



Safety Data Sheet

1. PRODUCT IDENTIFICATION

Name	Perchloroethylene
Synonyms	1,1,2,2-tetrachloroethylene; tetrachloroethylene; "perc", & many brand names
CAS#	127-18-4
Europe EC#	204-825-9
Product Uses	solvent, parts cleaning prior to painting or plating

EMERGENCY INFORMATION

Canada	Call CANUTEC (collect)	(613) 996-6666
U.S.A.	Call CHEMTREC	(800) 424-9300

2. HAZARDS

GHS Class (Category)	acute inhalation (4)	skin irritation (2)	carcinogen (2)	aquatic toxic (2)
Signal Words	WARNING	WARNING	WARNING	no Signal Word
Hazard Statements	harmful if inhaled (H332)	causes skin irritation (H315)	suspected of causing cancer (H351)	toxic to aquatic life with long lasting effects (H412)



Canada – WHMIS
Key:

D 1B, D 2A
B 2 – Flash Point <38°C, **B 3** – Flash Point >38°C & <93°C
D 1 – Immediately Toxic, **D 2** – Chronic Toxicity
C – Oxidising Substance, **E** – Corrosive, **F** – Reactive Substance



3. COMPOSITION

	%	TWAEV / TLV mg/m ³	LD ₅₀ (mg/kg) ORAL	LD ₅₀ (mg/kg) SKIN	LC ₅₀ ppm INHALATION
1,1,2,2-tetrachloroethylene	100%	25 / 170	2630	3230	2610

4. FIRST AID

SKIN:	Wash with soap & plenty of water. Remove contaminated clothing and do not reuse until thoroughly laundered.
EYES:	Wash eyes with plenty of water, holding eyelids open. Seek medical assistance promptly if there is irritation.
INHALATION:	Remove from contaminated area promptly. CAUTION: Rescuer must not endanger himself! If breathing stops, administer artificial respiration and seek medical aid promptly.
INGESTION:	Give plenty of water to dilute product. Do not induce vomiting (NOTE below). Keep victim quiet. If vomiting occurs, lower victim's head below hips to prevent inhalation of vomited material. Seek medical help promptly.

Inadvertent inhalation of vomited material may seriously damage the lungs. The danger of this is greater than the risk of poisoning through absorption of this relatively low-toxicity substance. The stomach should only be emptied under medical supervision, and after the installation of an airway to protect the lungs.

Please ensure that this MSDS is given to, and explained to people using this product.

5. FIRE FIGHTING & FLAMMABILITY

Flash Point	not combustible
Autoignition Temperature	not combustible
Flammable Limits	not combustible
Combustion Products	carbon monoxide, chlorine, phosgene, hydrogen chloride & other toxic or corrosive gases
Firefighting Precautions	as for materials sustaining fire; toxic combustion products; firefighters must wear SCBA
Static Charge Accumulation	cannot accumulate a static charge on agitation or pumping

6. ACCIDENTAL RELEASE MEASURES

Leak Precaution	dyke to control spillage and prevent environmental contamination
Handling Spill	ventilate contaminated area; recover free liquid with suitable pumps; absorb residue on an inert sorbent, sweep shovel & store in closed containers for recycling or disposal

If spill is extensive & excellent ventilation is impossible, cleanup workers must wear a respirator with a fresh organic vapour cartridge.

7. HANDLING & STORAGE

Store away from open flame and substances listed in Part 10. Stable to 500°C / 930°F. Always ensure that containers, whether empty or full, or part full, are tightly sealed unless in use.

Avoid breathing product vapour. **This product should only be used in a sealed apparatus to keep vapour out of the workplace.** If dealing with a spill, and ventilation is impossible or impractical, wear a suitable respirator with a fresh cartridge*. Discard cartridge after one use*. **Do not smoke around this product.** *The heat of the cigarette converts tetrachloroethylene into toxic phosgene and hydrogen chloride! For the same reason, keep welding operations away from the area.*

Never cut, drill, weld or grind on or near this container. Avoid all contact with skin and wash work clothes frequently. An eye bath and safety shower must be available near the workplace.

