SAFETY DATA SHEET
PERCHLOROETHYLENE
REVISION 6, DATE 01 JUL 2024

1. IDENTIFICATION

Product Name	**Perchloroethylene**
Other Names	1,1,2,2-Tetrachloroethene; Ethylene tetrachloride; PCE; Perchlor; Tetrachloroethylene
Uses	Industrial solvent.
Chemical Family	No Data Available
Chemical Formula	C2Cl4
Chemical Name	Ethene, tetrachloro-
Product Description	No Data Available

Contact Details of the Supplier of this Safety Data Sheet

Organisation	Location	Telephone
Redox Ltd	2 Swettenham Road Minto NSW 2566 Australia	+61-2-97333000
Redox Ltd	11 Mayo Road Wiri Auckland 2104 New Zealand	+64-9-2506222
Redox Inc.	3960 Paramount Boulevard Suite 107 Lakewood CA 90712 USA	+1-424-675-3200
Redox Chemicals Sdn Bhd	Suite 13A.03, Menara Summit Persiaran Kewajipan USJ1 47600 UEP Subang Jaya Selangor, Malaysia	+60-3-5614-2111

Emergency Contact Details

For emergencies only; DO NOT contact these companies for general product advice.

Organisation	Location	Telephone
National Poison Centre	Malaysia	+60-4-6536-999

2. HAZARD IDENTIFICATION

Poisons Schedule (Aust) 6

Globally Harmonised System

Hazard Classification			Hazardous according to the criteria of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS)
Hazard Categories			Skin Corrosion/Irritation - Category 2
			Serious Eye Damage/Irritation - Category 2
			Sensitisation (Skin) - Category 1B
			Carcinogenicity - Category 2
			Specific Target Organ Toxicity (Single Exposure) - Category 3
			Long-term Hazard To The Aquatic Environment - Category 2
Pictograms			
Signal Word			Warning
Hazard Statements		**H315**	Causes skin irritation.
		H317	May cause an allergic skin reaction.
		H319	Causes serious eye irritation.
		H336	May cause drowsiness or dizziness.
		H351	Suspected of causing cancer.
		H411	Toxic to aquatic life with long lasting effects.
Precautionary Statements	Prevention	**P280**	Wear protective gloves/protective clothing/eye protection/face protection.
		P261	Avoid breathing mist/vapours/spray.
		P201	Obtain special instructions before use.
		P273	Avoid release to the environment.
		P272	Contaminated work clothing should not be allowed out of the workplace.
		P271	Use only outdoors or in a well-ventilated area.
	Response	**P302 + P352**	IF ON SKIN: Wash with plenty of water and soap.
		P337 + P313	If eye irritation persists: Get medical advice.
		P333 + P313	If skin irritation or rash occurs: Get medical advice.
		P308 + P313	IF exposed or concerned: Get medical advice.
		P312	Call a POISON CENTER or doctor if you feel unwell.
		P391	Collect spillage.
		P362	Take off contaminated clothing.
		P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
		P304 + P340	IF INHALED: Remove victim to fresh air and keep comfortable for breathing.
	Storage	**P403 + P233**	Store in a well-ventilated place. Keep container tightly closed.
		P405	Store locked up.
	Disposal	**P501**	Dispose of contents/container in accordance with local / regional / national / international regulations.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients

Chemical Entity	Formula	CAS Number	Proportion
Perchlorethylene	C2Cl4	127-18-4	<=100 %

4. FIRST AID MEASURES

Description of necessary measures according to routes of exposure

Swallowed IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Call a Poison Centre or doctor/physician for advice. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Never give anything by mouth to an unconscious person.

Eye IF IN EYES: Immediately flush eyes with running water for several minutes, holding eyelids open and occasionally lifting the upper and lower lids. Remove contact lenses if present and easy to do. Continue flushing until advised to stop by a Poisons Information Centre or a doctor, or for at least 15 minutes. If eye irritation persists, get medical advice/attention. *Suitable emergency eye wash facility should be immediately available.

