irritation.

CHRONIC EFFECTS: Possible dermatitis from skin contact. Kidney and liver damage.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None known

OTHER EFFECTS OF OVEREXPORSURE: None

CARCINOGENICITY (US ONLY):

NTP - No
IARC MONOGRAPHS - No

OSHA REGULATED - No

4. FIRST AID MEASURES

INHALATION: Immediately remove victim to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration.

EYE CONTACT: Do not allow victim to rub or keep eyes tightly shut. Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Consult an opthalmologist immediately if pain or irritation persist.

SKIN CONTACT: Immediately remove contaminated clothing. Rinse the affected area with flooding amounts of water and then wash it with soap and water. For reddened or blistered skin, consult a physician.

INGESTION: Never give anything by mouth to an unconscious person. Contact a poison control center. Unless the poison control center advises otherwise, have the conscious and alert person drink 1 to 2 glasses of water to dilute.

IN EVENT OF EXPOSURE, CONSULT A PHYSICIAN

NOTE TO PHYSICIAN: None

5. FIRE FIGHTING MEASURES

FLASH POINT: 44 deg. C

AUTOIGNITION TEMPERATURE: 424 deg. C

FLAMMABLE LIMITS: Vol.% in air

LOWER: .90
UPPER: 6.50

EXTINGUISHING MEDIA: Carbon dioxide, foam, or dry chemical. For large fires, use water spray, fog, or regular foam.

SPECIAL FIRE FIGHTING INSTRUCTION AND EQUIPMENT: Wear self-contained breathing apparatus and full protective clothing. Move cylinders away from fire if this can be done safely. Keep fire exposed cylinders cool with water spray. Withdraw immediately if you hear a rising sound from venting safety device or notice any tank discoloration due to fire.

HAZARDOUS COMBUSTION PRODUCTS: Toxic carbon monoxide may be given off during combustion.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Vapors may travel a considerable distance to the source of ignition and flash back. May form explosive mixture in air. Poses an explosion hazard indoors, outdoors, and in sewers. Liquid can float on water and may travel to distant locations and/or spread fire.

6. ACCIDENTAL RELEASE MEASURES

CLEAN UP PROCEDURES: Evacuate and ventilate area. Shut off source if possible and remove source of heat.

Absorb with sand or vermiculite and place in closed containers for disposal.

SPECIALIZED EQUIPMENT: None

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING: Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in well ventilated areas. Keep valve protection cap on cylinders when not in use.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate general and local exhaust ventilation to maintain concentrations below exposure and flammable limits.

EYE / FACE PROTECTION: Goggles. A safety shower and eyewash station should be readily available.

SKIN PROTECTION: Impervious gloves, coveralls, boots, and/or other resistant protective clothing.

RESPIRATORY PROTECTION: Use a self-contained breathing apparatus in case of emergency or non-routine use.

OTHER PROTECTIVE EQUIPMENT: Safety shoes when handling cylinders.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless

ODOR: Gasoline-like

PHYSICAL PRESSURE: Liquid

VAPOR PRESSURE: @20 deg. C: 30 mm Hg

VAPOR DENSITY (AIR=1): 4.1

BOILING POINT (C): 152

SOLUBILITY IN WATER: Insoluble

SPECIFIC GRAVITY (H2O=1): @20 deg. C: 0.864

EVAPORATION RATE: N/Av

ODOR THRESHOLD: 0.008-0.132 ppm

10. STABILITY AND REACTIVITY

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal storage conditions.

CONDITIONS TO AVOID: Storage in poorly ventilated areas. Storage near a heat source.

MATERIALS TO AVOID: Strong oxidizing agents.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Toxic carbon monoxide.

11. TOXICOLOGICAL INFORMATION

LETHAL CONCENTRATION (LC50): 16,000 ppm, Rat 1 hour.

LETHAL DOSE 50 (LD50): N/Ap

TERATOGENICITY: N/Ap

REPRODUCTIVE EFFECTS: N/Ap

MUTAGENICITY: N/Ap

12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of non-refillable cylinders in accordance with federal, state and local regulations. Allow gas to vent slowly to atmosphere in an unconfined area or exhaust hood. If the cylinders are the refillable type, return cylinders to supplier with any valve outlet plugs or caps secured and valve protection caps in place.

14. TRANSPORT INFORMATION

CONCENTRATION: 99+%

DOT DESCRIPTION (US ONLY):

PROPER SHIPPING NAME: Isopropylbenzene
HAZARD CLASS: 3 (flammable), Packing group III
INDENTIFICATION NUMBER: UN1918
REPORTABLE QUANTITIES: 5,000 lbs
LABELING: FLAMMABLE LIQUID

ADR / RID (EU Only): 3, 31 (c)

SPECIAL PRECAUTIONS: Cylinders should be transported in a secure upright position in a well ventilated truck.

15. REGULATORY INFORMATION

OSHA: Process Safety Management: Material is not listed in appendix A of 29 CFR 1910.119 as highly hazardous chemical.

TSCA: Material is listed in TSCA inventory.

SARA: The threshold planning quantity for material is 10,000 lbs.

EU NUMBER: 202-704-5

NUMBER IN ANNEX 1 OF DIR 67/548: Not listed in annex 1.

EU CLASSIFICATION: N/Av

R: 10-37

S: N/Av

16. OTHER INFORMATION

OTHER PRECAUTIONS: Protect containers from physical damage. Do not deface cylinders or labels. Cylinders should be refilled by qualified producers of compressed gas. Shipment of a compressed gas cylinder which has not been filled by the owner or with his written consent is a violation of federal law (49 CFR).

ABBREVIATIONS: N/Ap - Not Applicable N/Av - Not Available SA - Simple Asphyxiant NE - None Established

DISCLAIMER: Information included in this document is given to the best of our knowledge, however, no warranty is made that the information is accurate or complete. We do not accept any responsibility for damages by the use of the document.

MSDS Number: **A0566** * * * * * *Effective Date:* ***02/22/06*** * * * * * *Supercedes:* ***08/10/04***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ACETOPHENONE

1. Product Identification

Synonyms: Acetylbenzene; methyl phenyl ketone; 1-phenylethanone
CAS No.: 98-86-2
Molecular Weight: 120.15
Chemical Formula: C6H5COCH3
Product Codes: 9012

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Ethanone, 1-phenyl-	98-86-2	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! CAUSES EYE IRRITATION. MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO SKIN AND RESPIRATORY TRACT. MAY AFFECT CENTRAL NERVOUS SYSTEM. COMBUSTIBLE LIQUID AND VAPOR.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 2 - Moderate
Reactivity Rating: 0 - None
Contact Rating: 3 - Severe
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
May cause irritation to the respiratory tract; symptoms may include sore throat, coughing, headache, and dizziness. Higher concentrations may cause narcosis.
Ingestion:
May cause sore throat, abdominal pain, nausea, coughing, headache, dizziness, anesthetic effects, and central nervous system effects.
Skin Contact:
May cause irritation with redness and pain.
Eye Contact:
May cause severe irritation, redness, pain, and transient corneal injury.
Chronic Exposure:
Prolonged or repeated skin exposure may cause dermatitis.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.
Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. Call a physician.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: 77C (171F) CC
Autoignition temperature: 571C (1060F)
Combustible.
Explosion:
Above the flash point, explosive vapor-air mixtures may be formed.
Fire Extinguishing Media:
Dry chemical, foam, water or carbon dioxide.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Isolate from oxidizing materials. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-ACGIH Threshold Limit Value (TLV): 10 ppm (TWA)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a respirator with an organic vapor cartridge may be worn for up to ten times the exposure limit. Since this compound has been identified as possibly existing in both vapor and particulate phase, a particulate prefilter (NIOSH type N95 or better filter) is recommended. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P particulate filter.For emergencies or instances where the exposure levels are not known, use a positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear protective gloves and clean body-covering clothing.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Pungent, floral odor.
Solubility:

Slightly soluble in water.
Density:
1.03
pH:
No information found.
% Volatiles by volume @ 21C (70F):
No information found.
Boiling Point:
198 - 204C (388 - 399F)
Melting Point:
20.5C (68F)
Vapor Density (Air=1):
4.1
Vapor Pressure (mm Hg):
0.4 @ 25C (77F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizers.
Conditions to Avoid:
Heat, flame, other sources of ignition.

11. Toxicological Information

Oral Rat LD50: 815 mg/kg. Skin Rabbit LD50: 15,900 mg/kg. Irritation data: Skin Rabbit 515 mg, open, mild; Eye Rabbit 771 ug, severe. Investigated as a mutagen.