*** NOTE: A respirator must not be relied on to protect a worker from this product! The odour threshold is ABOVE the TLV. Before you are aware of the substance, it is already harming you! Use respirators – always fitted with a fresh cartridge – for emergency only!**

8. EXPOSURE CONTROL & PERSONAL PROTECTION

Ontario TWAEV	25ppm / 170mg/m ³	Ontario STEV	100ppm / 685mg/m ³
ACGIH TLV	25ppm / 170mg/m ³	ACGIH STEL	100ppm / 685mg/m ³
OSHA PEL	100ppm / 670mg/m ³	OSHA STEL	200ppm / 1340mg/m ³
Ventilation*	mechanical ventilation may be required to maintain airborne titre below regulated limits; make an “escape” respirator with “ fresh ” organic vapour cartridge available for workers in area should vapour containment fail		
Hands	Store respirators & cartridges in airtight containers (“Tupperware”, “ZipLock”) to maintain “freshness”*.		
Eyes	“Viton” gloves recommended – other types may also protect; consult supplier to confirm suitability		
Clothing	safety glasses with side shields – always protect the eyes		
	wear impermeable (above) apron, boots, & long sleeves if there is any danger of splashing,		

* See Part 7

9. PHYSICAL PROPERTIES

Odour & Appearance	clear, colourless, mobile liquid with mild, pleasant ether odour
Odour Threshold	~50ppm – <i>the odour is inadequate warning of the presence of toxic amounts of perchloroethane</i>
Vapour Pressure	14mmHg / 1.9kPa (20°C / 68°F)
Evaporation Rate (Butyl Acetate = 1)	1.5
Vapour Density (air = 1)	5.8
Boiling Range	121°C / 250°F
Freezing Point	-22°C / -8.5°F

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9. PHYSICAL PROPERTIES, cont'd

Specific Gravity	1.62 (20/20°C)
Water Solubility	~20milligrams/litre (25°C / 77°F)
Also soluble in	most organic solvents
Partition Coefficient (Octanol/H ₂ O)	3.4
Viscosity	0.9centipoise (20°C / 68°F)
pH	none – <i>(does not liberate hydrogen ions when dissolved)</i>
Conversion Factor	1ppm = 6.77mg/m ³
Molecular Weight	166grams per mole

10. REACTIVITY

Dangerously Reactive With	strong oxidising agents; strong acids may cause explosions
Also Reactive With any	strong alkalis may cause an explosion if trichloroethylene present; copper may react with dichloroethylene present to form explosive substances; aluminum powder may react explosively
Stability	stable; will not polymerize
Decomposes in Presence of	heat above 500°C / 930°F
Decomposition Products	none apart from Hazardous Combustion Products
Sensitive to Mechanical Impact	no

11. TOXICITY**Effects, Acute Exposure**

Skin Contact	severely irritating within minutes, redness, possible blistering (<i>complete healing in days</i>)
Skin Absorption	slight; no toxic effects likely by this route
Eye Contact	mildly irritating; vapour irritating above ~250ppm
Inhalation	over 100ppm causes dizziness, drowsiness, headache, nausea; irritating above 200ppm; over 600ppm causes incoordination, possible unconsciousness
Ingestion	dizziness, drowsiness, intoxication, headache, nausea – <i>not a route of industrial exposure</i>

Effects, Chronic Exposure

General	severe acute effect makes prolonged or repeated skin exposure unlikely; chronic exposure causes dry skin & dermatitis; mood changes, persistent nausea, fatigue & other neurological effects may occur; kidney damage in rats at 200ppm & mice at 50ppm for long periods; mice also had liver damage
Sensitising	not a sensitiser in humans or animals
Carcinogen/Tumorigen	IARC (A2) – <i>probably carcinogenic in humans</i> ; ACGIH (A3) – <i>animal carcinogen</i> ;
Reproductive Effect	perchloroethylene is probably not a reproductive toxin
Mutagen	perchloroethylene is probably not a mutagen
Synergistic With	not known – <i>perchloroethylene appears to act synergistic with several organic solvents</i>
LD ₅₀ (oral)	2630mg/kg (rat), 6400 & 8100mg/kg (mouse), >4000mg/kg (dog & cat)
LD ₅₀ (skin)	>3230mg/kg (rabbit)
LC ₅₀ (inhalation)	3790, 4000 & 4620ppm (rat), 2610, 3645, 4860 & 5200ppm (mouse)

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12. ECOLOGICAL INFORMATION

Bioaccumulation	not a bioaccumulator; biological ½-life is 6 days
Biodegradation	biodegrades slowly with or without oxygen; ½-life under aerobic conditions is 180days & 98days under anaerobic conditions; rapid biodegradation (87% in 28days) in acclimated sewage facilities
Abiotic Degradation	reacts with atmospheric hydroxyl radicals; its estimated ½-life in air is 96 days; high stratospheric photolysis (high UV intensity) is rapid – 6 days for 50-90% destruction
Mobility in soil, water	sparingly water soluble; moves moderately readily in soil & water
Aquatic Toxicity	
LC ₅₀ (Fish, 96hr)	5mg/litre (Limada limada, Oncorhynchus mykiss & Salmo gairdneri), 13.4, 18.4 & 23.8mg/litre (Pimephelas promelas), 130mg/litre (Leuciscus idus), 29-52mg/litre (Cyprinodon variegatus), 13mg/litre (Lepomis macrochirus)
EC ₅₀ (Crustacea, 48hr)	3.2, 9-18, 22 & 126-176mg/litre (Daphnia magna)
EC ₅₀ (Algae)	10.5mg/litre (Phaeodactylum tricornutum), 816mg/litre (Selenastrum capricornutum), 500mg/litre (Skeletonema costatum)
EC ₅₀ (Bacteria)	112mg/litre (Nitrosomas sp), 100mg/litre (Tetrahymena pyriformis), & others
EC ₁₀ (Bacteria)	68mg/litre (Photobacterium phosphoreum), >45mg/litre Pseudomonas putida)
Chronic Aquatic Toxicity	
NOEC	1.6mg/litre (Poecilia sphenops), 2.0mg/litre (Hordanella floridae)

