

Material Safety Data Sheet



1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

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24-Hour Emergency Phone Number: 989-636-4400

Product: PERCHLOROETHYLENE INDUSTRIAL

Product Code: 59009

Effective Date: 04/12/02 Date Printed: 12/26/02 MSD: 000190

The Dow Chemical Company, Midland, MI 48674

Customer Information Center: 800-258-2436

2. COMPOSITION/INFORMATION ON INGREDIENTS

Tetrachloroethylene CAS# 000127-18-4 99.9%

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

* Colorless liquid. Irritating odor. Toxic fumes are released in *
* fire situations. Causes skin irritation. Harmful if inhaled. *
* Can cause death if too much is breathed. Clear all personnel *
* from area. Wear full protected equipment. Contain liquid to *
* prevent contamination of soil, surface water or ground water. *

POTENTIAL HEALTH EFFECTS (See Section 11 for toxicological data.)

EYE: May cause pain. May cause slight transient (temporary) eye irritation. Vapors may irritate the eyes at about 100 ppm perchloroethylene.

SKIN: Short single exposure may cause skin irritation. Prolonged or repeated exposure may cause severe skin irritation, even a burn. Repeated contact may cause drying or flaking of skin. A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. Did not cause allergic skin reactions when tested in guinea pigs.

INGESTION: Single dose oral toxicity is considered to be extremely low. Small amounts swallowed incidental to normal

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handling operations are not likely to cause injury; swallowing amounts larger than that may cause injury. If aspirated (liquid enters the lung), may be rapidly absorbed through the lungs and result in injury to other body systems.

INHALATION: In confined or poorly ventilated areas vapors 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.

SYSTEMIC (OTHER TARGET ORGAN) EFFECTS: Signs and symptoms of excessive exposure may be central nervous system effects and anesthetic or narcotic effects. Observations in animals include liver and kidney effects.

CANCER INFORMATION: For hazard communication purposes under OSHA Standard 29 CFR Part 1910.1200, this chemical is listed as a potential carcinogen by IARC and NTP. 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.

TERATOLOGY (BIRTH DEFECTS): Birth defects are unlikely. Exposures having no effect on the mother should have no effect on the fetus. Did not cause birth defects in animals; other effects were seen in the fetus only at doses which caused toxic effects 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. In animal studies, has been shown not to interfere with fertility.

4. FIRST AID

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EYE: Flush eyes with plenty of water.

SKIN: Wash off in flowing water or shower.

INGESTION: Do not induce vomiting. Call a physician and/or transport to emergency facility immediately.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

NOTE TO PHYSICIAN: Because rapid absorption may occur through 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. Exposure may increase "myocardial irritability". Do not administer sympathomimetic drugs unless absolutely necessary. No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: None

METHOD USED: TCC, TOC, COC

AUTOIGNITION TEMPERATURE: None available.

FLAMMABLE LIMITS

LFL: None.

UFL: None.

HAZARDOUS COMBUSTION PRODUCTS: Hazardous combustion products may include and are not limited to hydrogen chloride. Hazardous combustion products may include trace amounts of phosgene, chlorine.

OTHER FLAMMABILITY INFORMATION: This material does not burn. Container may vent and/or rupture due to fire. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Violent steam generation or eruption may

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occur upon application of direct water stream.

EXTINGUISHING MEDIA: This material does not burn. If exposed to fire from another source, use suitable extinguishing agent for that fire.

MEDIA TO BE AVOIDED: Do not use direct water stream.

FIRE FIGHTING INSTRUCTIONS: Keep people away. Isolate fire area and deny unnecessary entry. Contain fire run-off if possible. Fire water run-off, if not contained may cause environmental damage. Do not use direct water stream. This material does not burn. Fight fire for other material that is burning.

PROTECTIVE EQUIPMENT FOR FIRE FIGHTERS: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, pants, boots, and gloves. If protection equipment is not available or not used, fight fire from a protected location or safe distance. For protection equipment in post-fire or non-fire clean up situations, refer to the relevant sections.

6. ACCIDENTAL RELEASE MEASURES (See Section 15 for Regulatory Information)

PROTECT PEOPLE: Clear all personnel from area. Do not breathe vapors. Ventilate area of leak or spill. Wear protective equipment including positive pressure self contained or air supplied breathing apparatus. Follow confined space entry procedures: ASTM D-4276 and OSHA (29 CFR 1910.146).