--------\Cancer Lists\----------			
	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
----------	-----	-----------	-------------
Ethanone, 1-phenyl- (98-86-2)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into water, this material is expected to readily biodegrade. When released into the water, this material is expected to have a half-life between 1 and 10 days. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------				
Ingredient	TSCA	EC	Japan	Australia
----------	----	---	-----	---------
Ethanone, 1-phenyl- (98-86-2)	Yes	Yes	Yes	Yes

```
--------\Chemical Inventory Status - Part 2\--------------------------------
                                                --Canada--
Ingredient                                 Korea  DSL   NDSL  Phil.
-----------------------------------------  -----  ---   ----  -----
Ethanone, 1-phenyl- (98-86-2)               Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                       -SARA 302-    ------SARA 313------
Ingredient                             RQ    TPQ     List  Chemical Catg.
-------------------------------------  ---   -----   ----  --------------
Ethanone, 1-phenyl- (98-86-2)          No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                  -RCRA-    -TSCA-
Ingredient                             CERCLA     261.33     8(d)
-------------------------------------  ------     ------    ------
Ethanone, 1-phenyl- (98-86-2)          5000       U004       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: No   Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **1** Flammability: **2** Reactivity: **0**
Label Hazard Warning:
WARNING! CAUSES EYE IRRITATION. MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO SKIN AND RESPIRATORY TRACT. MAY AFFECT CENTRAL NERVOUS SYSTEM. COMBUSTIBLE LIQUID AND VAPOR.
Label Precautions:
Avoid breathing vapor.
Keep container closed.
Use with adequate ventilation.
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.
Keep away from heat and flame.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 3.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **N4530** * * * * * *Effective Date:* ***05/19/08*** * * * * * *Supercedes:* ***08/16/05***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

NITROBENZENE

1. Product Identification

Synonyms: Nitrobenzol; benzene, nitro-; oil of mirbane; essence of mirbane
CAS No.: 98-95-3
Molecular Weight: 123.11
Chemical Formula: C6H5 NO2
Product Codes:
J.T. Baker: 9325, 9326
Mallinckrodt: 6404, 6410

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Nitrobenzene	98-95-3	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. MAY CAUSE METHEMOGLOBINEMIA. AFFECTS, BLOOD, LIVER, KIDNEYS, AND REPRODUCTIVE SYSTEM. CAUSES IRRITATION TO EYES AND SKIN. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. COMBUSTIBLE LIQUID AND VAPOR.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 2 - Moderate
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

This material is so dangerous that personnel handling it should be trained to recognize the symptoms of methemoglobinemia.

Inhalation:
May be absorbed through inhalation of vapors. Symptoms parallel those following ingestion exposure.
Ingestion:
May cause headache, shallow respiration, dizziness, vomiting, weakness, and blood pressure fall. Forms methemoglobin in the blood, reducing oxygen transport and producing cyanosis, and anemia. Convulsions, coma and death may follow. Symptoms may be delayed from 1 to 4 hours, and workers developing fatal cases of methemoglobinemia may not immediately feel sick. Because of bitter almond odor, cyanide poisoning may be suspected, but cyanide acts much faster. Poisoning closely resembles that due to aniline. Estimated lethal dose 1 to 5 grams.
Skin Contact:
May be irritating and sensitizing to the skin. May be rapidly absorbed through the skin, with symptoms paralleling those following ingestion exposure.
Eye Contact:

Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.

Chronic Exposure:

Repeated or prolonged exposure through any route may cause damage to the central nervous system, liver, spleen, kidneys, and bone marrow. May also cause weight loss, anemia, jaundice, hemolysis, weakness, and irritability. A two year study titled "A Chronic Inhalation Toxicity Study of Nitrobenzene in B6CF1 Mice, Fischer 344 Rats and Sprague-Dawley Rats", was released by the Chemical Industry Institute of Toxicology (CIIT). The report indicates that Nitrobenzene has weak carcinogenic activity in rodents after chronic inhalation exposure and may express carcinogenic activity in humans. Based upon the result of this animal testing, Nitrobenzene should be handled as a potential carcinogen.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin or blood disorders or impaired liver, kidney, or cardiovascular function may be more susceptible to the effects of this substance. The influence of ethyl alcohol may aggravate the toxic effects of nitrobenzene.

---

4. First Aid Measures

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do not give mouth to mouth resuscitation. CALL A PHYSICIAN IMMEDIATELY.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician immediately. Thorough cleansing of the entire contaminated area of the body including scalp and nails is of the utmost importance.

Eye Contact:

Immediately flush eyes with gentle but large stream of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Call a physician immediately.

Note to Physician:

Consider methylene blue as an antidote.

---

5. Fire Fighting Measures

Fire:

Flash point: 88C (190F) CC
Autoignition temperature: 482C (900F)
Flammable limits in air % by volume:
lel: 1.8
(lel @ 93C)

Explosion:

Above the flash point, explosive vapor-air mixtures may be formed. Contact with strong oxidizers may cause fire. Vapors can flow along surfaces to distant ignition source and flash back. Forms explosive mixtures with aluminum chloride, aniline plus glycerine, nitric acid, nitrogen tetraoxide, aromatic nitrogen compounds, urea perchlorate, sodium hydroxide, sulfuric acid, potassium, potassium/sodium alloys, and silver perchlorate.

Fire Extinguishing Media:

Water spray, dry chemical, alcohol foam, or carbon dioxide. Use water spray to blanket fire, cool fire exposed containers, and to flush non-ignited spills or vapors away from fire.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Separate from incompatibilities. Workers must carefully follow good hygienic practices, including no eating, drinking, or smoking in workplace. Proper use and maintenance of protective equipment is essential. Workers using this substance need preplacement and annual medical exams. Special training should be given to workers. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

Nitrobenzene:
-OSHA Permissible Exposure Limit (PEL): 1 ppm (TWA) skin

-ACGIH Threshold Limit Value (TLV): 1 ppm (TWA) skin, A3- Confirmed Animal Carcinogen with Unknown Relevance to Humans.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Pale yellow to brown, oily liquid.
Odor:
Almond odor.
Solubility:
Practically insoluble in water.
Specific Gravity:
1.20 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
No information found.
Boiling Point:
211C (412F)
Melting Point:
5.7C (43F)
Vapor Density (Air=1):
4.3
Vapor Pressure (mm Hg):
1.0 @ 44.4C (111F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Due to low electric conductivity, the substance can generate electrostatic charges as a result of flow, agitation, etc.
Hazardous Decomposition Products:
Burning may produce carbon monoxide, carbon dioxide, nitrogen oxides.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Reducing agents, oxidizing agents, aluminum chloride, aniline plus glycerine, nitric acid, nitrogen tetraoxide, silver perchlorate, potassium, potassium/sodium alloys, aromatic nitrogen compounds, sodium hydroxide, sulfuric acid, tin, and zinc.
Conditions to Avoid:
Heat, flame, ignition sources, freezing, incompatibles

---

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 349 mg/kg; skin rat LD50: 2100 mg/kg; Inhalation rat LC50: 556 ppm/4H; investigated as a mutagen, reproductive effector.
Reproductive Toxicity:
In laboratory animals, this compound has caused both birth defects and damage to the reproductive system.
Carcinogenicity:
A two year study titled "A Chronic Inhalation Toxicity Study of Nitrobenzene in B6CF1 Mice, Fischer 344 Rats and Sprague-Dawley Rats", was released by the Chemical Industry Institute of Toxicology (CIIT). The report indicates that Nitrobenzene has weak carcinogenic activity in rodents after chronic inhalation exposure and may express carcinogenic activity in humans. Based upon the result of this animal testing, Nitrobenzene should be handled as a potential carcinogen.

```
--------\Cancer Lists\----------------------------------------------------
                                  ---NTP Carcinogen---
Ingredient                        Known    Anticipated    IARC Category
--------------------------------  -----    -----------    -------------
Nitrobenzene (98-95-3)             No          No             2B
```

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into water, this material may evaporate to a moderate extent. When released into water, this material is expected to readily biodegrade. When released into the water, this material is expected to have a half-life between 1 and 10 days. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by photolysis. When released into the air, this material is expected to have a half-life of less than 1 day.
Environmental Toxicity:
The EC50/48-hour values for daphnia are between 10 and 100 mg/l. The LC50/96-hour values for fish are over 100 mg/l. This material may be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: NITROBENZENE
Hazard Class: 6.1
UN/NA: UN1662
Packing Group: II
Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: NITROBENZENE
Hazard Class: 6.1
UN/NA: UN1662
Packing Group: II
Information reported for product/size: 4L

International (Air, I.C.A.O.)

Proper Shipping Name: NITROBENZENE
Hazard Class: 6.1
UN/NA: UN1662
Packing Group: II
Information reported for product/size: 4L

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
--------------------------------------------  ----  ---  -----  ---------
Nitrobenzene (98-95-3)                         Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                      --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
--------------------------------------------  -----  ---   ----  -----
Nitrobenzene (98-95-3)                         Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                      -SARA 302-    ------SARA 313------
Ingredient                            RQ    TPQ     List  Chemical Catg.
------------------------------------  ---   -----   ----  --------------
Nitrobenzene (98-95-3)                1000  10000   Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                    -RCRA-    -TSCA-
Ingredient                            CERCLA     261.33     8(d)
------------------------------------  ------     ------    ------
Nitrobenzene (98-95-3)                1000       U169       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
```

SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2X
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **3** Flammability: **2** Reactivity: **1**
Label Hazard Warning:
DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. MAY CAUSE METHEMOGLOBINEMIA. AFFECTS, BLOOD, LIVER, KIDNEYS, AND REPRODUCTIVE SYSTEM. CAUSES IRRITATION TO EYES AND SKIN. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. COMBUSTIBLE LIQUID AND VAPOR.
Label Precautions:
Do not breathe vapor.
Do not get in eyes, on skin, or on clothing.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. IF INHALED, remove to fresh air. If not breathing, give artificial respiration. DO NOT GIVE MOUTH-TO-MOUTH RESUSCITATION. If breathing is difficult, give oxygen. Keep patient warm and at rest. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician immediately.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet
3-Nitroaniline, 98%

ACC# 10194

Section 1 - Chemical Product and Company Identification

MSDS Name: 3-Nitroaniline, 98%
Catalog Numbers: AC128360000, AC128360050, AC128361000, AC128365000
Synonyms: m-Nitroaniline; 3-Nitrobenzenamine; 3-Nitrophenylamine.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
99-09-2	3-Nitroaniline	98	202-729-1

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: yellow.
Caution! Possible risks of irreversible effects. Methemoglobin former - can cause cyanosis. May cause eye and skin irritation. May cause respiratory and digestive tract irritation. May be harmful if swallowed. This substance has caused adverse reproductive and fetal effects in animals.
Target Organs: Blood, kidneys, liver, blood forming organs.

Potential Health Effects

Eye: May cause eye irritation. Vapors may cause eye irritation. May cause eye injury.
Skin: May cause skin irritation. Substance is rapidly absorbed through the skin. If absorbed, may cause symptoms similar to those for ingestion.
Ingestion: May cause methemoglobinemia, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), convulsions, and death. Effects may be delayed 2 to 4 hours. Methemoglobinemia is characterized by dizziness, drowsiness, headache, shortness of breath, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), rapid heart rate and chocolate-brown colored blood. May be harmful if swallowed. Alcohol can intensify effects.
Inhalation: May cause respiratory tract irritation. May cause effects similar to those described for ingestion. Inhalation of aniline causes anoxia due to the formation of methemoglobin.
Chronic: May cause liver and kidney damage. May cause bone marrow abnormalities with damage to blood forming tissues. May cause anemia and other blood cell abnormalities. Repeated exposure may cause central nervous system damage. Adverse reproductive effects have been reported in animals.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid imme diately.
Skin: Get medical aid immediately. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Call a poison control center. If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Absorption of this product into the body may cause cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood). Moderate degrees of cyanosis need to be treated only by supportive measures: bed rest and oxygen inhalation. For methemoglobinemia, administer oxygen alone or with Methylene Blue depending on the methemoglobin concentration in the blood. Cleansing of the entire contaminated area of the body is of utmost importance.
Antidote: Methylene blue, alone or in combination with oxygen is indicated as a treatment in nitrite induced methemoglobinemia.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. May decompose explosively when heated or involved in a fire.
Extinguishing Media: In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam. Use agent most appropriate to extinguish fire.
Flash Point: Not applicable.
Autoignition Temperature: 521 deg C (969.80 deg F)
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 1; Instability: 2

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Avoid generating dusty conditions. Remove all sources of ignition. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Keep container tightly closed. Do not get on skin or in eyes. Do not ingest or inhale.
Storage: Keep away from sources of ignition. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
3-Nitroaniline	none listed	none listed	none listed

OSHA Vacated PELs: 3-Nitroaniline: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: yellow
Odor: Not available.
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: 4.8
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 306 deg C
Freezing / Melting Point:114 deg C
Decomposition Temperature:> 396 deg C
Solubility: Insoluble in water.
Specific Gravity / Density: Not available.
Molecular Formula:NO2C6H4NH2
Molecular Weight:138.0542

Section 10 - Stability and Reactivity

Chemical Stability: Stable. However, may decompose if heated.
Conditions to Avoid: High temperatures, ignition sources, dust generation, excess heat.
Incompatibilities with Other Materials: Strong acids, strong oxidizing agents, strong reducing agents.
Hazardous Decomposition Products: Nitrogen oxides, carbon monoxide, irritating and toxic fumes and gases, carbon dioxide, nitrogen.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 99-09-2: BY6825000
LD50/LC50:
CAS# 99-09-2:
Oral, mouse: LD50 = 308 mg/kg;
Oral, rat: LD50 = 535 mg/kg;
.