13. DISPOSAL

Waste Disposal	do not flush to sewer , recycle solvent if possible, may be incinerated at high temperature in approved facility (gas fired flame initially with less than stoichiometric air:fuel ratio and excess air injection later), flue gas monitoring and scrubbing is essential
Containers	Drums should be reused. Recondition and pressure test by a licensed reconditioner prior to re-use. Pails must be vented and thoroughly dried prior to crushing and recycling. IBCs (intermediate bulk containers): polyethylene bottle must be pressure tested & recertified at 30 months. Replace at 60 months (5yrs). Steel containers must be inspected, pressure tested & recertified every 5 years. Never cut, drill, weld or grind on or near this container, even if empty

14. TRANSPORT CLASSIFICATION

Canada TDG	PIN	UN - 1897
AND	Shipping Name	tetrachloroethylene
U.S.A. 49 CFR	Class & Packing Group	6.1 (III)
Marine Pollutant		P
ERAP Required		NO

**15. REGULATIONS**

Canada DSL	on inventory
U.S.A. TSCA	on inventory
Europe EINECS	on inventory

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15. REGULATIONS, cont'd

U.S.A. Regulations:

Immediately Dangerous to Life or Health: NIOSH has recommended that tetrachloroethylene be treated as a potential occupational carcinogen.

Acceptable Daily Intakes: Suggested No-Adverse-Response Level (SNARL): In light of the lack of definitive information regarding the quantity of tetrachloroethylene that must be ingested to depress psychophysiological function, it seems appropriate that calculations for a SNARL be based upon quantities of the chemical that are required to produce tissue injury. ... the 0.3 ml/kg (0.49 g/kg) dose appears to be a reasonable "minimum toxic dose" from which to calculate a 24-hr SNARL for contamination of drinking water, assuming that the sole source of tetrachloroethylene during this period will be from 2 l/day of drinking water consumed by a 70 kg human. A safety factor of 100 is applied: 490 mg/kg times 70 kg/100 times 2 l= 172 mg/l. The above considerations ignore the possibility that tetrachloroethylene may be carcinogenic. ... a 7-day standard for drinking water contamination, which was obtained by dividing the 24-hr standard by 7 (172 mg/l/7 days= 24.5 mg/l), should protect against adverse effects by the chemical.

OSHA Standards: Permissible Exposure Limit: Table Z-2 8-hr Time Weighted Avg: 100 ppm. Permissible Exposure Limit: Table Z-2 Acceptable Ceiling Concentration: 200 ppm. Permissible Exposure Limit: Table Z-2 Acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift. Concentration: 300 ppm. Maximum Duration: 5 minutes in any 3 hours. Vacated 1989 OSHA PEL TWA 25 ppm (170 mg/cu m) is still enforced in some states.

NIOSH Recommendations: NIOSH recommends that tetrachloroethylene be regulated as a potential occupational carcinogen. NIOSH usually recommends that occupational exposures to carcinogens be limited to the lowest feasible concn. Minimize workplace exposure concentration.

Threshold Limit Values: 8 hr Time Weighted Avg (TWA): 25 ppm; 15 min Short Term Exposure Limit (STEL): 100 ppm A3: Confirmed animal carcinogen with unknown relevance to humans. Biological Exposure Index (BEI): Determinant: Tetrachloroethylene in end-exhaled air; Sampling Time: Prior to shift; BEI: 3 ppm. Biological Exposure Index (BEI): Determinant: Tetrachloroethylene in blood; Sampling Time: Prior to shift; BEI: 0.5 mg/L.

Atmospheric Standards: This action promulgates standards of performance for equipment leaks of Volatile Organic Compounds (VOC) in the Synthetic Organic Chemical Manufacturing Industry (SOCMI). The intended effect of these standards is to require all newly constructed, modified, and reconstructed SOCMI process units to use the best demonstrated system of continuous emission reduction for equipment leaks of VOC, considering costs, non air quality health and environmental impact and energy requirements. Tetrachloroethylene is produced, as an intermediate or a final product, by process units covered under this subpart. Listed as a hazardous air pollutant generally known or suspected to cause serious health problems. The Clean Air Act, as amended in 1990, directs EPA to set standards requiring major sources to sharply reduce routine emissions of toxic pollutants. EPA is required to establish and phase in specific performance based standards for all air emission sources that emit one or more of the listed pollutants. Tetrachloroethylene is included on this list.