PROTECT ENVIRONMENT: Contain liquid to prevent contamination of soil, surface water or ground water. Material is heavier than water and has limited water solubility. It will collect on the lowest surface.

CLEANUP: For large spills: contain liquid; transfer to properly labeled closed metal containers. For small spills: mop or soak up immediately. Place in properly labeled metal containers.

7. HANDLING AND STORAGE

HANDLING: To avoid uncontrolled emissions vent vapor from container to storage tank. Do not eat, drink, or smoke in working area. Refer to Exposure Controls/Personal Protection,

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Section 8, of the MSDS. Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. Vapors of this product are heavier than air and will collect in low areas such as pits, degreasers, storage tanks, and other confined areas. Do not enter these areas where vapors of this product are suspected unless special breathing apparatus is used and an observer is present for assistance.

STORAGE: Keep containers tightly closed when not in use. For more Storage and Handling information refer to bulletin #100-06170. Store in a dry place. Do not store in aluminum, zinc, aluminum alloys and plastics. Product should not be packaged in aluminum aerosol cans or with finely divided aluminum or its alloys in an aerosol can. Product is denser than water. Design storage containers appropriately.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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

PERSONAL PROTECTIVE EQUIPMENT

EYE/FACE PROTECTION: Use safety glasses. If vapor exposure causes eye discomfort, use a full-face respirator.

SKIN PROTECTION: Use protective clothing impervious to this material. Selection of specific items such as faceshield, gloves, boots, apron, or full body suit will depend on operation.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required, use an approved air-purifying or positive-pressure supplied-air respirator depending on the potential airborne concentration. For emergency and other conditions where the exposure guideline may be greatly exceeded, use an approved positive-pressure self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. In confined or poorly ventilated areas, use an approved positive-pressure supplied-air respirator.

EXPOSURE GUIDELINE(S): Perchloroethylene (tetrachloroethylene):
ACGIH TLV is 25 ppm TWA, 100 ppm STEL, A3. OSHA PEL is 25 ppm.

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PELs are in accord with those recommended by OSHA, as in the 1989 revision of PELs.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless liquid.
ODOR: Irritating odor
VAPOR PRESSURE: 13 mmHg @ 20C
VAPOR DENSITY: 5.76
BOILING POINT: 250F (121.1C)
SOLUBILITY IN WATER: 0.015 g/100g 25C
SPECIFIC GRAVITY: 1.619 @ 25/25C

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable under recommended storage conditions.
See storage section.

CONDITIONS TO AVOID: Avoid direct sunlight or ultraviolet sources. Avoid open flames, welding arcs, or other high temperature sources which induce thermal decomposition. High energy sources such as welding arcs can cause degradation generating chlorine, hydrogen chloride and possible phosgene, and should be avoided.

INCOMPATIBILITY WITH OTHER MATERIALS: Avoid contact with metals such as: aluminum powders, magnesium powders, potassium, sodium, and zinc powder. Avoid unintended contact with amines. Avoid contact with strong bases and strong oxidizers. Avoid prolonged contact with or storage in aluminum or its alloys.

HAZARDOUS DECOMPOSITION PRODUCTS: Hazardous decomposition products may include and are not limited to hydrogen chloride and trace amounts of chlorine and phosgene.

HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION (See Section 3 for Potential Health Effects. For detailed toxicological data, write or call the address or non-emergency number shown in Section 1)

SKIN: The LD50 for skin absorption in rabbits is > 10 g/kg.

INGESTION: The oral LD50 for rats is > 5000 mg/kg.

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MUTAGENICITY (EFFECTS ON GENETIC MATERIAL): In vitro mutagenicity studies were negative. Animal mutagenicity studies were negative.

12. ECOLOGICAL INFORMATION (For detailed Ecological data, write or call the address or non-emergency number shown in Section 1)

ENVIRONMENTAL FATE

MOVEMENT & PARTITIONING: Bioconcentration potential is low (BCF less than 100 or Log Pow less than 3). Bioconcentration factor (BCF) is 49 in the bluegill. Bioconcentration factor (BCF) is 38.9 in the trout. Log octanol/water partition coefficient (log Pow) is 3.4. Potential for mobility in soil is medium (Koc between 150 and 500). Log soil organic carbon partition coefficient (log Koc) is estimated to be 2.1-3.2. Henry's Law Constant (H) is 1.49E-02 atm-m³/mol. Log air/water partition coefficient (log Kaw) is estimated to be -0.30 to 0.37.