Carcinogenicity:
CAS# 99-09-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: Animal studies have demonstrated fetoxicity (growth retardation) and teratogenicity (exencephaly, angulated ribs, dilated brain ventricles).
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: No information available.
Physical: No information available.
Other: None.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	NITROANILINES	NITROANILINE
Hazard Class:	6.1	6.1
UN Number:	UN1661	UN1661
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 99-09-2 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 99-09-2: immediate, delayed, reactive.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 99-09-2 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
T
Risk Phrases:
R 23/24/25 Toxic by inhalation, in contact with skin and if swallowed.
R 33 Danger of cumulative effects.
R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
S 28 After contact with skin, wash immediately with...
S 36/37 Wear suitable protective clothing and gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 28B After contact with skin, wash immediately with plenty of water and soap.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

WGK (Water Danger/Protection)

CAS# 99-09-2: 2

Canada - DSL/NDSL

CAS# 99-09-2 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1A, D2A.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 99-09-2 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 11/05/1998
Revision #4 Date: 10/03/2005

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet
p-Cymene, 98%

ACC# 95901

Section 1 - Chemical Product and Company Identification

MSDS Name: p-Cymene, 98%
Catalog Numbers: AC111760000, AC111760010, AC111760025, AC111762500
Synonyms: Dolcymene; p-isopropyltoluene;isopropyl methylbenzene
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
99-87-6	P-CYMENE	98	202-796-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 47 deg C.
Warning! Flammable liquid and vapor. Causes eye, skin, and respiratory tract irritation. May be absorbed through intact skin. Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause central nervous system effects.
Target Organs: Central nervous system.

Potential Health Effects

Eye: May cause eye irritation.
Skin: Causes skin irritation. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. May be absorbed through the skin.
Ingestion: May cause irritation of the digestive tract. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation: Causes respiratory tract irritation. May cause narcotic effects in high concentration. May cause drowsiness, unconsciousness, and central nervous system depression.
Chronic: Chronic inhalation may cause effects similar to those of acute inhalation. Prolonged or repeated skin contact may cause defatting and dermatitis.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin: Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Possible aspiration hazard. Get medical aid immediately.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Containers may explode in the heat of a fire. Flammable liquid and vapor.
Extinguishing Media: Use water spray to cool fire-exposed containers. Water may be ineffective. Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: 47 deg C (116.60 deg F)
Autoignition Temperature: 435 deg C (815.00 deg F)
Explosion Limits, Lower:.70 vol %
Upper: 5.60 vol %
NFPA Rating: 1 - health, 2 - flammability, 0 - instability

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use with adequate ventilation. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
P-CYMENE	none listed	none listed	none listed

OSHA Vacated PELs: P-CYMENE: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: Lemon-type
pH: Not available.
Vapor Pressure: 1 mm Hg @17.3C
Vapor Density: 4.62 (air=1)
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 176 - 178 deg C @ 760.00mm Hg
Freezing/Melting Point:-68 deg C
Decomposition Temperature: Not available.
Solubility: practically insoluble in water
Specific Gravity/Density:.8600g/cm3
Molecular Formula:C10H14
Molecular Weight:134.22

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, ignition sources, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 99-87-6: GZ5950000
LD50/LC50:
CAS# 99-87-6:
Draize test, rabbit, skin: 500 mg/24H Moderate;
Inhalation, mouse: LC50 = 19500 mg/m3;
Oral, mouse: LD50 = 1695 mg/kg;
Oral, rat: LD50 = 4750 mg/kg;
Oral, rat: LD50 = 3669 mg/kg;
.

Carcinogenicity:
CAS# 99-87-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: Genotoxicity:see The Dictionary of Substances and their Effects, 1992
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Bioaccumulation:Readily biodegradableAbiotic removal:Evaporation rate relative to n-butyl-acetate which has been assigned a value of 1 at 25°C is 0.14 (The Dictionary of Substances and their Effects, 1992)
Environmental: No information available.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	CYMENES	No information available.
Hazard Class:	3	
UN Number:	UN2046	
Packing Group:	III	

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 99-87-6 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 99-87-6: immediate, fire.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 99-87-6 can be found on the following state right to know lists: Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XI F

Risk Phrases:

R 10 Flammable.
R 37/38 Irritating to respiratory system and skin.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.

WGK (Water Danger/Protection)

CAS# 99-87-6: No information available.

Canada - DSL/NDSL

CAS# 99-87-6 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B3, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 99-87-6 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #4 Date: 11/20/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the

any special, indirect, incidental, consequential or exemplary damages, however arising, even if Fisher has been advised of the possibility of such damages.

APPENDIX 6

WATERPROOFING AND VAPOR BARRIER MEMBRANE INSTALLATION SPECIFICATIONS

APPENDIX 6

WATERPROOFING AND VAPOR BARRIER MEMBRANE SYSTEM INSTALLATION SPECIFICATIONS

SITE: 15 PROSPECT STREET, STATEN ISLAND, NY

These specifications and accompanying plans complement and supplement each other. Both shall be reviewed for performing the project. In case of discrepancies between these specifications and the plans, these written specifications shall prevail.

The design of the subsurface Waterproofing and Vapor Barrier membrane system for installation at the above referenced site is presented in Dwgs. 1 thru 9 of 9 of the accompanying plans, dated June 6, 2016. (This set of plans includes the design for Waterproofing and Vapor Barrier system in Dwgs. 4, 5, and 6, as well as the design for a Subslab Depressurization and Active Venting System in Dwgs. 7, 8, and 9, with the preliminary setup plans in Dwgs. 1, 2, and 3 common to both designs.)

The following are the main elements, considerations, and requirements of the design and installation.

1. 46-Mil PREPRUFE 300R and 32-mil PREPRUFE 160R waterproofing/vapor barrier membranes manufactured by W.R. Grace & Company (or approved equals) are proposed for installation for horizontal and vertical applications, respectively, underneath the proposed slab covering the entire building footprint on the first floor at the property, as well as along the outside surface of foundation walls from bottom to grade.

2. The membrane (liner) shall be installed below the elevator as wells as along its outside vertical walls to provide thorough coverage. Same applies to any sump pits that may be constructed. Inside walls of the elevator pit and sumps may be waterproofed if and as required by the Architect.

3. The placement of the liner is shown in the drawings. The PREPRUFE 300R membrane is typically supplied in rolls of 4 ft width x 98 ft length and the PREPRUFE 160R membrane is supplied in rolls of 4 ft width x 115 length. During installation, the orientation of their installation shall be planned so as to maximize utilization and minimize waste, taking into consideration that a minimum 4” overlap of adjoining liner strips is required.

4. The Contractor shall ensure a tight seal. It is important that the liners to be sealed are straightened before applying the tape/seal as any wrinkles and undulations will prevent achieving a tight seal. At the same time sufficient slack shall be provide at corners, edges, and other turns to ensure good fit without damage to liner.

5. The Contractor shall review the plans and specifications carefully prior to commencing the installation and shall try to resolve all questions and seek clarifications to the extent possible prior to initiating the field work.

6. The Contractor shall follow the design plans and instructions contained therein, the instructions in this document, and the manufacturer’s instructions for surface preparation, for installation of their system, and for pre- and post-inspections. In case of any conflict between these sources, the Design Engineer of the waterproofing and of the vapor barrier

system shall be consulted prior to performing installation, for clarification and/or modifications as needed.

7. All seals shall be visually inspected for punctures, tears, and tight seals. Follow the supplier's instructions for sealing. The integrity of the liner and sealing shall be certified by the Contractor.

8. The Contractor shall maintain a written and photo documentation of all important phases of their work.

9. All accessories (e.g., tapes, sealants, etc.) shall be purchased from the same supplier as for the primary liner materials to ensure compatibility. All products shall be purchased directly from the supplier (manufacturer) or from their authorized vendor well within the expiry date of their stated shelf lives, and shall be properly stored per the supplier's instructions.

10. The supplier shall warranty the products for minimum 10 years.

11. All liner installation work shall be performed by a trained and experienced applicator acceptable to the supplier of the waterproofing and vapor barrier membranes PREPRUFE 300R and 160R, W. R. Grace, or to the supplier of approved equal.

12. The installation shall be performed within the environmental conditions (e.g., temperature and other weather conditions) specified by the supplier. Do not install over a damp or wet substrate. Do not install in fog or mist conditions, or on overcast days with signs of imminent precipitation.

13. Do not permit foot or vehicular traffic on unprotected installed membrane. Protect installed membrane from damage and wear. In general, restrict access to installed construction area, and limit it to the liner installers only.

14. Maintain good ventilation during mixing of products and during installation.

15. The Contractor shall schedule a kick-off meeting at Project site prior to start of installation to discuss and plan all elements of the installation, with a minimum 3-day notice, to be attended by the installing workers, the supplier's inspector who will certify the installation, the Design Engineer, and any other's requested by the Owner and/or the architect.

16. The installation shall be inspected on a full-time basis and certified as having been correctly installed for both waterproofing and vapor barrier functions by a site representative qualified by the supplier to inspect substrate conditions, surface preparation, membrane application, flashings, sealing, protection, and drainage components. The inspector shall maintain a daily log, and furnish daily reports to the Architect and Design Engineer.

17. The installation shall be inspected and approved by the Design Engineer or Owner's Representative also before completion of liner installation and pouring of concrete. Nonconformance by the Contractor of this condition would be at the Contractor's sole risk, as the cost of any remedial work that it may entail for inspection and approval by the Design Engineer or Owner's Representative shall be fully borne by the Contractor.

18. A minimum of three (3) days advance notice shall be given to the Design Engineer and to the Owner's Representative, and to the Architect and Structural Engineer if their direction is needed, by the Contractor for any questions, clarifications, and inspections and approvals.

19. The Contractor shall cleanup after their work at the end of their project. Their obligation to the contract will not be discharged unless and until this cleanup work is performed to the satisfaction of the Owner's Representative, and approval is obtained per Item 6 above.

