



# MATERIAL SAFETY DATA SHEET

24 Hour Emergency Phone 316/524-5751

## **SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

### PRODUCT NAME

Perchloroethylene, All Grades and PerSec®

### CHEMICAL NAME

Tetrachloroethylene

### SYNONYMS

Perc

### MANUFACTURER

Vulcan Chemicals, P O Box 385015, Birmingham, AL 35238-5015

## **SECTION 2 COMPOSITION INFORMATION ON INGREDIENTS**

<u>CHEMICAL NAME</u>	<u>CAS NUMBER</u>	<u>% RANGE</u>	<u>ACGIH TLV</u>
* Tetrachloroethylene	127-18-4	100	25 ppm

\* Denotes chemical subject to reporting requirements of Section 313 of Title III of the 1986 Superfund Amendments and Reauthorization Act (SARA) and 40 CFR Part 372

## **SECTION 3 HAZARDS IDENTIFICATION**

### EMERGENCY OVERVIEW

A dense, nonflammable, colorless, clear liquid with a mildly sweet odor.

WARNING! Harmful if inhaled. Can cause skin and eye irritation.

POSSIBLE CANCER HAZARD May cause cancer based on animal data.

### POTENTIAL HEALTH EFFECTS

#### INHALATION

Inhalation is the major potential route of exposure. Exposure to high concentrations of vapor or mist can cause central nervous system depression with symptoms of headache, dizziness, stupor, loss of consciousness or death depending on concentration and duration of exposure. Exposure to high concentrations can cause irregular heartbeat, cardiac arrest and death. Overexposure has been shown to cause adverse effects on the lungs, liver, kidney, nervous system and other internal organs.

#### SKIN

Prolonged or repeated contact of liquid can cause irritation, defatting of skin, and dermatitis. Prolonged single exposure can result in progressively severe burning sensation and redness. May be absorbed through the skin and cause adverse health effects as described in the Inhalation section above.

#### EYE

Liquid in eyes produces pain and irritation with mild temporary damage possible. Vapor can irritate eyes.

#### INGESTION

Single dose toxicity is moderate and causes severe gastrointestinal irritation with nausea, vomiting, stomach cramps, and diarrhea likely. Ingestion or vomiting can result in aspiration into the lungs which can cause chemical pneumonia and systemic effects. Ingestion can also cause central nervous system depression with symptoms of headache, dizziness, stupor, loss of consciousness or death. Ingestion can cause irregular heartbeat, cardiac arrest and death. Ingestion can cause adverse effects on the liver, kidney, nervous system and other internal organs.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE**

Acute and chronic liver and kidney disease, rhythm disorders of the heart, and neuritis. Exposure can result in cardiac sensitization and increase the risk of cardiac arrest.

**INTERACTIONS WITH OTHER CHEMICALS WHICH ENHANCE TOXICITY**

Consumption of alcoholic beverages may increase potential for development of toxic effects resulting from exposure to this product.

**CHRONIC EFFECTS**

Prolonged overexposure has caused toxic effects on the liver and kidneys, and has caused cancer in certain laboratory animal tests. IARC has classified perchloroethylene in Group 2A as a substance considered probably carcinogenic to humans. Perchloroethylene appears on the NTP carcinogen list.

See Section 11 for additional toxicological information.

**SECTION 4 FIRST AID MEASURES****INHALATION**

Remove to fresh air. If breathing has stopped, administer artificial respiration. Contact physician or emergency medical facility immediately.

**SKIN**

Remove contaminated clothing and shoes. Wash exposed area thoroughly with soap and water for at least 15 minutes. Wash contaminated clothing before reuse.

**EYES**

Immediately flush eyes with large amounts of water for at least 15 minutes while frequently lifting the upper and lower eyelids. If irritation persists, call a physician.

**INGESTION**

Do not induce vomiting. Contact physician or emergency medical facility immediately. Never give anything by mouth to an unconscious person.

**NOTES TO PHYSICIAN**

Chlorinated hydrocarbons may sensitize the heart to epinephrine and other circulating catecholamines so that arrhythmias may occur. Careful consideration of this potential adverse effect should precede administration of epinephrine or other cardiac stimulants and the selection of bronchodilators.

See Section 11 for Toxicological Information

**SECTION 5 FIRE FIGHTING MEASURES****FLAMMABLE PROPERTIES**

**FLASH POINT**  
None (TCC)

**AUTOIGNITION TEMPERATURE**  
None

**FLAMMABLE LIMITS IN AIR (PERCENT BY VOLUME)**  
None

**HAZARDOUS COMBUSTION PRODUCTS**  
Hydrogen chloride, phosgene, chlorine.

**EXTINGUISHING MEDIA**  
Nonflammable, use agent suitable for surrounding fire.

**FIRE FIGHTING INSTRUCTIONS**

Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Use flooding quantities of water as fog or spray to keep fire-exposed containers cool. Extinguish fire using agent suitable for surrounding fire.