Skin IF ON SKIN (or hair): Remove contaminated clothing and shoes immediately. Flush skin and hair with running water for at least 15 minutes. For minor skin contact, avoid spreading material on unaffected skin. If skin irritation or rash occurs, get medical advice/attention. Wash contaminated clothing and shoes before reuse. *Suitable emergency safety shower facility should be immediately available.

Inhaled IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a Poison Centre or doctor/physician for advice. Apply resuscitation if victim is not breathing - Do not use direct mouth-to-mouth method if victim ingested or inhaled the substance; use alternative respiratory method or proper respiratory device - Administer oxygen if breathing is difficult.

Advice to Doctor If exposed or concerned, get medical advice/attention. Medical examination necessary even on suspicion (only) of intoxication. Keep victim calm and warm - Obtain immediate medical care. Ensure that attending medical personnel are aware of the identity and nature of the product(s) involved, and take precautions to protect themselves.
*Most important symptoms and effects, both acute and delayed: Inhalation - High concentrations may cause : Headache, Dizziness, Tiredness, Nausea, Vomiting. May cause damage to the central nervous system through repeated or prolonged exposure. Skin Contact causes skin irritation. May cause an allergic skin reaction. Can be absorbed through the skin. Repeated exposure may cause skin dryness or cracking. Eye Contact : Risk of temporary eye lesions. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea. May cause : Liver and kidney injuries
*Indication of any immediate medical attention and special treatment needed: In the case of difficulty of opening eyelids, administer an analgesic eye wash (oxybuprocaine). Obtain immediate medical attention. Medical examination necessary even only on suspicion of intoxication.

Medical Conditions Aggravated by Exposure May cause an allergic skin reaction.

5. FIRE FIGHTING MEASURES

General Measures If safe to do so, move undamaged containers from fire area. Cool containers with water spray until well after fire is out. Avoid getting water inside containers.

Flammability Conditions Non-combustible; Material itself does not burn, but decomposes in a fire to hydrogen chloride and phosgene.

Extinguishing Media If material is involved in a fire, use dry chemical, Carbon dioxide (CO2), foam or water spray for extinction - Do not use water jets.

Fire and Explosion Hazard Containers may explode when heated. Contact with metals may evolve flammable hydrogen gas. The vapour is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen.

Hazardous Products of Combustion Fire or heat will produce irritating, toxic and/or corrosive gases, including Carbon monoxide, Chlorine, Hydrogen chloride gas, phosgene.

Special Fire Fighting Instructions Contain runoff from fire control or dilution water - Runoff may be toxic and/or corrosive and may pollute waterways.

Personal Protective Equipment Wear self-contained breathing apparatus (SCBA) and chemical splash suit. Fully-encapsulating, gas-tight suits should be worn for maximum protection. Structural firefighter's uniform is NOT effective for this material.

Flash Point No Data Available

Lower Explosion Limit No Data Available

Upper Explosion Limit	No Data Available
Auto Ignition Temperature	No Data Available
Hazchem Code	2Z

6. ACCIDENTAL RELEASE MEASURES

General Response Procedure	Ensure adequate ventilation - Ventilate enclosed spaces before entering. ELIMINATE all ignition sources. Do not touch or walk through spilled material. Avoid breathing vapours and contact with eyes, skin and clothing.
Clean Up Procedures	Large spill: Transfer by mechanical means such as vacuum truck to a salvage tank for product recovery or safe disposal. Absorb small spillage/residues with earth, sand or other non-combustible material and transfer to a labelled, sealable container for disposal (see SECTION 13).
Containment	Stop leak if safe to do so – Prevent entry into waterways, drains or confined areas. Cover with dry earth, sand or other non-combustible material followed by plastic sheet to minimise spreading and to slow down evaporation. Use bunds to contain the spill; Cover drains. *The vapour is heavier than air and may accumulate in lowered spaces causing a deficiency of oxygen.
Decontamination	Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely.
Environmental Precautionary Measures	Spillages and decontamination runoff should be prevented from entering drains and watercourses. Spillages or uncontrolled discharges must be alerted to the appropriate regulatory body.
Evacuation Criteria	Spill or leak area should be isolated immediately. Keep unauthorised personnel away. Keep upwind and to higher ground. Large spill: Immediately contact Police or Fire Brigade; Consider initial downwind evacuation of areas within at least 250 m.
Personal Precautionary Measures	Do not touch damaged containers or spilled material unless wearing appropriate protective clothing (see SECTION 8). Large spill: Wear SCBA and chemical splash suit. Fully-encapsulating, gas-tight suits should be worn for maximum protection.

