Material Safety Data Sheet
The Dow Chemical Company

Product Name: PERCHLOROETHYLENE INDUSTRIAL

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The Dow Chemical Company encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Product and Company Identification

Product Name
PERCHLOROETHYLENE INDUSTRIAL

COMPANY IDENTIFICATION
The Dow Chemical Company
2030 Willard H. Dow Center
Midland, MI 48674
USA

For MSDS updates and Product Information: 800-258-2436

Prepared By: Prepared for use in Canada by EH&S, Hazard Communications.
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Customer Information Number: 800-258-2436

EMERGENCY TELEPHONE NUMBER
24-Hour Emergency Contact: 989-636-4400
Local Emergency Contact: 989-636-4400

2. Hazards Identification

Emergency Overview
Color: Colorless
Physical State: Liquid.
Odor: Characteristic
Hazards of product:

WARNING! May cause central nervous system effects; can cause death if too much is breathed. Harmful if inhaled. May cause skin irritation. Aspiration hazard. Can enter lungs and cause damage to body systems. Keep upwind of spill. Stay out of low areas. Suspect cancer hazard. May cause cancer.

Potential Health Effects

Eye Contact: May cause pain disproportionate to the level of irritation to eye tissues. May cause slight temporary eye irritation. Low vapor concentrations may cause eye irritation; these concentrations are easily attainable at room temperature.
Skin Contact: Brief contact may cause skin irritation with local redness. Prolonged contact may cause skin irritation with local redness. Repeated contact may cause skin burns. Symptoms may include pain, severe local redness, swelling, and tissue damage. May cause drying and flaking of the skin.
Skin Absorption: Prolonged skin contact is unlikely to result in absorption of harmful amounts.
Skin Sensitization: For the minor component(s): Skin contact may cause an allergic skin reaction in a small proportion of individuals.
Inhalation: In confined or poorly ventilated areas, vapor can readily accumulate and can cause unconsciousness and death. Dizziness may occur at 200 ppm perchloroethylene; progressively higher levels may also cause nasal irritation, nausea, incoordination, drunkenness, and over 1000 ppm, unconsciousness and death. A single brief (minutes)inhalation exposure to levels above 6000 ppm perchloroethylene may be immediately fatal. Based on structural analogy and/or equivocal data in animals, excessive exposure may potentially increase sensitivity to epinephrine and increase myocardial irritability (irregular heartbeats). Alcohol consumed before or after exposure may increase adverse effects.
Ingestion: Very low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.
Aspiration hazard: Aspiration into the lungs may occur during ingestion or vomiting, resulting in rapid absorption and injury to other body systems.
Effects of Repeated Exposure: In humans, effects have been reported on the following organs: Central nervous system. In animals, effects have been reported on the following organs: Central nervous system. Kidney. Liver. Observations in animals include: Anesthetic or narcotic effects.
Cancer Information: Perchloroethylene has been shown to increase the incidence of tumors in certain strains of mice and rats. Other long-term inhalation studies in rats failed to show tumorigenic response. Human data are limited and have not established an association between perchloroethylene exposure and cancer. Perchloroethylene is not believed to pose a measurable carcinogenic risk to man when handled as recommended.
Birth Defects/Developmental Effects: Has been toxic to the fetus in laboratory animals at doses toxic to the mother.
Reproductive Effects: In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals.

3. Composition/information on ingredients

Component	CAS #	Amount W/W
Ethene, tetrachloro-	127-18-4	>= 99.9 %

Amounts are presented as percentages by weight.