Firefighters should wear self-contained, positive-pressure breathing apparatus and avoid skin contact.

**SECTION 6 ACCIDENTAL RELEASE MEASURES**

Evacuate the area, ventilate, and avoid breathing vapors. Dike area to contain spill. If spill occurs indoors, turn off heating and/or air conditioning systems to prevent vapors from contaminating entire building. Clean up area (wear protective equipment - refer to Section 8) by mopping or with absorbent material and transfer to closed containers for disposal. Avoid contamination of ground and surface waters. Do not flush to sewer. All spills or leaks of this material must be handled and disposed of in accordance with local, state and Federal regulations.

Notify National Response Center (800/424-8802), and any state and local agencies as applicable, of uncontained releases to the environment in excess of the EPA Reportable Quantity (RQ). See Section 15 for regulatory information.

For all transportation accidents, call CHEMTREC at 800/424-9300.

**SECTION 7 HANDLING AND STORAGE****HANDLING**

Avoid contact with skin and avoid breathing vapors. Do not eat, drink, or smoke in work area. Wash hands prior to eating, drinking, or using restroom. Any clothing or shoes which become contaminated with perchloroethylene should be removed immediately and thoroughly laundered before wearing again.

Carefully monitor handling, use and storage to avoid spills and leaks. Follow protective controls set forth in Section 8 when handling this product. Do not use in poorly ventilated or confined spaces. Vapors are heavier than air and will collect in low areas. Do not enter confined spaces such as tanks or pits without following proper entry procedures as required by 29 CFR 1910.146.

**STORAGE****STORAGE CONDITIONS**

Store in labeled, sealed containers in a cool, dry, well-ventilated area. Keep containers tightly closed when not in use. Do not store in open, unlabeled or mislabeled containers. Do not remove or deface label. Prevent water or moist air from entering storage tanks or containers.

Do not reuse drum without recycling or reconditioning in accordance with any applicable federal, state or local laws. Do not use cutting or welding torches, open flames, or electric arcs on empty or full containers.

**SHELF LIFE LIMITATIONS**

Perchloroethylene has an indefinite shelf life when stored under recommended conditions.

**INCOMPATIBLE MATERIALS FOR STORAGE OR TRANSPORT**

Aluminum equipment should not be used for storage and/or transfer.

**SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION****ENGINEERING CONTROLS****VENTILATION**

Do not use in closed or confined space. Open doors and/or windows. Use ventilation to maintain exposure levels below 25 ppm time-weighted average (TWA). To determine exposure level(s), monitoring should be performed regularly.

**PERSONAL PROTECTIVE EQUIPMENT****EYE AND FACE PROTECTION**

Wear safety glasses. Contact lenses should not be worn. Chemical goggles and/or face shields should be worn where splashing is a possibility.

**SKIN PROTECTION**

Wear solvent-resistant gloves such as Viton, polyvinyl alcohol, or equivalent. Solvent-resistant boots, apron, headgear and/or faceshield should be worn where splashing is a possibility. Safety shower and eyewash station should be available.

**RESPIRATORY PROTECTION**

Where vapor concentration exceeds or is likely to exceed 25 ppm, a NIOSH approved organic vapor type half-mask respirator is acceptable. A NIOSH approved self-contained breathing apparatus or air line respirator, with full face piece, is required for vapor concentrations above 150 ppm and for spills and/or emergencies. Follow any applicable respirator use standards or regulations.

**GENERAL**

Protective equipment and clothing should be selected, used, and maintained according to applicable standards and regulations. For further information, contact the clothing or equipment manufacturer or the Vulcan Chemicals Technical Service Department.

**EXPOSURE GUIDELINES**

Vulcan Chemicals recommends that its customers minimize employee exposure. Vulcan therefore suggests that its customers consider adopting the lower of the current OSHA PEL or the ACGIH TLVs for the purpose of evaluating employee exposures. The TLVs recommended by the ACGIH have been updated on a continuing basis.

**ACGIH:** 25 ppm TWA (8 hr), 100 ppm STEL  
(Based on irritation and CNS effects)

**OSHA:** 100 ppm TWA (8 hr)

**ACGIH Biological Exposure Indices:**

Exhaled Air: 10 ppm, Blood: 1 mg/L,  
Urine: 7 mg/L

**IMMEDIATELY DANGEROUS TO LIFE OR HEALTH**

150 ppm

**ODOR THRESHOLD**

Odor threshold approximately 50 ppm; causes olfactory fatigue (temporary loss of odor perception for this product).

**SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES****CHEMICAL FORMULA**

$C_2Cl_4$

**MOLECULAR WEIGHT**

165.82

**APPEARANCE AND ODOR**

Colorless, clear liquid; mildly sweet odor

**SPECIFIC GRAVITY**

1.62 @ 25/25°C

**VAPOR PRESSURE**

13 mm Hg @ 20°C

**VOLATILES, PERCENT BY VOLUME**

100

**BOILING POINT**

250°F (121.1°C)

**VAPOR DENSITY**

5.8 (Air=1)

**EVAPORATION RATE**

(ether = 1): 0.1

**SOLUBILITY IN WATER**

0.015 gm/100 gm @ 25°C

**SECTION 10 STABILITY AND REACTIVITY****CHEMICAL STABILITY**

Stable

**CONDITIONS TO AVOID**

Avoid contact with open flame, electric arcs, or other hot surfaces which can cause thermal decomposition.

**INCOMPATIBILITY WITH OTHER MATERIALS**

Strong oxidizers, barium, lithium

**HAZARDOUS DECOMPOSITION PRODUCTS**

Hydrogen chloride, phosgene, chlorine.

**HAZARDOUS POLYMERIZATION**

Will not occur

**SECTION 11 TOXICOLOGICAL INFORMATION****ACUTE TOXICITY****INHALATION**

100 ppm for 7 hours causes mild irritation to eyes, nose, and throat; flushing of face and neck; headache, slurred speech, and drowsiness. 200 ppm for 1 hour causes the same symptoms, plus dizziness and lightheadedness. 600 ppm for 10 minutes causes sensation of numbness around mouth, dizziness, and incoordination; 2,000 ppm causes mild narcosis within 5 minutes. 5,000 ppm cannot generally be tolerated and causes vertigo, nausea, and mental confusion. Unconsciousness or death can occur at extremely high concentrations or on prolonged exposures above 500 ppm.

**ANIMAL TOXICOLOGY**

Inhalation LC<sub>50</sub>: > 2,000 ppm - 4 hours (rat)  
Dermal LD<sub>50</sub>: > 10 g/kg (rabbit)  
Oral LD<sub>50</sub>: > 5000 mg/kg (rats)

**CHRONIC TOXICITY**

Adverse effects on the liver have been reported in humans from repeated or prolonged exposure.

Studies have shown an association between long-term occupational exposure to perchloroethylene and subtle changes in clinical liver and kidney tests, and neurobehavioral tests. One study indicated an increased incidence of subclinical hepatic effects (ultrasonic changes) of unknown significance among workers exposed to perchloroethylene as compared to other workers. The toxicological and clinical significance of these findings is not clear at this time.

One published epidemiology study reported a dose-related impairment of color vision (color blindness) among dry cleaning workers exposed to perchloroethylene.

Adverse effects on the liver and kidneys have been reported in laboratory animal studies. The finding of chronic toxic effects in laboratory animals may indicate toxicity to humans. Overexposure should be avoided, failure to do so could result in injury, illness or even death, depending on the level and duration of exposure.

**CARCINOGENICITY**

A lifetime oral gavage study in rats and mice resulted in an increased incidence of liver tumors in mice. An increased incidence of liver tumors in mice and kidney tumors in male rats was observed in a lifetime inhalation study. Findings from these studies were considered to be treatment-related. The relevance of these animal cancer findings to humans is not clear at this time.

The International Agency for Research on Cancer (IARC) has concluded that with respect to perchloroethylene, there is sufficient evidence of carcinogenicity to experimental animals, and limited evidence of carcinogenicity to humans, resulting in a classification in Group 2A as a substance probably carcinogenic to humans. The NTP has identified perchloroethylene as an animal carcinogen. ACGIH classifies perchloroethylene as an A3 - Animal Carcinogen.

Published studies have associated occupational exposure to dry cleaning solvents with increased incidence of some forms of cancer. Some of these studies include exposure to other substances and do not demonstrate a statistically significant relationship between perchloroethylene exposure and increased cancer incidence. Other studies report increased cancer incidence in workers exposed primarily to perchloroethylene, but do not rule-out other potential causes such as alcohol consumption and smoking. The relationship between occupational perchloroethylene exposure and increased cancer incidence is not clear at this time.

**MUTAGENICITY**

Several tests have shown positive findings, but the weight of evidence indicates that perchloroethylene is not mutagenic or genotoxic.