GRACE

PREPRUFE® 300R & 160R

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites

Description

Preprufe® 300R & 160R membranes are unique composite sheets comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating.

Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe bond to concrete prevents ingress or migration of water around the structure.

The Preprufe R System includes:

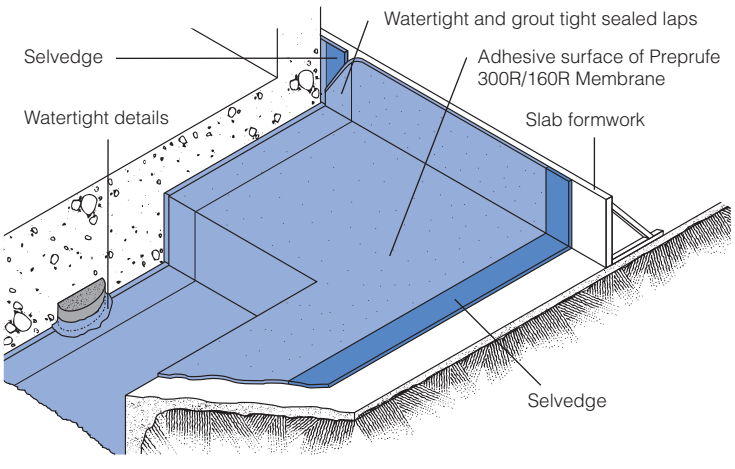
- **Preprufe 300R**—heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R**—thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe Tape LT**—for covering cut edges, roll ends, penetrations and detailing (temperatures between 25°F (-4°C) and 86°F (+30°C)).
- **Preprufe Tape HC**—as above for use in Hot Climates (minimum 50°F (10°C)).
- **Bituthene® Liquid Membrane**—for sealing around penetrations, etc.
- **Adcor™ ES**—waterstop for joints in concrete walls and floors
- **Preprufe Tieback Covers**—preformed cover for soil retention wall tieback heads
- **Preprufe Preformed Corners**—preformed inside and outside corners

Preprufe 300R & 160R membranes are applied either horizontally to smooth prepared concrete, carton forms or well rolled and compacted earth or crushed stone substrate; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be returned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene self-adhesive membrane or Procor® fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.

Advantages

- **Forms a unique continuous adhesive bond to concrete poured against it**—prevents water migration and makes it unaffected by ground settlement beneath slabs
- **Fully-adhered watertight laps** and detailing
- **Provides a barrier to water, moisture and gas**—physically isolates the structure from the surrounding ground
- **BBA Certified** for basement Grades 2, 3, & 4 to BS 8102:1990
- **Zero permeance** to moisture
- **Solar reflective**—reduced temperature gain
- **Simple and quick to install**—requiring no priming or fillets
- **Can be applied to permanent formwork**—allows maximum use of confined sites
- **Self protecting**—can be trafficked immediately after application and ready for immediate placing of reinforcement
- **Unaffected by wet conditions**—cannot activate prematurely
- **Inherently waterproof, non-reactive system:**
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- **Chemical resistant**—effective in most types of soils and waters, protects structure from salt or sulphate attack



Drawings are for illustration purposes only.
Please refer to graceconstruction.com for specific application details.

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No. 97/3325

Installation

The most current application instructions, detail drawings and technical letters can be viewed at graceconstruction.com. For other technical information contact your local Grace representative.

Preprufe 300R & 160R membranes are supplied in rolls 4 ft (1.2 m) wide, with a selvedge on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe Membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.

Substrate Preparation

All surfaces—It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability (see Figure 1).

Horizontal—The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry, but standing water must be removed.

Vertical—Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment.

Membrane Installation

Preprufe can be applied at temperatures of 25°F (-4°C) or above. When installing Preprufe in cold or marginal weather conditions 55°F (<13°C) the use of Preprufe Tape LT is recommended at all laps and detailing. Preprufe Tape LT should be applied to clean, dry surfaces and the release liner must be removed immediately after application. Alternatively, Preprufe Low Temperature (LT) is available for low temperature condition applications. Refer to Preprufe LT data sheet for more information.

Horizontal substrates—Place the membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave plastic release liner in position until overlap procedure is completed (see Figure 2).

Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

Refer to Grace Tech Letter 15 for information on suitable rebar chairs for Preprufe.

Vertical substrates—Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the the clear plastic release liner facing towards the concrete pour. The membrane may be installed in any convenient length. Fastening can be made through the selvedge using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps. Immediately remove the plastic release liner.

Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Roll firmly to ensure a watertight seal.

Roll ends and cut edges—Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap edges and roll firmly (see Figure 3). Immediately remove printed plastic release liner from the tape.

Details

Refer to Preprufe Field Application Manual, Section V Application Instructions or visit graceconstruction.com. This manual gives comprehensive guidance and standard details.

Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by power washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Repair small punctures (0.5 in. (12 mm) or less) and slices by applying Preprufe Tape centered over the damaged area and roll firmly. Remove the release liner from the tape. Repair holes and large punctures by applying a patch of Preprufe membrane, which extends 6 in. (150 mm) beyond the damaged area. Seal all edges of the patch with Preprufe Tape, remove the release liner from the tape and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove printed plastic release liner from tape. Where exposed selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe membrane and tape.

It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Following proper ACI guidelines, concrete must be placed carefully and consolidated properly to avoid damage to the membrane. Never use a sharp object to consolidate the concrete.

Removal of Formwork

Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe membranes are not recommended for conventional twin-sided wall forming systems.

A minimum concrete compressive strength of 1500 psi (10 N/mm^2) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

Refer to Grace Tech Letter 17 for information on removal of formwork for Preprufe.

Figure 1

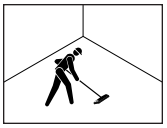


Figure 2

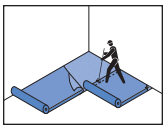
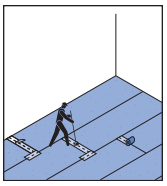
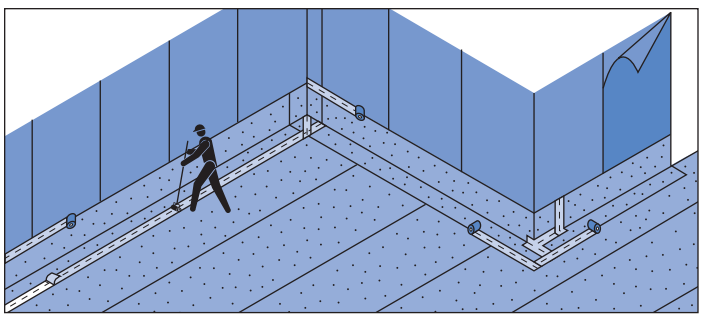


Figure 3

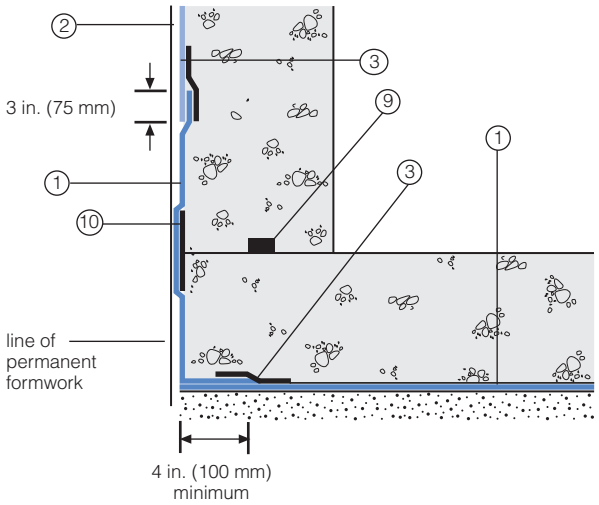




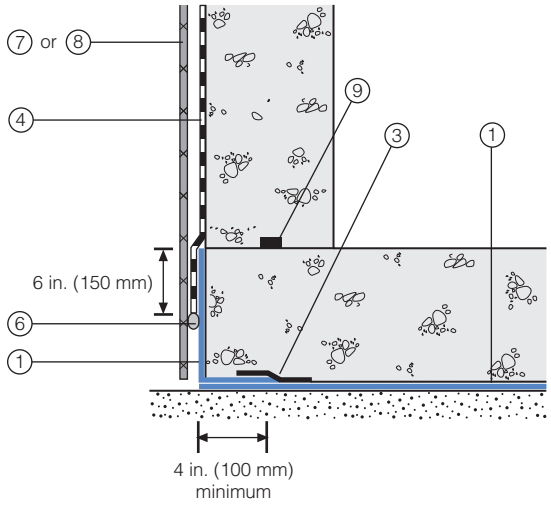
Detail Drawings

Details shown are typical illustrations and not working details. For a list of the most current details, visit us at graceconstruction.com. For technical assistance with detailing and problem solving please call toll free at 866-333-3SBM (3726).

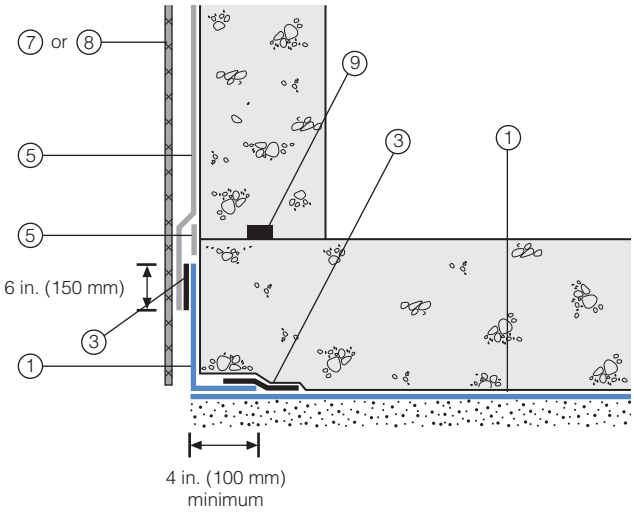
Wall base detail against permanent shutter



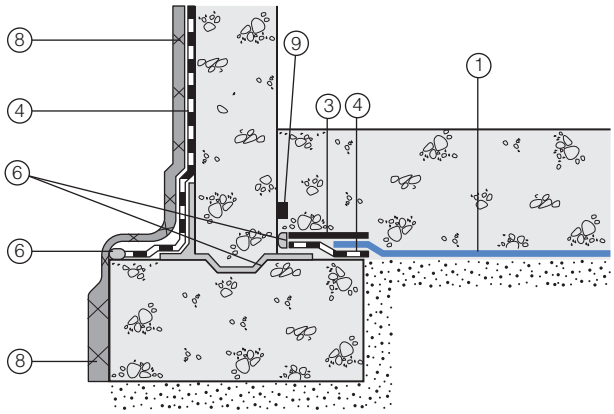
Bituthene wall base detail (Option 1)



