

1. IDENTIFICATION

Product Name	Tetrahydrofuran
Other Names	1,4 Epoxybutane; Furan, Tetrahydro-; THF
Uses	Solvent, Laboratory chemicals, Corrosion Inhibiter, Coatings, Cleaning agent
Chemical Family	No Data Available
Chemical Formula	C4H8O
Chemical Name	Tetrahydrofuran
Product Description	No Data Available

Contact Details of the Supplier of this Safety Data Sheet

Organisation	Location	Telephone
Redox Pty Ltd	2 Swettenham Road Minto NSW 2566 Australia	+61-2-97333000
Redox Pty 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	Level 2, No. 8, Jalan Sapir 33/7 Seksyen 33, Shah Alam Premier Industrial Park 40400 Shah Alam Sengalor, Malaysia	+60-3-5614-2111

Emergency Contact Details


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

Organisation	Location	Telephone
Poisons Information Centre	Westmead NSW	1800-251525 131126
Chemcall	Australia	1800-127406 +64-4-9179888
Chemcall	Malaysia	+64-4-9179888
Chemcall	New Zealand	0800-243622 +64-4-9179888
National Poisons Centre	New Zealand	0800-764766
CHEMTREC	USA & Canada	1-800-424-9300 CN723420 +1-703-527-3887

2. HAZARD IDENTIFICATION

Poisons Schedule (Aust) Not scheduled

Globally Harmonised System

Hazard Classification	Hazardous according to the criteria of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS)	
Hazard Categories	Flammable Liquids - Category 2 Serious Eye Damage/Irritation - Category 2A Skin Corrosion/Irritation - Category 2 Specific Target Organ Toxicity (Single Exposure) - Category 3 Acute Toxicity (Oral) - Category 4 Carcinogenicity - Category 2	
Pictograms		
Signal Word	Danger	
Hazard Statements	H225	Highly flammable liquid and vapour.
	H302	Harmful if swallowed.
	H315	Causes skin irritation.
	H319	Causes serious eye irritation.
	H335	May cause respiratory irritation.
	H336	May cause drowsiness or dizziness.
	H351	Suspected of causing cancer.
Precautionary Statements	Prevention	P201 Obtain special instructions before use. P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking. P233 Keep container tightly closed. P242 Use only non-sparking tools. P243 Take precautionary measures against static discharge. P261 Avoid breathing dust/fume/gas/mist/vapours/spray. P264 Wash hands and contaminated body thoroughly after handling. P271 Use only outdoors or in a well-ventilated area. P280 Wear protective gloves/protective clothing/eye protection/face protection.
	Response	P302 + P352 IF ON SKIN: Wash with plenty of soap and water. P303 + P361 + P353 IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower. P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P308 + P313 IF exposed or concerned: Get medical advice/ attention. P312 Call a POISON CENTER or doctor/physician if you feel unwell. P321 Specific treatment (see First Aid Measures on Safety Data Sheet). P332 + P313 If skin irritation occurs: Get medical advice/attention. P337 + P313 If eye irritation persists: Get medical advice/attention. P362 Take off contaminated clothing and wash before reuse. P370 + P378 In case of fire: Use carbon dioxide (CO ₂), dry chemical or alcohol resistant foam for extinction.
	Storage	P403 + P233 Store in a well-ventilated place. Keep container tightly closed. P403 + P235 Store in a well-ventilated place. Keep cool. P405 Store locked up.

Disposal **P501**

Dispose of contents/container in accordance with local / regional / national / international regulations.

National Transport Commission (Australia)

Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Dangerous Goods Classification

Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Environmental Protection Authority (New Zealand)

Hazardous Substances and New Organisms Amendment Act 2015

HSNO Classifications

Physical Hazards	3.1B	Flammable liquid - high hazard
Health Hazards	6.1D	Substances that are acutely toxic - Harmful
	6.3A	Substances that are irritating to the skin
	6.4A	Substances that are irritating to the eye
	6.7B	Substances that are suspected human carcinogens
	6.9B	Substances that are harmful to human target organs or systems
Environmental Hazards	9.3C	Substances that are harmful to terrestrial vertebrates

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients

Chemical Entity	Formula	CAS Number	Proportion
Tetrahydrofuran	C4H8O	109-99-9	>=99.5 %

4. FIRST AID MEASURES

Description of necessary measures according to routes of exposure

Swallowed	Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
Eye	Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.
Skin	Wash off with soap and plenty of water. Consult a physician.
Inhaled	If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
Advice to Doctor	Treat symptomatically based on judgement of doctor and individual reactions of patient.
Medical Conditions Aggravated by Exposure	No information available on medical conditions aggravated by exposure to this product.

5. FIRE FIGHTING MEASURES

General Measures

Clear fire area of all non-emergency personnel. Stay upwind. Keep out of low areas. Eliminate ignition sources. Move fire exposed containers from fire area if it can be done without risk. Flame-proof equipment is necessary in all areas where this chemical is being used. Nearby equipment must be earthed. Use water spray to cool unopened containers.