4. First-aid measures

Eye Contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.
Skin Contact: Wash skin with plenty of water. Safety shower should be located in immediate work area.
Inhalation: Move person to fresh air. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

Ingestion: Do not induce vomiting. Call a physician and/or transport to emergency facility immediately.
Notes to Physician: Maintain adequate ventilation and oxygenation of the patient. Exposure may increase "myocardial irritability". Do not administer sympathomimetic drugs such as epinephrine unless absolutely necessary. Because rapid absorption may occur through the lungs if aspirated and cause systemic effects, the decision of whether to induce vomiting or not should be made by a physician. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. If burn is present, treat as any thermal burn, after decontamination. Alcohol consumed before or after exposure may increase adverse effects. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.
Medical Conditions Aggravated by Exposure: Skin contact may aggravate preexisting dermatitis.
Emergency Personnel Protection: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

5. Fire Fighting Measures

Extinguishing Media: This material does not burn. If exposed to fire from another source, use suitable extinguishing agent for that fire.
Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Do not use direct water stream. May spread fire. This material does not burn. Fight fire for other material that is burning. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this (M)SDS.
Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.
Unusual Fire and Explosion Hazards: Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.
Hazardous Combustion Products: Fire conditions may cause this product to decompose. Refer to section 10 - Thermal Decomposition.

See Section 9 for related Physical Properties

6. Accidental Release Measures

Steps to be Taken if Material is Released or Spilled: Small spills: Absorb with materials such as: Bentonite. Sawdust. Clay. Large spills: Contain spilled material if possible. Recover spilled material if possible. Collect in suitable and properly labeled containers. Suitable containers include: Metal drums. See Section 13, Disposal Considerations, for additional information.
Personal Precautions: Only trained and properly protected personnel must be involved in clean-up operations. Keep personnel out of low areas. Keep upwind of spill. Ventilate area of leak or spill. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.
Environmental Precautions: Material will sink in water. Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

7. Handling and Storage

Handling
General Handling: Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling. Do not swallow. Avoid breathing vapor. Use with adequate ventilation. Keep container closed. Do not

enter confined spaces unless adequately ventilated. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Storage

Store under cover in a dry, clean, cool, well ventilated place away from sunlight. Do not handle or store near an open flame, heat, or sources of ignition. Keep container tightly closed when not in use. Do not store in: Aluminum. Aluminum alloys. Additional storage and handling information on this product may be obtained by calling your sales or customer service contact. Ask for a product brochure.

8. Exposure Controls / Personal Protection

Exposure Limits

Component	List	Type	Value
Ethene, tetrachloro-	CAD AB OEL	TWA	170 mg/m3 25 ppm
	CAD AB OEL	STEL	678 mg/m3 100 ppm
	CAD BC OEL	TWA	25 ppm
	CAD BC OEL	STEL	100 ppm
	CAD ON OEL	TWAEV	25 ppm
	CAD ON OEL	STEV	100 ppm
	OEL (QUE)	TWA	170 mg/m3 25 ppm
	OEL (QUE)	STEL	685 mg/m3 100 ppm
	ACGIH	TWA	25 ppm BEI
	ACGIH	STEL	100 ppm BEI
	OEL (QUE)	TWA	170 mg/m3 25 ppm
	OEL (QUE)	STEL	685 mg/m3 100 ppm

Consult local authorities for recommended exposure limits.
A BEI notation following the exposure guideline refers to a guidance value for assessing biological monitoring results as an indicator of the uptake of a substance from all routes of exposures.

Personal Protection

Eye/Face Protection: Use safety glasses (with side shields).
Skin Protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

> **Hand protection:** Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl alcohol ("PVA"). Viton. Examples of acceptable glove barrier materials include: Butyl rubber. NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Respiratory Protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use an approved respirator. Selection of air-purifying or positive-pressure supplied-air will depend on the specific operation and the potential airborne concentration of the material. For emergency conditions, use an approved positive-pressure self-contained breathing apparatus. In confined or poorly ventilated areas, use an approved self-contained breathing apparatus or positive pressure air line with auxiliary self-contained air supply. The following should be effective types of air-purifying respirators: Organic vapor cartridge.
Ingestion: Avoid ingestion of even very small amounts; do not consume or store food or tobacco in the work area; wash hands and face before smoking or eating.

Engineering Controls

Ventilation: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines. Lethal concentrations may exist in areas with poor ventilation.