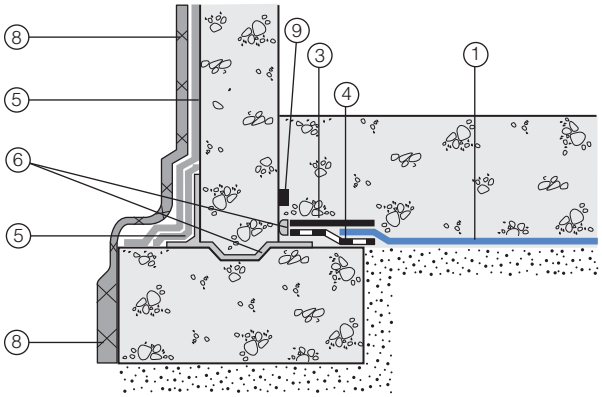
Procor wall base detail (Option 1)



Bituthene wall base detail (Option 2)



Procor wall base detail (Option 2)



1 Preprufe 300R
2 Preprufe 160R
3 Preprufe Tape
4 Bituthene
5 Procor
6 Bituthene Liquid Membrane
7 Protection
8 Hydroduct®
9 Adcor ES
10 Preprufe CJ Tape

Supply

Dimensions (Nominal)	Preprufe 300R Membrane	Preprufe 160R Membrane	Preprufe Tape (LT or HC*)
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	
Roll size	4 ft x 98 ft (1.2 m x 30 m)	4 ft x 115 ft (1.2 m x 35 m)	4 in. x 49 ft (100 mm x 15 m)
Roll area	392 ft^2 (36 m^2)	460 ft^2 (42 m^2)	
Roll weight	108 lbs (50 kg)	92 lbs (42 kg)	4.3 lbs (2 kg)
Minimum side/end laps	3 in. (75 mm)	3 in. (75 mm)	3 in. (75 mm)
* LT denotes Low Temperature (between 25°F (-4°C) and 86°F (+30°C)) HC denotes Hot Climate (50°F (>+10°C))			
Ancillary Products			
Bituthene Liquid Membrane—1.5 US gal (5.7 liter) or 4 US gal (15.1 liter)			

Physical Properties

Property	Typical Value 300R	Typical Value 160R	Test Method
Color	white	white	
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	ASTM D3767
Lateral Water Migration Resistance	Pass at 231 ft (71 m) of hydrostatic head pressure	Pass at 231 ft (71 m) of hydrostatic head pressure	ASTM D5385, modified[1]
Low temperature flexibility	Unaffected at -20°F (-29°C)	Unaffected at -20°F (-29°C)	ASTM D1970
Resistance to hydrostatic head	231 ft (71 m)	231 ft (71 m)	ASTM D5385, modified[2]
Elongation	500%	500%	ASTM D412, modified[3]
Tensile strength, film	4000 psi (27.6 MPa)	4000 psi (27.6 MPa)	ASTM D412
Crack cycling at -9.4°F (-23°C), 100 cycles	Unaffected, Pass	Unaffected, Pass	ASTM C836
Puncture resistance	221 lbs (990 N)	100 lbs (445 N)	ASTM E154
Peel adhesion to concrete	5 lbs/in. (880 N/m)	5 lbs/in. (880 N/m)	ASTM D903, modified[4]
Lap peel adhesion	5 lbs/in. (880 N/m)	5 lbs/in. (880 N/m)	ASTM D1876, modified[5]
Permeance to water vapor transmission	0.01 perms (0.6 ng/(Pa x s x m^2))	0.01 perms (0.6 ng/(Pa x s x m^2))	ASTM E96, method B
Water absorption	0.5%	0.5%	ASTM D570

Footnotes:

1. Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the membrane.
2. Hydrostatic head tests of Preprufe Membranes are performed by casting concrete against the membrane with a lap. Before the concrete cures, a 0.125 in. (3 mm) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to the head indicated.
3. Elongation of membrane is run at a rate of 2 in. (50 mm) per minute.
4. Concrete is cast against the protective coating surface of the membrane and allowed to properly dry (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 2 in. (50 mm) per minute at room temperature.
5. The test is conducted 15 minutes after the lap is formed (per Grace published recommendations) and run at a rate of 2 in. (50 mm) per minute.

Specification Clauses

Preprufe 300R or 160R shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only Grace Construction Products approved membranes shall be bonded to Preprufe 300R/160R. All Preprufe 300R/160R system materials shall be supplied by Grace Construction Products, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available.

NOTE: Use Preprufe Tape to tie-in Procor with Preprufe.

Health and Safety

Refer to relevant Material Safety data sheet. Complete rolls should be handled by a minimum of two persons.

www.graceconstruction.com

For technical assistance call toll free at 866-333-3SBM (3726)

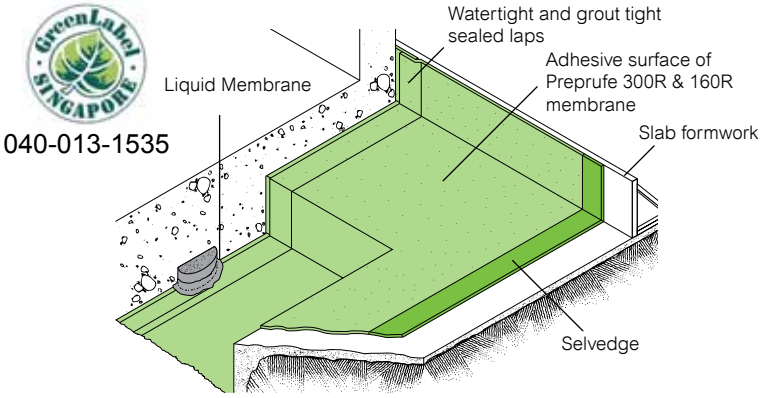
PF-111H Printed in U.S.A. 07/12 FA/PDF

GRACE

Preprufe® 300R & 160R

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites

040-013-1535



Advantages

- Forms a unique integral seal to concrete poured against it. This prevents water migration and makes it unaffected by ground settlement beneath slabs.
- Fully-adhered watertight laps and detailing
- Provides a barrier to water, moisture and gas – physically isolates the structure from the surrounding ground.
- BBA Certified for basement Grades 2, 3, & 4 to BS 8102:1990
- Zero permeance to moisture
- Solar reflective - reduced temperature gain
- Simple and quick to install, requiring no priming or fillets.
- Can be applied to permanent formwork - allows maximum use of confined sites.
- Self protecting - can be trafficked immediately after application and ready for immediate placing of reinforcement.
- Unaffected by wet conditions - cannot activate prematurely.
- Inherently waterproof, non-reactive system:
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- Chemically resistant, effective in all types of soils and waters - protects structure from salt or sulphate attack.

Description

Preprufe® 300R & 160R membranes are unique composite sheets comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating.
Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe seal to concrete prevents any ingress or migration of water around the structure.

The Preprufe R System includes:

- Preprufe 300R - heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- Preprufe 160R - thinner grade for lighter applications and reverse tanking (i.e. blindside zero property line) applications against permanent formwork such as soil retention systems.
- Preprufe Tape LT - for covering cut edges, roll ends, penetrations and detailing (temperatures between -4°C and +30°C).
- Preprufe Tape HC - as above for use in Hot Climates (minimum10°C).
- Liquid Membrane - for sealing around penetrations, etc.

Preprufe 300R & 160R membranes are applied either horizontally to smooth prepared concrete or well rolled and compacted sand or crushed stone blinding; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

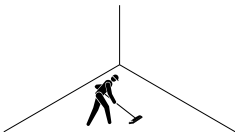
Preprufe can be returned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene self-adhesive membrane or Procor fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.

BBA BRITISH BOARD OF AGREMENT CERTIFICATE No.

Installation

Preprufe® 300R & 160R membranes are supplied in rolls 1.2m wide, with a selvedge on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.

Substrate Preparation



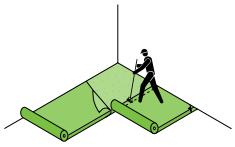
All Surfaces - It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 12 mm. Grout around all penetrations such as utility conduits, etc. for stability.

Horizontal Blinding - Monolithic concrete blinding or mud slab is preferred. The blinding must be free of loose aggregate and sharp protrusions. An angular profiled blinding is recommended rather than a sloping or rounded substrate. The surface does not need to be dry, but standing water must be removed.

Vertical Sheet Piling - Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 12 mm out of alignment.

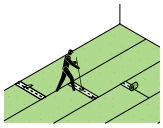
Membrane Installation

Preprufe can be applied at temperatures of -4ºC or above. During cold or damp conditions, the selvedge and tape adhesive can be gently warmed using a hot air gun or similar to remove moisture or condensation and improve initial adhesion.



Horizontal Substrates - Place the membrane HDPE film side to the substrate with printed coated side up facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave plastic release liner in position until overlap procedure is completed. Accurately position succeeding sheets to overlap the previous sheet 75 mm along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

Vertical Substrates - Mechanically fasten the membrane vertically using fixings (i.e. fasteners) appropriate to the substrate with the printed coated side facing towards the concrete pour. The membrane may be installed in any convenient length. Secure the top of the membrane using a batten such as a termination bar or fixing 50 mm below the top edge. Fixings can be made through the selvedge so that the membrane lays flat and allows firmly rolled overlaps. Immediately remove the plastic release liner. Any additional fixings must be covered with a patch of Preprufe Tape. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Roll firmly to ensure a watertight seal. Roll Ends and Cut Edges - Overlap all roll ends and cut edges by a minimum 75 mm and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap and roll firmly. Immediately remove printed plastic release liner from the tape.