Federal Drinking Water Standards: Maximum contaminant levels (MCL) for organic contaminants apply to community and non-transient, non-community water systems: Tetrachloroethylene, MCL 0.005 mg/L, EPA 5 ug/L

State Drinking Water Standards: Florida 3 ug/L, New Jersey 1 ug/L

State Drinking Water Guidelines: Arizona 0.67 ug/L, Connecticut 5 ug/L, Maine 7 ug/L, Minnesota 5 ug/L

Clean Water Act Requirements: Toxic pollutant designated pursuant to section 307(a)(1) of the Federal Water Pollution Control Act and is subject to effluent limitations.

CERCLA Reportable Quantities: Persons in charge of vessels or facilities are required to notify the National Response Center (NRC) immediately, when there is a release of this designated hazardous substance, in an amount equal to or greater than its reportable quantity of 100 lb or 45.4 kg. The toll free number of the NRC is (800) 424-8802. The rule for determining when notification is required is stated in 40 CFR 302.4 (section IV.D.3.b).

TSCA Requirements: Pursuant to section 8(d) of TSCA, EPA promulgated a model Health and Safety Data Reporting Rule. The section 8(d) model rule requires manufacturers, importers, and processors of listed chemical substances and mixtures to submit to EPA copies and lists of unpublished health and safety studies. Tetrachloroethylene is included on this list. Effective date 6/1/87; Sunset date: 6/1/97.

RCRA Requirements: A solid waste containing tetrachloroethylene may or may not become characterized as a hazardous waste when subjected to the Toxicity Characteristic Leaching Procedure listed in 40 CFR 261.24, and if so characterized, must be managed as a hazardous waste. As stipulated in 40 CFR 261.33, when tetrachloroethylene, as a commercial chemical product or manufacturing chemical intermediate or an off-specification commercial chemical product or a manufacturing chemical intermediate, becomes a waste, it must be managed according to Federal and/or State hazardous waste regulations. Also defined as a hazardous waste is any residue, contaminated soil, water, or other debris resulting from the cleanup of a spill, into water or on dry land, of this waste. Generators of small quantities of this waste may qualify for partial exclusion from hazardous waste regulations (40 CFR 261.5). When trachloroethylene is a spent halogenated solvent, it is classified as a hazardous waste from a nonspecific source, as stated in 40 CFR 261.31, and must be managed according to state and/or federal hazardous waste regulations.

FIFRA Requirements: As the federal pesticide law FIFRA directs, EPA is conducting a comprehensive review of older pesticides to consider their health and environmental effects and make decisions about their continued use. Under this pesticide reregistration program, EPA examines newer health and safety data for pesticide active ingredients initially registered before November 1, 1984, and determines whether the use of the pesticide does not pose unreasonable risk in accordance to newer safety standards, such as those described in the Food Quality Protection Act of 1996. Pesticides for which EPA had not issued Registration Standards prior to the effective date of FIFRA '88 were divided into three lists based upon their potential for human exposure and other factors, with List B containing pesticides of greater concern than those on List C, and with List C containing pesticides of greater concern than those on List D. Tetrachloroethylene is found on List C. Case No: 3109; Case Status: No products containing the pesticide are actively registered. Therefore, we are characterizing the case as "cancelled." Under FIFRA, pesticide producers may voluntarily cancel their registered products. EPA also may cancel pesticide registrations if registrants fail to pay required fees or make/meet certain reregistration commitments, or if EPA reaches findings of unreasonable adverse effects.; Active ingredient (AI): tetrachloroethylene; AI Status: The active ingredient is no longer contained in any registered products ... "cancelled."

16. OTHER INFORMATION

Prepared for Megaloid Laboratories by Peter Bursztyn, (705) 734-1577

Data from RTECS, HSDB (Haz. Substance Data Base), Cheminfo (CCOHS), IUCLID Datasheets (ESIS – European Chem. Substance Info. System), & others.

Preparation Date: May 2004 Revision Date: May 2007, May 2010, May 2013

Additional Information from:

(1) European Chemicals Agency, Perchloroethylene: http://apps.echa.europa.eu/registered/data/dossiers/DISS-9d9d70a2-cd25-29ec-e044-00144f67d249/AGGR-9f9bec32-6a63-4f79-ab7b-197e428ff38f_DISS-9d9d70a2-cd25-29ec-e044-00144f67d249.html

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