9. Physical and Chemical Properties

Physical State	Liquid.
Color	Colorless
Odor	Characteristic
Odor Threshold	No test data available
Flash Point - Closed Cup	*ASTM D56* (none)
Flammability (solid, gas)	Not applicable to liquids
Flammable Limits In Air	**Lower**: None **Upper**: None
Autoignition Temperature	None
Vapor Pressure	13 mmHg @ 20 °C *Literature*
Boiling Point (760 mmHg)	121 °C *Literature* .
Vapor Density (air = 1)	5.76 *Literature*
Specific Gravity (H2O = 1)	1.619 25 °C/25 °C *Literature*
Freezing Point	-22 °C *Literature*
Melting Point	Not applicable
Solubility in water (by weight)	0.015 % @ 25 °C *Literature*
pH	Not applicable
Molecular Weight	165.8 g/mol *Literature*
Decomposition Temperature	No test data available
Partition coefficient, n-octanol/water (log Pow)	3.4 *Measured*
Evaporation Rate (Butyl Acetate = 1)	No test data available
Percent Volatiles	100 Wt% *Literature*
Kinematic Viscosity	0.52 cSt @ 25 °C *Estimated.*

10. Stability and Reactivity

Stability/Instability

Stable under recommended storage conditions. See Storage, Section 7.
Conditions to Avoid: Exposure to elevated temperatures can cause product to decompose. Avoid open flames, welding arcs, or other high temperature sources which induce thermal decomposition. Avoid direct sunlight or ultraviolet sources.

Incompatible Materials: Avoid contact with: Strong bases. Strong oxidizers. Avoid contact with metals such as: Zinc powders. Zinc. Aluminum powders. Magnesium powders. Potassium. Sodium. Avoid unintended contact with: Amines.

Hazardous Polymerization

Will not occur.

Thermal Decomposition

Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Hydrogen chloride. Decomposition products can include trace amounts of: Chlorine. Phosgene.

11. Toxicological Information

Acute Toxicity
Ingestion
LD50, Rat > 5,000 mg/kg
Dermal
The dermal LD50 has not been determined.

Serious eye damage/eye irritation
May cause pain disproportionate to the level of irritation to eye tissues. May cause slight temporary eye irritation. Low vapor concentrations may cause eye irritation; these concentrations are easily attainable at room temperature.

Skin corrosion/irritation
Brief contact may cause skin irritation with local redness. Prolonged contact may cause skin irritation with local redness. Repeated contact may cause skin burns. Symptoms may include pain, severe local redness, swelling, and tissue damage. May cause drying and flaking of the skin.

Sensitization
Skin
For the minor component(s): Skin contact may cause an allergic skin reaction in a small proportion of individuals.

Repeated Dose Toxicity
In humans, effects have been reported on the following organs: Central nervous system. In animals, effects have been reported on the following organs: Central nervous system. Kidney. Liver. Observations in animals include: Anesthetic or narcotic effects.

Chronic Toxicity and Carcinogenicity
Perchloroethylene has been shown to increase the incidence of tumors in certain strains of mice and rats. Other long-term inhalation studies in rats failed to show tumorigenic response. Human data are limited and have not established an association between perchloroethylene exposure and cancer. Perchloroethylene is not believed to pose a measurable carcinogenic risk to man when handled as recommended.

Carcinogenicity Classifications:

Component	List	Classification
Ethene, tetrachloro-	IARC	Probably carcinogenic to humans.; 2A
	ACGIH	Confirmed animal carcinogen with unknown relevance to humans.; Group A3

Developmental Toxicity
Has been toxic to the fetus in laboratory animals at doses toxic to the mother. Did not cause birth defects in laboratory animals.

Reproductive Toxicity
In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals. In animal studies, did not interfere with fertility.