DEGRADATION & PERSISTENCE: Biodegradation under aerobic conditions is below detectable limits. Theoretical oxygen demand (ThOD) is calculated to be 0.19 p/p. Biodegradation may occur under anaerobic conditions (in the absence of oxygen). Degradation is expected in the atmospheric environment within days to weeks. Biodegradation rate may increase in soil and/or water with acclimation.

ECOTOXICOLOGY: Material is moderately toxic to aquatic organisms on an acute basis (LC50 between 1 and 10 mg/L in most sensitive species). Acute LC50 for Japanese medaka or rice fish (*Oryzias latipes*) is 1.6 mg/L. Acute LC50 for water flea (*Daphnia magna*) is 3.2-123 mg/L. Acute LC50 for rainbow trout (*Oncorhynchus mykiss*) is 4.8-5.8 mg/L. Acute LC50 for sheepshead minnow (*Cyprinodon variegatus*) is 8.0-52.2 mg/L. Acute LC50 for American flagfish *Jordenella floridae* is 8.4-24 mg/L. Acute LC50 for bluegill (*Lepomis macrochirus*) is 13 mg/L. Acute LC50 for fathead minnow (*Pimephales promelas*) is 13.4-23-8 mg/L. Maximum acceptable toxicant concentration (MATC) is 3.1 mg/L in American flagfish.

13. DISPOSAL CONSIDERATIONS (See Section 15 for Regulatory Information)

DISPOSAL: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal methods must be in compliance with all Federal, State/Provincial and local laws and regulations.

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Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. THE DOW CHEMICAL COMPANY HAS 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 2 (Composition/Information On Ingredients).

FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted recycler, reclaimer, incinerator or other thermal destruction device.

For additional information, refer to Dow Technical Bulletin discussing considerations for this product. Bulk Lit No 100-06170.

As a service to its customers, Dow can provide names of information resources to help identify waste management companies and other facilities which recycle, reprocess or manage chemicals or plastics, and that manage used drums. Telephone Dow's Customer Information Center at 800-258-2436 or 989-832-1556 for further details.

14. TRANSPORT INFORMATION

DEPARTMENT OF TRANSPORTATION (D.O.T.): For D.O.T. regulatory information, if required, consult transportation regulations, product shipping papers or contact your Dow representative.

CANADIAN TDG INFORMATION: For TDG regulatory information, if required, consult transportation regulations, product shipping papers or contact your Dow representative.

15. REGULATORY INFORMATION (Not meant to be all-inclusive--selected regulations represented)

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations. See other sections for health and safety information.

U.S. REGULATIONS
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REGULATORY INFORMATION (CONTINUED)

SARA 313 INFORMATION: This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

CHEMICAL NAME	CAS NUMBER	CONCENTRATION
PERCHLOROETHYLENE	000127-18-4	99.9 %

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

- An immediate health hazard
- A delayed health hazard

CALIFORNIA PROPOSITION 65: The following statement is made in order to comply with the California Safe Drinking Water and Toxic Enforcement Act of 1986:

WARNING: This product contains a chemical(s) known to the State of California to cause cancer.

TOXIC SUBSTANCES CONTROL ACT (TSCA):

All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

STATE RIGHT-TO-KNOW: The following product components are cited on certain state lists as mentioned. Non-listed components may be shown in the composition section of the MSDS.

CHEMICAL NAME	CAS NUMBER	LIST
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REGULATORY INFORMATION (CONTINUED)

D2B - eye or skin irritant

Refer elsewhere in the MSDS for specific warnings and safe handling information. Refer to the employer's workplace education program.

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CPR STATEMENT: 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: This product contains the following ingredients which are Controlled Products and/or on the Ingredient Disclosure List (Canadian HPA section 13 and 14):

COMPONENTS:	CAS #	AMOUNT (%w/w)
TETRACHLOROETHYLENE	000127-18-4	99.9%

16. OTHER INFORMATION

HAZARD RATING SYSTEM:

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) RATINGS:

Health	2
Flammability	0
Reactivity	0

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.

GENERAL APPLICATION GUIDELINES:

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.

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- 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).

MSDS STATUS: No revisions. Reviewed for Canadian regulations.