7. HANDLING AND STORAGE

Handling	Safety showers and eyewash facilities should be provided within the immediate work area for emergency use. Ensure adequate ventilation - Use only outdoors or in a well-ventilated area. Obtain special instructions before use - Do not handle until all safety precautions have been read and understood. Minimise workplace exposure concentrations. Avoid breathing mist/vapours and contact with eyes, skin and clothing. Do not ingest. Wear protective gloves/protective clothing/eye protection/face protection (see SECTION 8). Forms dangerous gas near radiators or naked flames: Keep away from heat, hot surfaces and sources of ignition - No smoking. Take precautionary measures against static discharges. Avoid splash filling. Do not use compressed air for filling, discharging or handling operations. Avoid release to the environment - Collect spillage (see SECTION 6).
Storage	Store in a cool, dry and well-ventilated place, out of direct sunlight. Keep container tightly closed. Keep away from heat, hot surfaces and sources of ignition - No smoking. Keep away from foodstuffs and incompatible materials (see SECTION 10). Store locked up. Locate bulk storage outdoors. Bulk storage tanks should be diked (bunded).
Container	Keep in the original container or appropriate packaging, i.e. Stainless steel, Steel (drums) or glass. Do not store in Aluminium.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

General	For Perchloroethylene (CAS No. 127-18-4): - Safe Work Australia Exposure Standard: TWA = 50 ppm (340 mg/m3); STEL = 150 ppm (1,020 mg/m3). - New Zealand Workplace Exposure Standard (2018): TWA = 20 ppm (136 mg/m3); STEL = 40 ppm (271 mg/m3); Skin absorption (skin); Confirmed carcinogen (6.7A). - NIOSH REL: Minimise workplace exposure concentrations; NIOSH considers tetrachloroethylene to be a potential occupational carcinogen as defined by the OSHA carcinogen policy.

	- OSHA PEL: TWA = 100 ppm; Ceiling = 200 ppm (for 5 minutes in any 3-hour period), with a maximum peak of 300 ppm. - Immediately dangerous to life or health (IDLH) concentration: 150 ppm [Note: NIOSH recommends as part of its carcinogen policy that the "most protective" respirators be worn for tetrachloroethylene at any detectable concentration].
Exposure Limits	No Data Available
Biological Limits	No information available.
Engineering Measures	A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. The use of local exhaust ventilation is recommended to control emissions near the source.
Personal Protection Equipment	- Respiratory protection: Wear respiratory protection at any detectable concentration. Recommended: Supplied-air respirator or self-contained breathing apparatus (SCBA) that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (refer to AS/NZS 1715 & 1716). - Eye/face protection: Wear appropriate eye protection to prevent eye contact. Recommended: Chemical splash goggles. - Hand protection: Wear protective gloves. Recommended: Impervious gloves, e.g. Fluorocarbon rubber. Unsuitable glove materials: PVC, Polyethylene, Neoprene, Nitrile rubber. - Skin/body protection: Wear appropriate personal protective clothing to prevent skin contact. Recommended: Use protective clothing which is chemical resistant to this material. Safety shoes and boots should also be chemical-resistant.
Special Hazards Precaustions	Depending on the degree of exposure, periodic medical examination is suggested.
Work Hygienic Practices	Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product. Wash hands and exposed skin before breaks and immediately after handling the product. Contaminated work clothing should not be allowed out of the workplace.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Appearance	Liquid
Odour	Ether-like
Colour	Colourless
pH	No Data Available
Vapour Pressure	25 hPa (@ 25 °C)
Relative Vapour Density	5.7 - 5.83 Air = 1
Boiling Point	121.2 °C
Melting Point	No Data Available
Freezing Point	-22 °C
Solubility	Slightly soluble in water (150 mg/l @ 25 °C) - Soluble in organic solvents 20°C
Specific Gravity	1.62 - 1.63
Flash Point	No Data Available
Auto Ignition Temp	No Data Available
Evaporation Rate	No Data Available
Bulk Density	No Data Available
Corrosion Rate	No Data Available
Decomposition Temperature	>=140 °C
Density	No Data Available
Specific Heat	No Data Available
Molecular Weight	165.85 g/mol
Net Propellant Weight	No Data Available
Octanol Water Coefficient	Log Pow: 2.53 @ 20 °C
Particle Size	No Data Available
Partition Coefficient	No Data Available
Saturated Vapour Concentration	No Data Available