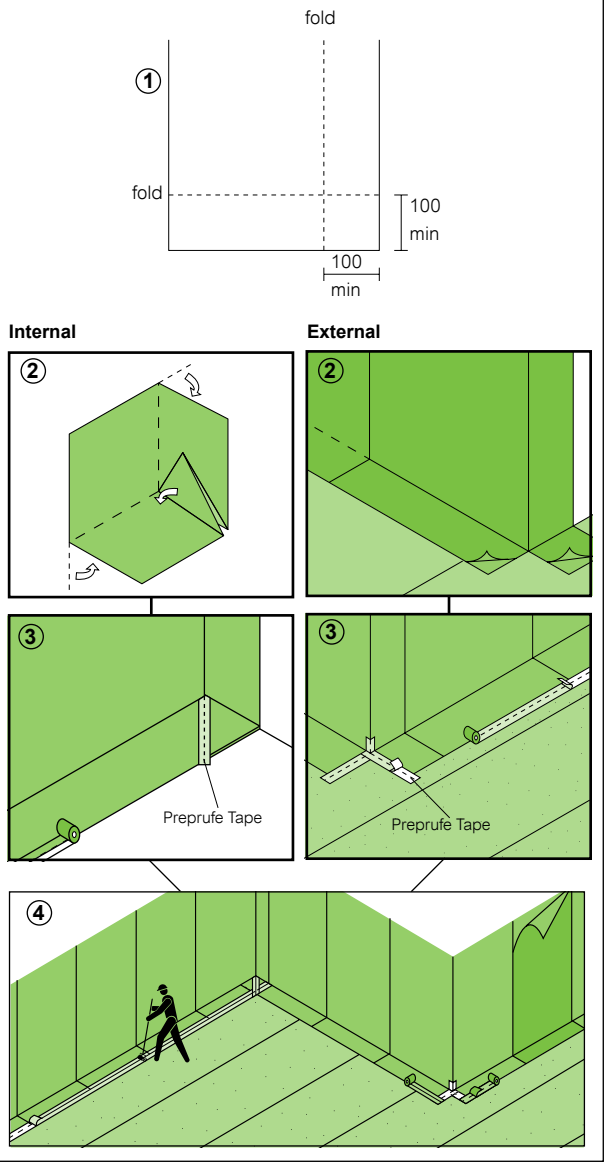


Penetrations

Use the following steps to seal around penetrations such as service pipes, piles, lightning conductors, etc.
Grout around the penetration if the penetration is not stable. Scribe membrane tight to the penetration. If the membrane is not within 12mm of the penetration, apply Preprufe Tape to

Corners

Internal and external corners should be formed as shown in the diagrams returning the membrane a minimum of 100mm and sealing with Preprufe Tape. Ensure that the apex of the corner is covered and sealed with tape and roll firmly. Crease and fold the membrane to ensure a close fit to the substrate profile and avoid hollows.



cover the gap. Wrap the penetration with Preprufe Tape by positioning the tape 12 mm above the membrane.
Mix and apply Bituthene Liquid Membrane around the penetrations using a fillet to provide a watertight seal between the Preprufe membrane and Preprufe Tape.

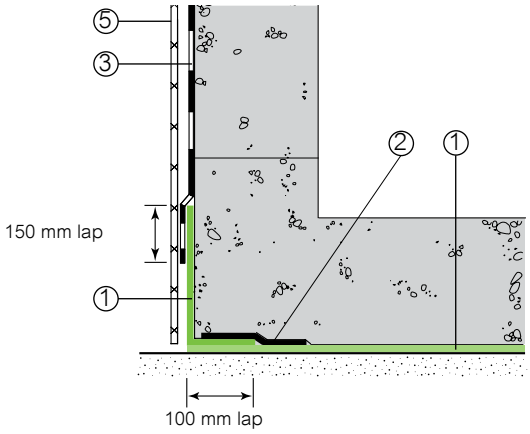
Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by jet washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Apply Preprufe Tape centered over the damaged area and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove printed plastic release liner from tape. Where exposed selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

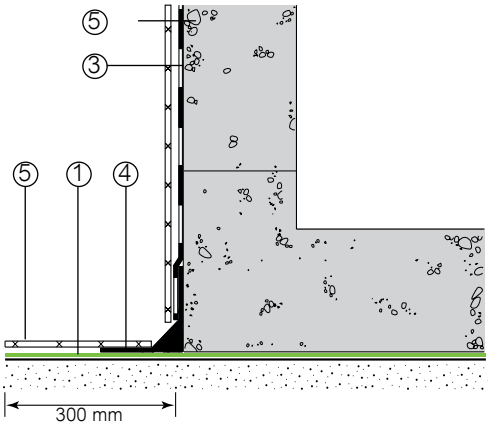
Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe R membrane and Tape. It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Concrete must be placed and compacted carefully to avoid damage to the membrane. Never use a sharp object to consolidate the concrete.

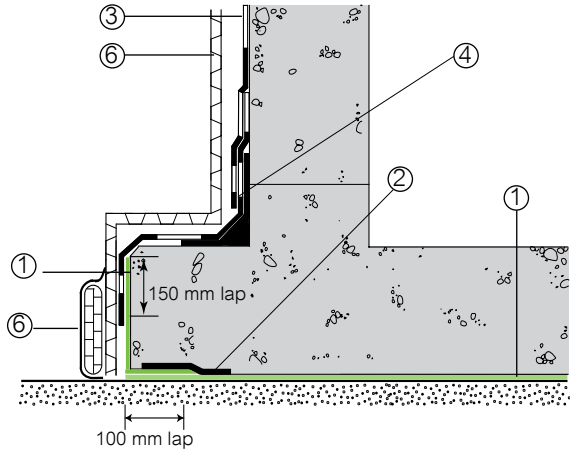
Wall base detail



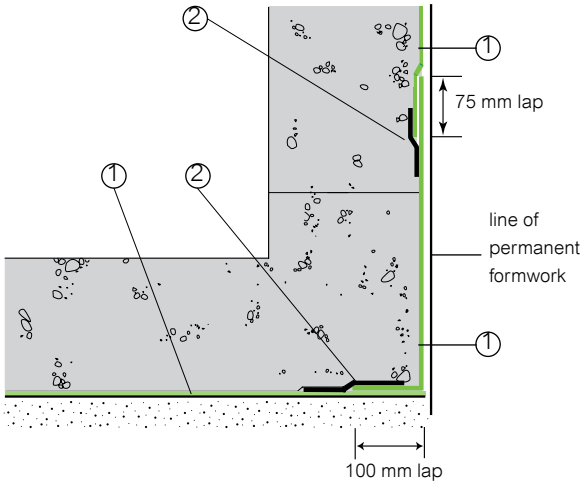
Alternative wall base detail for early shutter removal



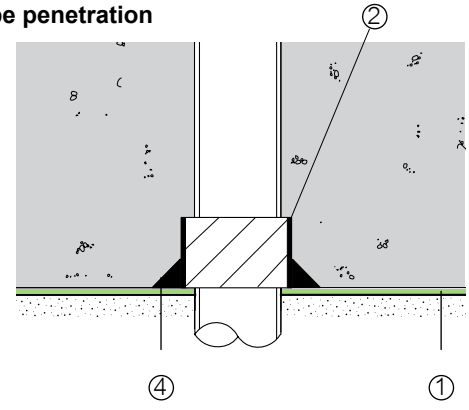
Wall base with toe detail showing drainage option



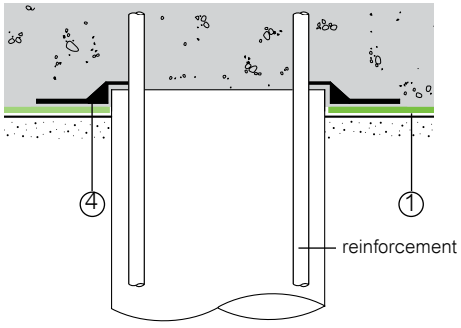
Wall base detail against permanent shutter



Pipe penetration



Pile detail



1 Preprufe
2 Preprufe Tape
3 Bituthene® or Procor®
4 Liquid Membrane
5 Protection
6 Hydroduct®

Details shown are typical illustrations and not working details. For assistance with detailing and problem solving please contact Grace Technical Department.

Physical Properties

Property	Typical Value		Test Method
	300R	160R	
Colour	White		
Thickness*	1.2 mm	0.8 mm	ASTM D3767
Peel Adhesion to Concrete	880 N/m		ASTM D903 modified
Resistance to Hydrostatic Head	>70 m		ASTM D5385 modified
Low Temperature Flexibility	<-23°C		ASTM D1970
Puncture Resistance	990 N	445 N	ASTM E 154
Elongation	300% minimum		ASTM D412 modified
Tensile Strength, Film	27.6 Mpa		ASTM D412
Crack Cycling @ -23°C	Pass		ASTM C 836

Typical test values represent average values from samples tested. Test methods noted may be modified.
* Nominal thickness refers to the thickness of the membrane without release liner.

Supply

Preprufe	300R	160R	Tape LT or HC*
Thickness (nominal)	1.2 mm	0.8 mm	-
Roll size	1.2x30.0 m	1.2x35.0 m	100 mmx15.0 m
Roll area	36.0 m^2	42 m^2	-
Roll weight	50 kg	42 kg	2 kg
Min. edge/end laps	75 mm	75 mm	75 mm

* LT denotes Low Temperature (between -4˚C and +30˚C)
HC denotes Hot Climates (>+10˚C)

Ancillary Products
Liquid Membrane, 5.7 litre

Removal of Formwork

Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe membranes are not recommended for conventional twin-sided wall forming systems.

A minimum concrete compressive strength of 10 N/mm^2 (1500 psi) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

As a guide, to reach the minimum compressive strength stated above, a structural concrete mix with an ultimate strength of 40 N/mm^2 (6000 psi) will typically require a cure time of approximately 6 days at an average ambient temperature of 4ºC, or 2 days at 21ºC.

Specification Clauses

Preprufe 300R or 160R shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only Grace Construction Products approved membranes shall be bonded to Preprufe 300R &160R. All Preprufe 300R &160R system materials shall be supplied by Grace Construction Products, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available.

Health and Safety

Refer to relevant Material Safety data sheet. Complete rolls should be handled by a minimum of two persons.

Grace Technical Services

For assistance with working drawings for projects and additional technical advice, please contact Grace Technical Services.

www.grace.com/construction

Australia 1800 855 525 New Zealand (64-9) 448 1146 China Mainland (86-21) 3158 2888
Hong Kong (852) 2675 7898 India (91-124) 402 8972 Indonesia (62-21) 893 4260 Japan (81-3) 3537 6366
Korea (82-32) 820 0800 Malaysia (60-3) 9074 6133 Philippines (63-49) 549 7373 Singapore (65) 6265 3033
Thailand (66-2) 709 4470 Vietnam (84-8) 3710 6168

GRACE

APPENDIX 7

SUB-SLAB DEPRESSURIZATION AND ACTIVE VENTING SYSTEM INSTALLATION SPECIFICATIONS

APPENDIX 7

SUBSLAB DEPRESSURIZATION AND ACTIVE VENTING SYSTEM INSTALLATION SPECIFICATIONS

SITE: 15 PROSPECT STREET, STATEN ISLAND, NY

These specifications and accompanying plans complement and supplement each other. Both shall be reviewed for performing the project. In case of discrepancies between these specifications and the plans, these written specifications shall prevail.

The design of the Subslab Depressurization and Active Venting System for installation at the above referenced site is presented in Dwgs. 1 thru 9 of 9 of the accompanying plans, dated June 6, 2016. (This set of plans includes the design for Waterproofing and Vapor Barrier system in Dwgs. 4, 5, and 6, as well as the design for a Subslab Depressurization and Active Venting System in Dwgs. 7, 8, and 9, with the preliminary setup plans in Dwgs. 1, 2, and 3 common to both designs.)

