Safety Data Sheet
The Dow Chemical Company

Product Name: PERCHLOROETHYLENE TECHNICAL

Revision Date: 2011/03/24
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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.

Section 1. Identification of the substance/preparation and of the company/undertaking

1.1 Product identifiers

Product Name
PERCHLOROETHYLENE TECHNICAL

Chemical Name: Tetrachloroethylene
CAS-No. 127-18-4
EC-No. 204-825-9
REACH Registration Number
01-2119475329-28-0000

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses
Manufacture of substance, industrial. Use as an intermediate, industrial. Use in dry-cleaning, industrial. Use in surface cleaning (closed systems), industrial. Use as heat transfer fluid, industrial. Distribution and (re)packing, industrial. Professional use in dry cleaning. Professional use in film cleaning and copying.

1.3 Details of the supplier of the safety data sheet

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

Customer Information Number: 800-258-2436
SDSQuestion@dow.com

1.4 EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: 989-636-4400
Local Emergency Contact: 00 31 115 69 4982

®(TM)*Trademark

Section 2. Hazards Identification

2.1 Classification of the substance or mixture

Classification - REGULATION (EC) No 1272/2008

Skin corrosion/irritation	Category 2	H315	Causes skin irritation.
Skin sensitization	Category 1	H317	May cause an allergic skin reaction.
Carcinogenicity	Category 2	H351	Suspected of causing cancer.
Specific target organ toxicity - single exposure (Narcotic effects.) (Inhalation)	Category 3	H336	May cause drowsiness or dizziness.
Chronic aquatic toxicity	Category 2	H411	Toxic to aquatic life with long lasting effects.

Classification according to EU Directives 67/548/EEC or 1999/45/EC

	R40	Limited evidence of a carcinogenic effect.
	R43	May cause sensitization by skin contact.
Xi	R38	Irritating to skin.
	R67	Vapours may cause drowsiness and dizziness.
N	R51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

2.2 Label elements

Labelling - REGULATION (EC) No 1272/2008

Hazard pictograms

Signal Word: Warning

Hazard statements:

H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H351 Suspected of causing cancer.
H336 May cause drowsiness or dizziness.
H411 Toxic to aquatic life with long lasting effects.

Precautionary Statements:

P202 Do not handle until all safety precautions have been read and understood.
P281 Use personal protective equipment as required.
P273 Avoid release to the environment.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P391 Collect spillage.
P405 Store locked up.
P502 Refer to manufacturer/ supplier for information on recovery/ recycling.

2.3 Other Hazards

No information available.

Section 3. Composition/information on ingredients

3.1 Substance

This product is a substance.

CAS-No. / EC-No. / Index	REACH No.	Amount	Component	Classification: REGULATION (EC) No 1272/2008
CAS-No. 127-18-4 **EC-No.** 204-825-9 **Index** 602-028-00-4	—	> 99.9 %	Tetrachloroethylene	Carc., 2, H351 Aquatic Chronic, 2, H411 STOT SE, 3, H336 Skin Irrit., 2, H315 Skin Sens., 1, H317

CAS-No. / EC-No. / Index	Amount	Component	Classification: 67/548/EEC
CAS-No. 127-18-4 **EC-No.** 204-825-9 **Index** 602-028-00-4	> 99.9 %	Tetrachloroethylene	Carc. 3: R40; R43; Xi: R38; R67; N: R51/53

For the full text of the H-Statements mentioned in this Section, see Section 16.
See Section 16 for full text of R-phrases.

Section 4. First-aid measures

4.1 Description of first aid measures

General advice: 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.
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.
Skin Contact: Remove material from skin immediately by washing with soap and plenty of water. Remove contaminated clothing and shoes while washing. Seek medical attention if irritation persists. Wash clothing before reuse. Discard items which cannot be decontaminated, including leather articles such as shoes, belts and watchbands.
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.
Ingestion: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

4.2 Most important symptoms and effects, both acute and delayed

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), no additional symptoms and effects are anticipated.

4.3 Indication of immediate medical attention and special treatment needed

Maintain adequate ventilation and oxygenation of the patient. If burn is present, treat as any thermal burn, after decontamination. Exposure may increase "myocardial irritability". Do not administer sympathomimetic drugs such as epinephrine unless absolutely necessary. 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.
Skin contact may aggravate preexisting dermatitis.

Section 5. Fire Fighting Measures

5.1 Extinguishing Media

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

5.2 Special hazards arising from the substance or mixture

Hazardous Combustion Products: Fire conditions may cause this product to decompose. Refer to section 10 - Thermal Decomposition.
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.

5.3 Advice for firefighters

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.