**REPRODUCTIVE TOXICITY**

Laboratory animal studies on mice, rats and rabbits have been conducted to evaluate the potential reproductive and developmental effects of perchloroethylene exposures. Perchloroethylene exposure by inhalation was found to cause transitory delays in the skeletal development of fetal rats and mice, increased fetal resorptions (fetal death) in rats, and impaired neuromotor function in rats. Perchloroethylene exposure has not been shown to cause teratogenic effects (birth defects) in experimental animals.

A recent epidemiology study reported a slight increase in miscarriages for operators of dry cleaning equipment (1:6 vs. 1:8 for the general population) though no differences were observed for workers in dry cleaning facilities that did not operate dry cleaning equipment. The authors concluded that the increased rate of miscarriages could not be specifically attributed to exposure to perchloroethylene

**SECTION 12 ECOLOGICAL INFORMATION****ENVIRONMENTAL FATE**

Water: Slow biodegradation may occur in groundwater where acclimated populations of microorganisms exist. Perchloroethylene does not significantly bioconcentrate in aquatic organisms or adsorb to sediment. Perchloroethylene in water is subject to volatilization, with half-life estimates ranging from less than one day to several weeks.

Octanol/Water Partition Coefficient (log  $K_{ow}$ ) is 2.88

Soil: Perchloroethylene can leach rapidly through sandy soil to reach groundwater. Soil adsorption potential is low. Will not significantly hydrolyze in soil or water under normal environmental conditions.

Air: Vapors in air are subject to photooxidation, but do not contribute to tropospheric ozone formation. Half-life estimates range from 2 months to less than 1 hour.

**ECOTOXICITY**

Acute LC <sub>50</sub> (96 Hours) for Fathead Minnow:	15.7 ppm
Acute LC <sub>50</sub> (96 Hours) for Bluegill:	12.9 ppm
Acute LC <sub>50</sub> (96 Hours) for Mysid	10.2 ppm
Acute LC <sub>50</sub> (96 Hours) for Sheepshead Minnow:	29.4 - 52.2 ppm

**SECTION 13 DISPOSAL CONSIDERATIONS**

All disposals of this material must be done in accordance with local, state and Federal regulations. Waste characterization and compliance with disposal regulations are the responsibilities of the waste generator.

**SPILL RESIDUES**

Recovered liquids may be sent to an EPA permitted reclaimer or incineration facility. Contaminated material must be disposed of in a permitted waste management facility. Consult federal, state, or local disposal authorities for approved procedures.

**SECTION 14 TRANSPORT INFORMATION****DOT IDENTIFICATION NO.**

UN 1897

**DOT SHIPPING DESCRIPTION (49 CFR 172.101)**

Tetrachloroethylene, 6.1, UN 1897, PG III, RQ, Marine Pollutant

**PLACARD REQUIRED**

KEEP AWAY FROM FOOD, 1897, Class 6

**LABEL REQUIRED**

KEEP AWAY FROM FOOD, Class 6

Label as required by OSHA Hazard Communication Standard, and any applicable state and local regulations.

**IMO REQUIREMENTS**

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**SECTION 15 REGULATORY INFORMATION****U S FEDERAL REGULATIONS****REPORTABLE QUANTITY (RQ)**

Reportable Quantity is 100 lbs.

**TOXIC SUBSTANCES CONTROL ACT**

Listed on TSCA Inventory

**SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) TITLE III**

Components identified with an asterisk (\*) in Section 2 are subject to the reporting requirements of Section 313 of Title III of the 1986 Superfund Amendments and Reauthorization Act (SARA) and 40 CFR Part 372.

**SARA HAZARD CATEGORIES (40 CFR 370.2)**

HEALTH: Immediate Health, Delayed Health

**INTERNATIONAL REGULATIONS****CANADA****WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) CLASSIFICATION**

WHMIS Classifications applicable to this product:

D-1B (Toxic Material) based on assignment to TDG Class 6.1, PG III

D-2A (Very Toxic Material) based on classification as 2A carcinogen by IARC

**CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)**

All components of this product are on the Domestic Substances List (DSL).

**HAZARDOUS PRODUCTS ACT**

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR).

**EUROPE**

EINECS No.: 204-825-9

**STATE REGULATIONS****CALIFORNIA PROPOSITION 65**

The State of California has listed perchloroethylene under Proposition 65 as a chemical known to the state to cause cancer.

**SECTION 16 OTHER INFORMATION****NFPA RATINGS**

Health 2, Flammability 0, Reactivity 0

**Medical Emergencies:**

Call toll-free 24 hours a day  
for emergency toxicological  
information 888/211-9412

**Other Emergency information:**

Call 316/524-5751 (24 Hours)

**For any other information contact:**

Vulcan Chemicals  
Technical Service Department  
P O Box 385015  
Birmingham, AL 35238-5015  
800/873-4898  
8 AM - 5 PM, Central Time  
Monday through Friday

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