Genetic Toxicology
In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

12. Ecological Information

ENVIRONMENTAL FATE

Movement & Partitioning
Bioconcentration potential is low (BCF less than 100 or log Pow less than 3). Potential for mobility in soil is medium (Koc between 150 and 500).
Henry's Law Constant (H): 1.49E-02 atm*m3/mole; 25 °C Estimated.
Partition coefficient, n-octanol/water (log Pow): 3.4 Measured
Partition coefficient, soil organic carbon/water (Koc): 137 - 1,685 Estimated.
Bioconcentration Factor (BCF): 25.8 - 77; common carp (Cyprinus carpio);Measured

Persistence and Degradability

Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions. Biodegradation may occur under anaerobic conditions (in the absence of oxygen). Biodegradation rate may increase in soil and/or water with acclimation.

Indirect Photodegradation with OH Radicals

Rate Constant	Atmospheric Half-life	Method
2.14E-13 cm3/s	141 d	Estimated.

Theoretical Oxygen Demand: 0.19 mg/mg

ECOTOXICITY

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

Fish Acute & Prolonged Toxicity

LC50, rainbow trout (Oncorhynchus mykiss), flow-through, 96 h: 4.8 - 5.8 mg/l

Aquatic Invertebrate Acute Toxicity

LC50, water flea Daphnia magna, 48 h: 3.2 - 123 mg/l

Aquatic Plant Toxicity

EC50, algae: 10.5 - 509 mg/l

13. Disposal Considerations

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Recycler. Reclaimer. Incinerator or other thermal destruction device. DISPOSAL OF CONTACT WATER: Process water in contact with solvent and/or water separators of cleaning or distillation equipment should be treated as hazardous waste. Do not discharge water from water separators to drain.

14. Transport Information

TDG Small container

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1 **ID Number:** UN1897 **Packing Group:** PG III

TDG Large container

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1 **ID Number:** UN1897 **Packing Group:** PG III

IMDG

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1 **ID Number:** UN1897 **Packing Group:** PG III
EMS Number: F-A,S-A
Marine pollutant.: Yes

ICAO/IATA

Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1 **ID Number:** UN1897 **Packing Group:** PG III
Cargo Packing Instruction: 612
Passenger Packing Instruction: 605

15. Regulatory Information

US. Toxic Substances Control Act
All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30
CEPA - Domestic Substances List (DSL)
All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

Hazardous Products Act Information: CPR Compliance

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

Hazardous Products Act Information: WHMIS Classification

D1B	Poisonous Substance as Defined by the TDG Regulations
D2A	Possible, Probable or Known Human Carcinogen According to Classifications By IARC or ACGIH
D2B	Eye or Skin Irritant

Hazardous Products Act Information: Hazardous Ingredients
This product contains the following ingredients which are Controlled Products and/or are on the Ingredient Disclosure List (Canadian HPA Section 13 and 14).

Component	CAS #	Amount W/W
Ethene, tetrachloro-	127-18-4	99.9%

16. Other Information

Hazard Rating System

NFPA	Health	Fire	Reactivity
	2	0	0

Recommended Uses and Restrictions

Industrial solvent. Dow does NOT approve this product for direct sales to the general public. Dow does NOT recommend the use of this product in applications where: - soil or ground water contamination is likely (direct applications to the ground, sink drains, sewers, or septic tanks). - where over exposure is likely (small rooms or confined space, or where there would be inadequate ventilation). - where skin contact is likely (adhesive tape removal from skin or as hand cleaner to remove oils and greases). - where there is direct food contact. - where vapor concentrations would be in the flammable range. - where disposal of waste would pose an environmental or health risk. - where chemical reactivity poses a danger (contact with strong alkali, or in areas where welding is done).

Revision

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Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

N/A	Not available
W/W	Weight/Weight
OEL	Occupational Exposure Limit
STEL	Short Term Exposure Limit

TWA	Time Weighted Average
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
DOW IHG	Dow Industrial Hygiene Guideline
WEEL	Workplace Environmental Exposure Level
HAZ_DES	Hazard Designation
VOL/VOL	Volume/Volume

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