Product is highly flammable.

Flammability Conditions	
Extinguishing Media	In case of fire, use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Fire and Explosion Hazard	May form explosive peroxides.
Hazardous Products of Combustion	Carbon oxides.
Special Fire Fighting Instructions	Do NOT allow fire fighting water to reach waterways, drains or sewers. Store fire fighting water for treatment.
Personal Protective Equipment	Fire fighters should wear a positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots and gloves) or chemical splash suit.
Flash Point	-17 °C Closed cup
Lower Explosion Limit	1.8 %(V) %
Upper Explosion Limit	11.8 %(V) %
Auto Ignition Temperature	215 at 1013hPa °C
Hazchem Code	•2YE

6. ACCIDENTAL RELEASE MEASURES

General Response Procedure	Avoid breathing vapours, mist or gas. Shut off all possible sources of ignition. Avoid accidents, clean up immediately. Increase ventilation. Avoid walking through spilled product as it is slippery when spilled. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
Clean Up Procedures	Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal. Dispose of promptly as hazardous waste.
Containment	Stop leak if safe to do so. Isolate the area.
Environmental Precautionary Measures	Do NOT let product reach drains or waterways. If product does enter a waterway, advise the Environmental Protection Authority or your local Waste Management.
Evacuation Criteria	Evacuate all unnecessary personnel.
Personal Precautionary Measures	Personnel involved in the clean up should wear full protective clothing as listed in section 8.

7. HANDLING AND STORAGE

Handling	Ensure an eye bath and safety shower are available and ready for use. Observe good personal hygiene practices and recommended procedures. Wash thoroughly after handling. Take precautionary measures against static discharges by bonding and grounding equipment. Avoid contact with eyes, skin and clothing. Do not inhale product vapours. Avoid prolonged or repeated exposure. Keep away from heat and flame. Handle under inert gas. No smoking. Take measures to prevent the build up of electrostatic charge.
Storage	Dry residue is explosive. Store under inert gas. Test for peroxide formation periodically and before distillation. Storage class (TRGS 510): Flammable liquids. Store in a cool, dry, well-ventilated, fire-proof area (or refrigerated tank). Keep containers tightly sealed when not in use. Inspect regularly for deficiencies such as damage or leaks. Protect against physical damage. Ground and bond storage containers. Store away from incompatible materials as listed in section 10. Store in sealed containers with oxygen and light excluded. Inside storage should be in a standard flammable liquids storage room or cabinet. This product has a UN Classification of 2056 and a Dangerous Goods Class 3 (flammable) according to The Australian Code for the Transport of Dangerous Goods By Road and Rail
Container	Store in original packaging as approved by manufacturer.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

General	Components:	ACGIH - Threshold Limit Values - Time Weighted Averages (TLV-TWA)	U.S. - OSHA - Final PELs - Time Weighted Averages (TWAs)
	Tetrahydrofuran	50ppmTWA	200 ppm
	109-99-9 (99.9)	100 ppm STEL	590 mg/m3

The following exposure standard has been established by The Australian Safety and Compensation Council (ASCC); Tetrahydrofuran: CAS: 109-99-9 TWA = 100ppm (295mg/m³) Notice: SK

NOTE: The exposure value at the TWA is the average airborne concentration of a particular substance when calculated over a normal 8 hour working day for a 5 day working week. Peak limitation is a ceiling concentration which should not be exceeded over a measurement period which should be as short as possible but not exceeding 15 minutes. These exposure standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. These exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.

Exposure Limits	No Data Available
Biological Limits	No information available on biological limit values for this product.
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.
Personal Protection Equipment	RESPIRATOR: Wear a respirator with suitable filter if engineering controls are inadequate for controlling airborne exposure at point of use (AS1715/1716). EYES: Chemical goggles; also wear a face shield if splashing hazard exists (AS1336/1337). HANDS: Wear protective gloves (AS2161). CLOTHING: Chemical-resistant coveralls, splash apron and safety footwear (AS3765/2210).
Work Hygienic Practices	No Data Available

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Appearance	Liquid
Odour	Ether-like
Colour	Clear, colourless
pH	ca. 7
Vapour Pressure	170 hPa (@ 20 °C)
Relative Vapour Density	ca 2.5
Boiling Point	66 - 67 °C at 1013.25hPa
Melting Point	-108.44 °C at 1013.25hPa
Freezing Point	-108.5 °C
Solubility	Soluble in water
Specific Gravity	0.886
Flash Point	-17 °C Closed cup
Auto Ignition Temp	215 at 1013hPa °C
Evaporation Rate	No Data Available
Bulk Density	No Data Available
Corrosion Rate	No Data Available
Decomposition Temperature	No Data Available
Density	0.89 g/cm ³
Specific Heat	No Data Available
Molecular Weight	72.11 g/mol
Net Propellant Weight	No Data Available
Octanol Water Coefficient	No Data Available
Particle Size	No Data Available
Partition Coefficient	log Pow: 0.46
Saturated Vapour Concentration	No Data Available
Vapour Temperature	25 °C
Viscosity	0.518 mm ² /s (@ 25 °C)
Volatile Percent	No Data Available
VOC Volume	No Data Available