Vapour Temperature	No Data Available
Viscosity	0.891 mPa•s (@ 20 °C)
Volatile Percent	No Data Available
VOC Volume	No Data Available
Additional Characteristics	No information available.
Potential for Dust Explosion	Not applicable.
Fast or Intensely Burning Characteristics	No information available.
Flame Propagation or Burning Rate of Solid Materials	No information available.
Non-Flammables That Could Contribute Unusual Hazards to a Fire	No information available.
Properties That May Initiate or Contribute to Fire Intensity	Non-combustible; Material itself does not burn, but decomposes in a fire to hydrogen chloride and phosgene.
Reactions That Release Gases or Vapours	Decomposition will produce irritating, toxic and/or corrosive gases, including Carbon monoxide, Chlorine, Hydrogen chloride gas, phosgene.
Release of Invisible Flammable Vapours and Gases	Contact with metals may evolve flammable hydrogen gas.

10. STABILITY AND REACTIVITY

General Information	Decomposes slowly on contact with moisture and on long exposure to light. Reacts violently with finely divided metals; This generates fire and explosion hazard.
Chemical Stability	Stable under normal conditions of use.
Conditions to Avoid	Avoid direct sunlight. Keep away from heat, hot surfaces and sources of ignition.
Materials to Avoid	Incompatible/reactive with oxidising agents, strong bases, metal salts, plastic, non-iron metals (Aluminium, Magnesium, Zinc).
Hazardous Decomposition Products	Decomposition will produce irritating, toxic and/or corrosive gases, including Carbon monoxide, Chlorine, Hydrogen chloride gas, phosgene.
Hazardous Polymerisation	No information available.

11. TOXICOLOGICAL INFORMATION

General Information	- Acute toxicity: If swallowed the substance may cause vomiting and could result in aspiration pneumonitis. Vapour is harmful to health on prolonged exposure. Use of alcoholic beverages enhances the harmful effect. - Skin corrosion/irritation: Causes skin irritation. Solvents may de-grease the skin. Repeated or prolonged contact with skin may cause dermatitis. - Eye damage/irritation: Causes serious eye irritation. - Respiratory/skin sensitisation: May cause an allergic skin reaction. - Germ cell mutagenicity: Not classified. Did not show mutagenic effects in animal experiments. - Carcinogenicity: Suspected of causing cancer. Tetrachloroethylene (Perchloroethylene) is classified by the IARC Monograph as "Probably carcinogenic to humans" (Group 2A). - Reproductive toxicity: Not classified. - STOT (single exposure): May cause drowsiness or dizziness. May cause irritation of respiratory tract and shortness of breath. Inhalation of high vapour concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting. The substance may cause effects on the central nervous system. Exposure at high levels could cause unconsciousness. - STOT (repeated exposure): Not classified. The substance may have effects on the liver, kidneys and central nervous system. - Aspiration toxicity: Not classified.

Information on likely routes of exposure:
- Ingestion: Acutely toxic, possible aspiration risk and GI discomfort.
- Eye contact: Serious eye irritant.
- Skin contact: Skin sensitizer and irritant.
- Inhalation: Vapours are harmful (long-term exposure).
Chronic effects: Group 2 carcinogen.