The following are the main elements, considerations, and requirements of the design and installation.

These specifications consist of the following Sections:

A. Notes for Site Work – discusses safety and construction issues that are specific to this site

B. Standards – lists applicable standards for construction of the SSDS

C. Piping, Fan, and Related Specifications – provides specifications for the slotted pipe, solid riser, and plugging of utility line and other unintended pathways

D. Piping Support – provides specification for the Blue stone gravel surrounding the pipe and for preparing a compacted and supportive base

E. Documentation – specifies requirements for as-builts and other documentation

A. NOTES FOR SITE WORK

1. The Contractor shall coordinate all work with the Owner designated representative, and receive approvals for any anticipated field deviations from the plans from the design engineer before performing work. [All references to "designated representative" in these plans and specifications shall mean person designated by owner for performing the task under discussion. All references to "design engineer" or "engineer" shall refer to the engineer who designed the SSDS.]

2. The design engineer's prior written approval shall be obtained for any proposed changes to the SSDS, as depicted in these plans and specifications.

3. The Contractor is responsible for any and all damages resulting from improper installation of the SSDS. Receiving approvals of proposed work from the designated representative or design engineer shall not relieve the Contractor of this responsibility, who shall remain responsible for the safety and constructability of the proposed system, except where approval of the portions of the drawings impacting

structural elements is received in writing from the designated Project Architect and/or Structural Engineer.

4. The role of the designated licensed engineer or architect in inspecting and approving the construction shall be limited to verifying that construction was performed in compliance with these plans and specifications and any building permits received for this project (i.e., SSDS).

5. The Contractor shall schedule inspections with the designated inspecting engineer or architect upon preparation of ground and layout of vent piping, and upon completion of all construction. A minimum 48-hour notice shall be given by the Contractor for inspections by the designated inspecting engineer or architect. Additionally, the Contractor is responsible for scheduling inspections by agencies, if required to do so by the project's permits and approvals conditions, in compliance with such conditions.

6. The methods and means of construction shall be the responsibility of the Contractor. All construction shall be performed with good workmanship to the satisfaction of the Owner's representative in-charge of overseeing the construction.

B. STANDARDS

ASTM Standard D2321-89 (Reapproved 1995), "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications," is included here by reference. Unless otherwise stated below, the Contractor shall follow ASTM Standard D2321 during trenching, backfilling, and piping construction. This specification is only needed in areas requiring trenching work.

In addition to the above standard, the Contractor shall follow all applicable Federal, State, and Local codes, regulations, and ordinances pertaining to construction and safety.

The Contractor shall consult with and follow Engineer's instructions in case of any conflicts between these plans and specifications and any of the above standards.

C. PIPING, FAN, AND RELATED SPECIFICATIONS

1. The slotted/perforated portions of the vents shall be protected by a non-woven geotextile fabric, 6 oz/SY, with minimum permittivity of 1.63/Sec, to prevent any migration of fines into the pipes. The catalog sheet for US Fabrics Nonwoven Geotextile US 165NW (Environmental) is provided as an example product meeting the specifications. Any alternative product meeting the above weight and permittivity specifications, with approximately similar strength characteristics, is acceptable. If an alternative product is chosen, the Contractor shall submit, prior to installation, the specifications for that product to the Engineer for review and approval.

2. The horizontal vapor collection piping shall be 4" dia., Sch. 40 PVC, with all matching fittings as needed. The piping shall be slotted, with an open area of 7.5 +/- square inches per foot of pipe length (approximately 5% of total outside surface area of the pipe). A size selection sheet is provided for selecting the slot configuration. The slots shall have a maximum slot width of 0.020" and shall be arranged in a minimum of three (3) rows at 120^{o}. Other slot parameters may be selected based on product availability subject the above specifications in this paragraph.

3. Install piping such that at least one row of slots will be facing the top, to facilitate easier entry for vapors trapped above the pipe and below the slab/vapor barrier/insulation.

4. Perforated piping may be used with Engineer's prior approval, provided the areas of openings is 5 +/- %, and the holes are no larger than one-quarter of an inch (1/4"). In this event, product catalog sheet shall be submitted to the Engineer for review and approval prior to installation.

5. The underground slotted pipe (or perforated pipe to be used with design engineer's approval) will be vented to the atmosphere through a 4" cast iron vent riser installed next to the elevator as shown in the plans. The height of the riser is variable; however, it shall be a minimum 3' above the outside grade or minimum 3' above top of slab, whichever is higher.

6. An inline, centrifugal duct fan, 9-5/8" length, 4" dia., 115V, 0.18A, 122 cfm @ 0" SP, Fantech Model FR100, Supplier: Grainger, or approved equivalent shall be installed at the top of the riser and connected for continuous operation. A sound and light alarm signal, with manual reset, shall be installed in the office of the building Supervisor to provide immediate feedback in case of its malfunction. At the rated flow rate, the vapors in the subsurface 6" Blue stone gravel zone over the entire footprint of the building on the first floor will be vented approximately once every 10 minutes, i.e., five to six air changes per hours (5-6 ACH).

7. All underground utility conduits and any other underground conduits shall be properly sealed at both ends to prevent the migration of gases through them into the buildings. All unpressurized water and wastewater lines connected to the buildings shall be equipped with house traps (P-traps) to prevent the migration of gases through them into the buildings, unless otherwise specified by the Plumbing and Building Codes. These lines shall be equipped with vents on the outside of the buildings such that the P-traps are located between these vents and the buildings to which they are connected, unless otherwise specified by the Plumbing and Building Codes. These measures are not needed for city water supply lines.

D. PIPING SUPPORT

1. The Blue stone gravel surrounding the pipe, installed as depicted in the plans, shall be maximum one-half inch (1/2"), smooth, and rounded.

2. Outside of this Blue stone gravel envelope surrounding the piping, to ensure its structural integrity, it is important that the base and all sides are properly compacted with structurally

sound materials. To this end, the following instructions #3 to #8 are provided. The Contractor shall consult with the Project Architect and/or Structural Engineer for their acceptability, and in case of conflict, their instructions shall be followed provided it is ensured that firm support is provided for the piping by the alternative methods specified by them.

3. All soil material used as backfill ("fill") or sand bedding shall be completely free of organic material, and free of all extraneous materials such as roots, tree stumps, construction spoils, or any other material that would eventually degrade and cause a change in soil volume. Backfill shall also be free of rocks, bricks, nails, or any other hard, sharp material that could damage the gas collection piping in the trench.

4. Any backfill or sand bedding shall not contain any frozen material and shall not be placed on frozen ground because of significant damage that can occur when the material thaws.

5. Backfill/sand bedding shall be mixed and deposited in a manner as to produce reasonable uniformity throughout the mass.

6. Backfill/sand bedding shall be carefully deposited into the excavation and compacted to form a uniform, dense, and stable mass. Before a new layer of backfill/sand bedding is deposited on a freshly compacted layer, the surface of the compacted layer shall be scarified to enhance mechanical bonding between the surfaces of the two layers.

7. Field inspection must be conducted while construction is in progress.

8. The existing ground surface level shall be "dressed" to remove sharp or protruding objects such as roots or jagged rock fragments.

E. DOCUMENTATION

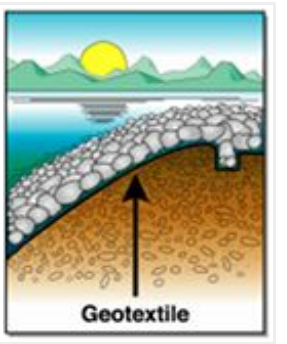
1. Any changes made to these plans and specifications with prior approval from the Engineer shall be annotated at the time of modification, and not at a later time. As-built documents reflecting the changes, including drawing markups, shall be submitted for verification and approval to the design engineer, or designated licensed engineer or architect, per Owner's direction, when requested at any time during the course of the project, and a complete package shall be submitted at the conclusion of construction.

2. The Contractor shall document all work with photographs and logbooks. The logbooks shall remain available at the site at all times for review and inspection. Annotated photographs shall be submitted to the Owner's designated representative and/or to the design engineer upon request and at the conclusion of the project.

US 165NW (Environmental)

Nonwoven Geotextile

US 165NW is a 6 OZ MARV WEIGHT nonwoven needlepunched geotextile made of 100% polypropylene staple filaments. US 165NW is resistant to ultraviolet deterioration, rotting, biological degradation, naturally encountered bases and acids. Polypropylene is stable within a pH range of 2 to 13. US 165NW meets the following M.A.R.V. values:



PROPERTY	TEST METHOD	ENGLISH	METRIC
Weight	ASTM D-5261	6 oz/sy	203 g/sm
Tensile Strength	ASTM D-4632	160 lbs	711 N
Elongation @ Break	ASTM D-4632	50%	50%
Thickness	ASTM D-5199	85 mils (at time of manufacture)	2.16 mm (at time of manufacture)
Mullen Burst*	ASTM D-3786*	330 psi	2,274 kPa
Puncture Strength*	ASTM D-4833*	95 lbs	423 N
CBR Puncture	ASTM D-6241	450 lbs	2,000 N
Trapezoidal Tear	ASTM D-4533	65 lbs	290 N
Apparent Opening Size	ASTM D-4751	70 US Sieve	0.212 mm
Permittivity	ASTM D-4491	1.63 Sec-1	1.63 Sec-1
Permeability	ASTM D-4491	0.48 cm/sec	0.48 cm/sec
Water Flow Rate	ASTM D-4491	125 g/min/sf	5,080 l/min/sm
UV Resistance @ 500 Hours	ASTM D-4355	70%	70%

ROLL SIZE	ROLL DIAMETER	AREA	WEIGHT
15' x 300'		500 sys	210 lbs

* Historical averages (current values not available): Mullen Burst Strength ASTM D3786 is no longer recognized by ASTM D-35 on Geosynthetics as an acceptable test method. Puncture Strength ASTM D4833 is not recognized by AASHTO M288 and has been replaced with CBR Puncture ASTM D6241.