Section 6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures: Evacuate area. 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. Refer to Section 7, Handling, for additional precautionary measures. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

6.2 Environmental precautions: Material will sink in water. Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

6.3 Methods and materials for containment and cleaning up: 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.

Section 7. Handling and Storage

7.1 Precautions for safe handling

Handling

General Handling: Avoid breathing vapor. Avoid contact with skin and clothing. Do not swallow. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation. Do not enter confined spaces unless adequately ventilated. To avoid uncontrolled emissions, vent vapor from container to storage tank. Vapors of this product are heavier than air and lethal concentrations of vapors can collect in low, confined and unventilated spaces such as tanks, pits, small rooms and even in equipment (degreasers) that is used for degreasing metal parts. Do not enter these confined spaces where vapors of this product are suspected unless special breathing apparatus is used and an observer is present for assistance. When using do not eat, drink or smoke. When appropriate, unique handling information for containers can be found on the product label. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

7.2 Conditions for safe storage, including any incompatibilities

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: Zinc. Aluminum. Aluminum alloys. Plastic. Additional storage and handling information on this product may be obtained by calling your sales or customer service contact. Ask for a product brochure.

Storage Period: 24 Months

7.3 Specific end uses

See the technical data sheet on this product for further information.

Section 8. Exposure Controls / Personal Protection

8.1 Control parameters

Exposure Limits

Component	List	Type	Value
Tetrachloroethylene	Ireland OELV	TWA	170 mg/m3 25 ppm
	Ireland OELV	STEL	1,000 mg/m3 150 ppm
	UK WEL	TWA	345 mg/m3 50 ppm
	UK WEL	STEL	689 mg/m3 100 ppm
	ACGIH	TWA	25 ppm BEI
	ACGIH	STEL	100 ppm BEI

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.

Derived No Effect Level (DNEL)

Workers

Potential Health Effects	Possible route(s) of exposure:	Value
Acute - systemic effects	Skin contact	Not available
Acute - systemic effects	Inhalation	275 mg/m3
Acute - local effects	Skin contact	Not available
Acute - local effects	Inhalation	275 mg/m3
Long-term - systemic effects	Skin Contact	39.4 mg/kg bw/day
Long-term - systemic effects	Inhalation	138 mg/m3
Long-term - local effects	Skin contact	Not available
Long-term - local effects	Inhalation	Not available

Predicted No Effect Concentration (PNEC)

Compartment	Value	Remarks
Fresh water	0.051 mg/l	
Marine water	0.0051 mg/l	
Intermittent releases	0.0364 mg/l	
STP	11.2 mg/l	
Fresh water sediment	0.903 mg/kg d.w.	
Marine sediment	0.0903 mg/kg d.w.	
Soil	0.01 mg/kg d.w.	

8.2 Exposure controls

Personal Protection

Eye/Face Protection: Use safety glasses (with side shields). Safety glasses (with side shields) should be consistent with EN 166 or equivalent.

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 chemical resistant gloves classified under Standard EN374: Protective gloves against chemicals and micro-organisms. 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. When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended. When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended. 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. Use the following CE approved air-purifying respirator: Organic vapor cartridge, type A (boiling point >65 ºC)

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: Use engineering controls to maintain airborne level below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use only in enclosed systems or with local exhaust ventilation. Exhaust systems should be designed to move the air away from the source of vapor/aerosol generation and people working at this point. Lethal concentrations may exist in areas with poor ventilation.

Section 9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance	
Physical State	Liquid.
Color	Colorless
Odor	Characteristic
Odor Threshold	27 ppm *Literature*
pH	Not applicable

Melting Point	-22 °C *Literature*
Freezing Point	-22 °C *Literature*
Boiling Point (760 mmHg)	121 °C *Literature* .
Flash Point - Closed Cup	*ASTM D56* None
Evaporation Rate (Butyl Acetate = 1)	1.5 *Literature*
Flammability (solid, gas)	No
Flammable Limits In Air	**Lower**: *Literature* None **Upper**: *Literature* None
Vapor Pressure	1.7 kPa @ 20 °C *Literature*
Vapor Density (air = 1)	5.76 *Literature*
Specific Gravity (H2O = 1)	1.619 25 °C/25 °C *Literature*
Solubility in water (by weight)	0.015 % @ 25 °C *Literature*
Partition coefficient, n-octanol/water (log Pow)	2.53 *Measured*
Autoignition Temperature	*Literature* None
Decomposition Temperature	No test data available
Kinematic Viscosity	0.521 mm2/s @ 25 °C *Calculated*
Explosive properties	No
Oxidizing properties	No

9.2 Other information

Molecular Weight	165.8 g/mol *Literature*
Henry's Law Constant (H)	2.11E+03 Pa*m3/mole. Calculated

Section 10. Stability and Reactivity

10.1 Reactivity
No dangerous reaction known under conditions of normal use.

10.2 Chemical stability
Stable under recommended storage conditions. See Storage, Section 7.

10.3 Possibility of hazardous reactions
Polymerization will not occur.

10.4 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.

10.5 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.