Acute

Ingestion Acute toxicity (Oral):
- LD50, Rats (male/female): 3,005 - 3,835 mg/kg

Inhalation Acute toxicity (Inhalation):
- LC50, Rat: 3,786 ppm (4 h).

Carcinogen Category Carc. 2

12. ECOLOGICAL INFORMATION

Ecotoxicity Aquatic toxicity:
- LC50, Fish (Oncorhynchus mykiss): 5 mg/l (96 h).
- NOEC, Fish (Jordanella floridae): 2.0 mg/l (10 days).
- EC50, Crustacea (Daphnia magna): 8.5 mg/l (48 h).
- NOEC, Crustacea (Daphnia magna): 0.51 mg/l (28 days).
- EC50, Algae/aquatic plants (Chlamydomonas reinhardii): 3.64 mg/l (72 h).
- NOEC, Algae/aquatic plants (Chlamydomonas reinhardii): 1.77 mg/l (72 h) (Growth Rate).

Persistence/Degradability Not readily biodegradable (0 %, 21 d). Non-significant photolysis (Half-life: 50 d).

Mobility Very volatile (air).
- Henry's Constant: 21 hPa.m^3/mol @ 25 °C
Unlikely to absorb in soil.
- KOC: 141
- log Koc: 2.15

Environmental Fate Toxic to aquatic life with long lasting effects - Avoid release to the environment.

Bioaccumulation Potential The substance does not bioaccumulate.
- Bioconcentration factor (BCF): 49 [Lepomis macrochirus (Bluegill sunfish)].

Environmental Impact No Data Available

13. DISPOSAL CONSIDERATIONS

General Information Recover and reclaim or recycle, if practicable, or dispose of in accordance with local/regional/national regulations. Contact a licensed professional waste disposal service to dispose of this material. The organic ingredients can be incinerated in a suitable installation when in accordance with local regulations. Do not release to sewers. Do not dispose together with household waste.

Special Precautions for Land Fill Drain container thoroughly. After draining, vent in a safe place away from sparks and fire. Do not puncture, cut or weld unclean drums.

14. TRANSPORT INFORMATION

Sea Transport
IMDG Code

Proper Shipping Name TETRACHLOROETHYLENE

Class	6.1 Toxic and Infectious Substances - Toxic Substances
Subsidiary Risk(s)	CP Marine Pollutant
UN Number	1897
Hazchem	2Z
Pack Group	III
Special Provision	No Data Available
EMS	F-A, S-A
Marine Pollutant	Yes

Air Transport
IATA DGR

Proper Shipping Name	TETRACHLOROETHYLENE
Class	6.1 Toxic and Infectious Substances - Toxic Substances
Subsidiary Risk(s)	No Data Available
UN Number	1897
Hazchem	2Z
Pack Group	III
Special Provision	No Data Available

15. REGULATORY INFORMATION

General Information	TETRACHLOROETHYLENE
Poisons Schedule (Aust)	6

National/Regional Inventories

Australia (AIIC)	Listed
Canada (DSL)	Listed
Canada (NDSL)	Not Listed
China (IECSC)	Listed
Europe (EINECS)	204-825-9
Europe (REACh)	Not Determined
Japan (ENCS/METI)	Listed
Korea (KECI)	Listed
Malaysia (List of Classified Substances)	Listed
New Zealand (NZIoC)	Listed
Philippines (PICCS)	Listed
Taiwan (TCSI)	Listed
USA (TSCA)	Listed
Mexico (INSQ)	Listed