Screen Slot Table

Readily available pipe sizes and slot configurations, other sizes, wall thickness and slot patterns available upon request

Pipe Size	Outside Diameter	Wall Thickness SCH 40	Wall Thickness SCH 80	A Maximum Max Rows of Slots	B Approximate Slot Length SCH 40	B Approximate Slot Length SCH 80
1/2"	.840"	.109"	.147"	2	.47"	.45"
3/4"	1.050"	.113"	.154"	2	.68"	.62"
1"	1.315"	.113"	.179"	3	.70"	.65"
1-1/4"	1.660"	.140"	191"	3	.78"	74"
1-1/2"	1.900"	.145"	.200"	3	.88"	.75"
2"	2.375"	.154"	.218"	3	1.50"	1.30"
2-1/2"	2.875"	.203"	.276"	3	1.40"	1.32"
3"	3.500"	.216"	.300"	3	1.54"	1.40"
4"	4.500"	.237"	.337"	4 or 6	1.50"/1.10"	1.20"/N/A
4-1/2"	4.950"	.248"	N/A	4	1.47"	N/A
5"	5.563"	.258"	.375"	4	1.45"	1.40"
6"	6.625"	.280"	.432"	5	1.90"	1.80"
8"	8.625"	.332"	.500"	6	2.35"	1.60"
10"	10.750"	.365"	.593"	7	2.40"	1.60"
12"	12.750"	.460"	.687"	7 or 8	2.75"	2.20"
14"	14.000"	.438"	.750"	8	2.24"	1.73"
16"	16.000"	.500"	.843"	10	2.30"	1.57"
18"	18.000"	.532"	.937"	10	2.40"	N/A

Calculating the Intake Open Area of Titan's PVC Slotted Screen

Approximate open area per foot of screen for a variety of slot configurations can be easily calculated by the instructions and charts.

1. Choose the size and schedule of PVC Screen
2. Choose a slot configuration
   - A. Rows of Slots
   - B. Slot Length
   - C. Slot Width
   - D. Slots per Row per Foot
3. Multiply the figure for A, B, C, D, for the total open area per foot of slotted PVC Screen.

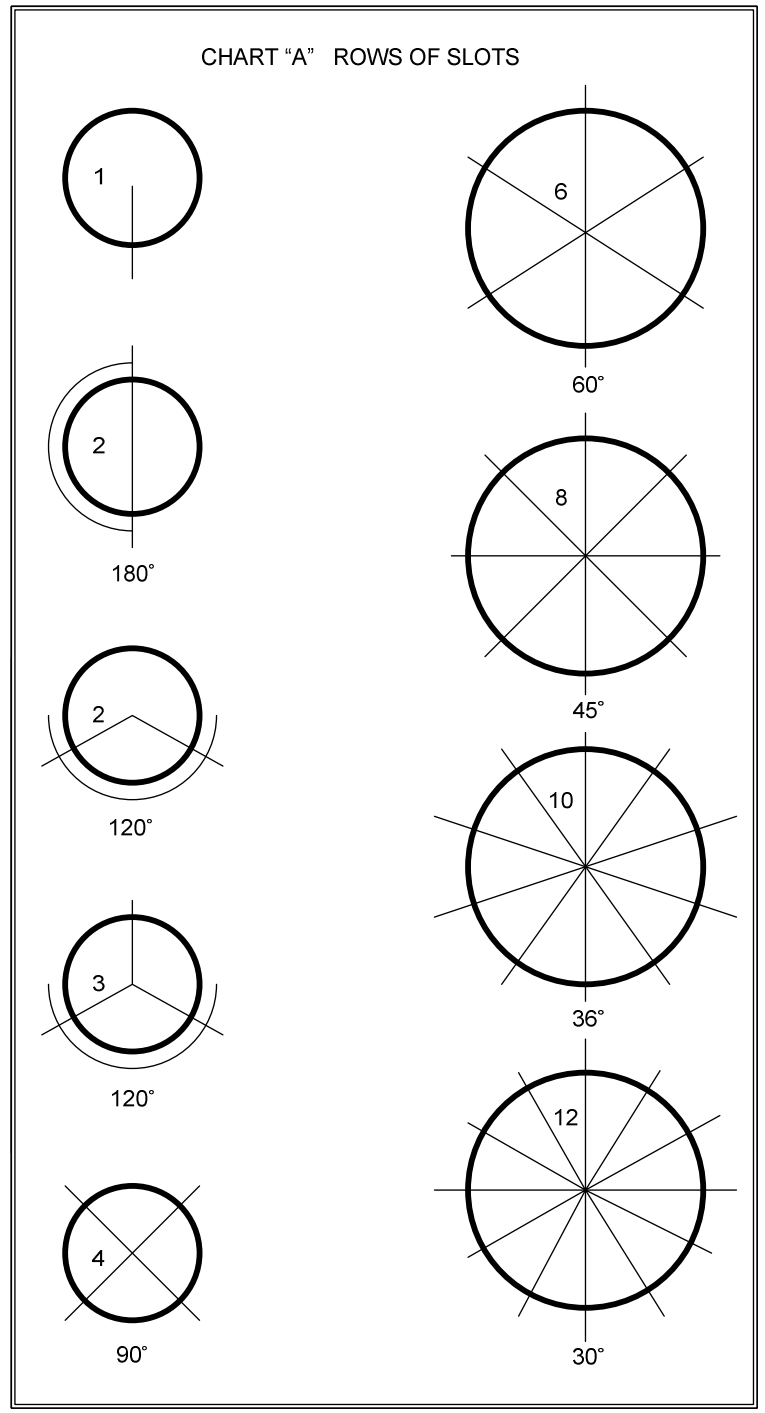
EXAMPLE

4" SCH 40 with 4 rows of .010" wide slots on 90 degree centers with 1/4" spacing.

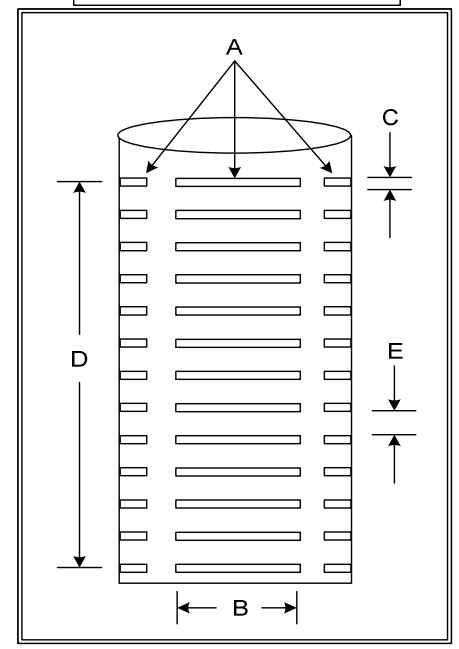
4 rows (A) X 1.50" (B) X 0.10" (C) X 42 (D) = 2.52 Square inches of open area per foot of slotted PVC screen.

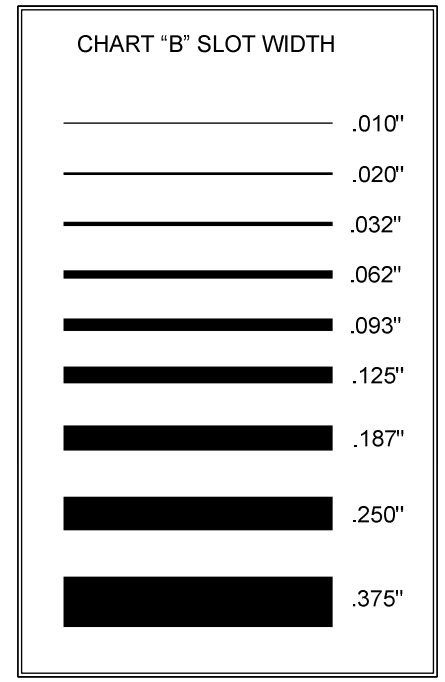
Common pipe sizes and slot configurations are shown, other sizes up to 48", SCH or SDR'S and slot patterns are available upon request. Slot spacing and slot length is nominal, small variances may occur due to ovality of pipe and the effects of temperature.

C Slot Width	D Slot/Row Foot	E Slot Spacing
.010" & .015" & .020"	80	1/8"
	42	1/4"
	21	1/2"
	15	3/4"
	11	1"
	6	2"
	4	3"
	2	6"
.032" & .062"	62	1/8"
	36	1/4"
	20	1/2"
	14	3/4"
	11	1"
	6	2"
	4	3"
	2	6"
.093"	32	1/4"
	19	1/2"
	13	3/4"
	11	1"
	6	2"
	4	3"
	2	6"
.125"	19	1/2"
	14	3/4"
	11	1"
	6	2"
	4	3"
	2	6"
.187"	17	1/2"
	13	3/4"
	10	1"
	5	2"
	4	3"
	2	6"
.250"	16	1/2"
	12	3/4"
	10	1"
	5	2"
	3.5	3"
	2	6"
.375"	14	1/2"
	11	3/4"
	9	1"
	5	2"
	3.5	3"
	2	6"



A: ROWS OF SLOTS
B: SLOT LENGTH
C: SLOT WIDTH
D: SLOT PER ROW PER FOOT
E: SLOT SPACING





FANTECH

Thermoplastic Inline Centrifugal Duct Fan, Fits Duct Dia. 4", Voltage 120V

Item# **5C516** Mfr. Model# **FR100** Catalog Page# **3689** UNSPSC# **40101604**

TRIPLEGUARD

How can we improve our **Product Images**?

Compare

Price
$236.75 / each

Deliver one time only

Auto-Reorder Every 1 Month

1 ADD TO CART

+ Add to List

Confirm ZIP Code to determine availability.

11743 SAVE

4.5 of 5 | 2 reviews | Write a Review

Shipping Weight **5.15 lbs.**

Country of Origin **Varies** | *Country of Origin is subject to change.*

Note: Product availability is real-time updated and adjusted continuously. The product will be reserved for you when you complete your order. More

PRODUCT DETAILS

Centrifugal, in-line duct fan mounts horizontally or vertically. It is engineered with ball bearings, speed controls, designer grilles, and dampers to help provide lower sound levels than comparable surface-mounted fans. Mounting bracket included. Suitable for radon gas mitigation.

TECHNICAL SPECS

Item	**Inline Centrifugal Duct Fan**
Housing Material	**Thermoplastic**
Fits Duct Dia.	**4"**
Voltage	**120V**
Max. Amps	**0.18**
Max. Wattage	**19**
Number of Speeds	**1**
Housing Dia.	**9-1/2"**
Length	**9-5/8"**
CFM @ 0.000-In. SP	**122**
CFM @ 0.200-In. SP	**100**
CFM @ 0.400-In. SP	**78**
CFM @ 0.600-In. SP	**55**

Inlet and Outlet Dia.	**3-7/8"**
Hz	**60**
Phase	**1**
Motor HP	**1/50**
Motor RPM	**2900**
Motor Enclosure	**Totally Enclosed**
Bearing Type	**BALL**
Flange Width	**7/8"**
Speed Control	**Mfr. No. 48C172**
Mounting Position	**Horizontal or Vertical**
Standards	**C-UL-US**
Includes	**Mounting Bracket**
Green Certification or Other Recognition	**ENERGY STAR Rated**
Green Environmental Attribute	**Product Contributes To Reducing Energy Consumption**

CFM @ 0.800-In. SP	**15**
Max. Inlet Temp.	**140 Degrees F**