10.6 Hazardous decomposition products
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.

Section 11. Toxicological Information

11.1 Information on toxicological effects

Acute Toxicity

Ingestion

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.
LD50, Rat > 3,000 mg/kg

Aspiration hazard

Based on physical properties, not likely to be an aspiration hazard.

Dermal

Prolonged skin contact is unlikely to result in absorption of harmful amounts.
LD50, Rabbit > 10,000 mg/kg

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.
LC50, 4 h, Vapor, Rat > 20 mg/l

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 moderate skin irritation with local redness. Repeated contact may cause skin burns. Symptoms may include pain, severe local redness, swelling, and tissue damage. Prolonged or repeated exposure may cause defatting of the skin leading to drying or flaking of skin.

Sensitization

Skin

Has demonstrated the potential for contact allergy in mice.

Respiratory

No relevant data found.

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.

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.

Section 12. Ecological Information

12.1 Toxicity

Material is toxic to aquatic organisms (LC50/EC50/IC50 between 1 and 10 mg/L in the most sensitive species).

Fish Acute & Prolonged Toxicity
LC50, rainbow trout (Oncorhynchus mykiss), flow-through, 96 h: 5 mg/l
LC50, dab (Limanda limanda), flow-through, 96 h: 5 mg/l
Aquatic Invertebrate Acute Toxicity
EC50, water flea Daphnia magna, static, 48 h, immobilization: 8.5 mg/l
Aquatic Plant Toxicity
EC50, Chlamydomonas reinhardtii, Growth rate inhibition, 72 h: 3.64 mg/l
NOEC, Chlamydomonas reinhardtii, Growth rate inhibition, 72 h: 1.77 mg/l
Toxicity to Micro-organisms
IC50; Nitrosomonas sp., 24 h: 112 mg/l
Toxicity to Soil Dwelling Organisms
EC50, Eisenia fetida (earthworms), 24 h: 113.4 mg/kg

12.2 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
8.05E-13 cm3/s	50 d	Estimated.

Theoretical Oxygen Demand: 0.19 mg/mg

12.3 Bioaccumulative potential
Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient, n-octanol/water (log Pow): 2.53 Measured
Bioconcentration Factor (BCF): 49; bluegill (Lepomis macrochirus); Measured

12.4 Mobility in soil
Mobility in soil: Potential for mobility in soil is medium (Koc between 150 and 500).
Partition coefficient, soil organic carbon/water (Koc): 141 Estimated.
Henry's Law Constant (H): 2.11E+03 Pa*m3/mole. Calculated
Distribution in Environment: Mackay Level 1 Fugacity Model:

Air	Water.	Biota	Soil	Sediment
99.69 %	0.23 %	0.01 %	0.07 %	0.01 %
76.39 %	23.3 %		0.06 %	0.23 %

12.5 Results of PBT and vPvB assessment
This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

12.6 Other adverse effects
This substance is not in Annex I of Regulation (EC) 2037/2000 on substances that deplete the ozone layer.

Section 13. Disposal Considerations

13.1 Waste treatment methods

This product, when being disposed of in its unused and uncontaminated state should be treated as a hazardous waste according to EC Directive 91/689/EEC. Any disposal practices must be in compliance with all national and provincial laws and any municipal or local by-laws governing hazardous waste. For used, contaminated and residual materials additional evaluations may be required. Do not dump into any sewers, on the ground, or into any body of water. 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.

Section 14. Transport Information

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

Hazard identification No: 60
Tremcard Number: 61S1897
Environmental Hazard: Yes
OCEAN
Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1 **ID Number:** UN1897 **Packing Group:** PG III
EMS Number: F-A,S-
Marine pollutant.: Yes

AIR
Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1 **ID Number:** UN1897 **Packing Group:** PG III
Cargo Packing Instruction: 663
Passenger Packing Instruction: 655
Environmental Hazard: Yes

INLAND WATERWAYS
Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1 **ID Number:** UN1897 **Packing Group:** PG III
Hazard identification No: 60
Tremcard Number: 61S1897
Environmental Hazard: Yes

Section 15. Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

European Inventory of Existing Commercial Chemical Substances (EINECS)
This product is on the EINECS inventory.

15.2 Chemical Safety Assessment
A Chemical Safety Assessment has been carried out for this substance.

Section 16. Other Information

Hazard statement in the composition section

H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H411	Toxic to aquatic life with long lasting effects.

Risk-phrases in the Composition section

R38	Irritating to skin.
R40	Limited evidence of a carcinogenic effect.
R43	May cause sensitization by skin contact.
R51/53	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R67	Vapours may cause drowsiness and dizziness.

Product Literature

Additional information on this product may be obtained by calling your sales or customer service contact. Ask for a product brochure. Additional information on this and other products may be obtained by visiting our web page.

Revision

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

The Dow Chemical Company urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided 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 between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.