16. OTHER INFORMATION

Related Product Codes	PECHLO0200, PECHLO0400, PECHLO0500, PECHLO0600, PECHLO0700, PECHLO0800, PECHLO0900, PECHLO0901, PECHLO0902, PECHLO1000, PECHLO1001, PECHLO1002, PECHLO1003, PECHLO1004, PECHLO1005, PECHLO1006, PECHLO1007, PECHLO1008, PECHLO1009, PECHLO1010, PECHLO1011, PECHLO1012, PECHLO1013, PECHLO1014, PECHLO1015, PECHLO1016, PECHLO1017, PECHLO1018, PECHLO1019, PECHLO1020, PECHLO1021, PECHLO1022, PECHLO1023, PECHLO1100, PECHLO1101, PECHLO1102, PECHLO1103, PECHLO1200, PECHLO1300, PECHLO1400, PECHLO1500, PECHLO1600, PECHLO1700, PECHLO1701, PECHLO1705, PECHLO1707, PECHLO1800, PECHLO1801, PECHLO1802, PECHLO1803, PECHLO1804, PECHLO1805, PECHLO1806, PECHLO1807, PECHLO1808, PECHLO1809, PECHLO1810, PECHLO1811, PECHLO1812, PECHLO1813, PECHLO1814, PECHLO1815, PECHLO1816, PECHLO1817, PECHLO1818, PECHLO1819, PECHLO1820, PECHLO1821, PECHLO1822, PECHLO1823, PECHLO1824, PECHLO1825, PECHLO1826, PECHLO1827, PECHLO1828, PECHLO1900, PECHLO2000, PECHLO2001, PECHLO2002, PECHLO2100, PECHLO2200, PECHLO2202, PECHLO2300, PECHLO2400, PECHLO2700, PECHLO3000, PECHLO3001, PECHLO3010, PECHLO3011, PECHLO3012, PECHLO3020, PECHLO3021, PECHLO3100, PECHLO3200, PECHLO4000, PECHLO5000, PECHLO5400, PECHLO5500, PECHLO6000, PECHLO7700, PECHLO8000, PECHLO9000, PECHLO9001, PECHLO9009, PECHLO9010, PECHLO9100, PECHLO9200
Revision	6
Revision Date	01 Jul 2024
Key/Legend	< Less Than > Greater Than **AICS** Australian Inventory of Chemical Substances **atm** Atmosphere **CAS** Chemical Abstracts Service (Registry Number) **cm^2** Square Centimetres **CO2** Carbon Dioxide **COD** Chemical Oxygen Demand **deg C (°C)** Degrees Celcius **EPA (New Zealand)** Environmental Protection Authority of New Zealand **deg F (°F)** Degrees Farenheit **g** Grams **g/cm^3** Grams per Cubic Centimetre **g/l** Grams per Litre **HSNO** Hazardous Substance and New Organism **IDLH** Immediately Dangerous to Life and Health **immiscible** Liquids are insoluable in each other. **inHg** Inch of Mercury **inH2O** Inch of Water **K** Kelvin **kg** Kilogram **kg/m^3** Kilograms per Cubic Metre **lb** Pound **LC50** LC stands for lethal concentration. LC50 is the concentration of a material in air which causes the death of 50% (one half) of a group of test animals. The material is inhaled over a set period of time, usually 1 or 4 hours. **LD50** LD stands for Lethal Dose. LD50 is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals. **ltr** or **L** Litre **m^3** Cubic Metre **mbar** Millibar **mg** Milligram **mg/24H** Milligrams per 24 Hours **mg/kg** Milligrams per Kilogram **mg/m^3** Milligrams per Cubic Metre **Misc** or **Miscible** Liquids form one homogeneous liquid phase regardless of the amount of either component present. **mm** Millimetre **mmH2O** Millimetres of Water **mPa.s** Millipascals per Second **N/A** Not Applicable **NIOSH** National Institute for Occupational Safety and Health **NOHSC** National Occupational Heath and Safety Commission

OECD Organisation for Economic Co-operation and Development
Oz Ounce
PEL Permissible Exposure Limit
Pa Pascal
ppb Parts per Billion
ppm Parts per Million
ppm/2h Parts per Million per 2 Hours
ppm/6h Parts per Million per 6 Hours
psi Pounds per Square Inch
R Rankine
RCP Reciprocal Calculation Procedure
STEL Short Term Exposure Limit
TLV Threshold Limit Value
tne Tonne
TWA Time Weighted Average
ug/24H Micrograms per 24 Hours
UN United Nations
wt Weight