Additional Characteristics	Not explosive, In use may form flammable/explosive vapour-air mixture. The substance or mixture is not classified as oxidizing.
Potential for Dust Explosion	Product is a liquid.
Fast or Intensely Burning Characteristics	No Data Available
Flame Propagation or Burning Rate of Solid Materials	No Data Available
Non-Flammables That Could Contribute Unusual Hazards to a Fire	No Data Available
Properties That May Initiate or Contribute to Fire Intensity	No Data Available
Reactions That Release Gases or Vapours	No Data Available
Release of Invisible Flammable Vapours and Gases	No Data Available

10. STABILITY AND REACTIVITY

General Information	Flammable Liquid.
Chemical Stability	Material may form explosive peroxides over time. Stable if not exposed to air. Protect against light
Conditions to Avoid	Reacts with air to form peroxides Exposure to light. Exposure to oxygen. Heat, flames and sparks.
Materials to Avoid	Oxidizing materials., Air (if unstabilized)., Lithium aluminum hydride., Sodium aluminum hydride., Sodium hydroxide., Potassium hydroxide, acids.
Hazardous Decomposition Products	Irritating fumes emitted when heated to decomposition.
Hazardous Polymerisation	No Data Available

11. TOXICOLOGICAL INFORMATION

General Information	<p>Acute Oral Toxicity (LD50): 1650 mg/kg (Rat)</p> <p>Acute Dermal Toxicity (LD50): >2000 mg/kg (Rat)</p> <p>Acute Inhalation Toxicity (LC50): >14.7 mg/l 4hour (Rat)</p> <p>Eye Irritation: Severe eye irritation (Rabbit). May cause irreversible eye damage</p> <p>Skin Irritation: Mildly irritating to rabbit skin (24 hour exposure)</p> <p>Sensitization: Non- sensitizing to guinea pig skin. Not a skin sensitizer in mouse LLNA assay</p> <p>Mutagenicity: Weight of evidence indicates THF is non-genotoxic.</p> <p>Reproductive/Developmental Toxicity: In a two generation reproductive toxicity study in rats, no adverse reproductive effects were reported and development effects were noted only at maternally toxic doses.</p> <p>Teratogenicity: Not teratogenic in mice and rats following inhalation exposure during gestation.</p> <p>Carcinogenicity: Some evidence of carcinogenicity in female mice (liver tumors) and male rats (kidney tumors) reported following lifetime inhalation exposure.</p> <p>Other Information: Repeated inhalation exposure resulted in mucous membrane and respiratory tract irritation, liver toxicity, kidney effects (male rats only), adrenal toxicity (mice only) and transient narcosis. THF is absorbed through skin.</p> <p>Specific target organ toxicity - single exposure : May cause drowsiness or dizziness. - Nervous system</p>
Eye/Irritant	Irritating to eyes. Causes severe eye irritation. Causes blurred vision.
Ingestion	May be harmful if swallowed. Irritation to the mucous membranes. Nausea. Dizziness. Headaches. May cause liver and kidney damage.
Inhalation	Irritating to the respiratory system. Causes respiratory tract irritation. Irritation to the mucous membranes. Nausea. Dizziness. Headaches. May cause liver and kidney damage. Central nervous system depression, Cough, chest pain, Difficulty in breathing, Exposure to high airborne concentrations can cause anesthetic effects.
Skin/Irritant	Causes mild skin irritation. May be absorbed through the skin and produce nervous system effects.
Carcinogen Category	No Data Available

12. ECOLOGICAL INFORMATION

Ecotoxicity	Fish 96 hr LC50 = 2160 mg/L Daphnia 24 hr EC50 = 382 mg/l Growth inhibition IC50 - Algae - 3,700 mg/l - 192 h
Persistence/Degradability	According to the results of tests of biodegradability this product is not readily biodegradable.
Mobility	Soluble in water.
Environmental Fate	Do NOT let product reach waterways, drains and sewers.
Bioaccumulation Potential	No bioaccumulation is to be expected (log Pow <= 4).
Environmental Impact	No Data Available

13. DISPOSAL CONSIDERATIONS

General Information	Dispose of in accordance with all local, state and federal regulations. All empty packaging should be disposed of in accordance with Local, State, and Federal Regulations or recycled/reconditioned at an approved facility.
Special Precautions for Land Fill	Contact a specialist disposal company or the local waste regulator for advice.

14. TRANSPORT INFORMATION

Land Transport (Australia)

ADG Code

Proper Shipping Name	TETRAHYDROFURAN
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
EPG	14 Liquids - Highly Flammable
UN Number	2056
Hazchem	•2YE
Pack Group	II
Special Provision	No Data Available

Land Transport (Malaysia)

ADR

Proper Shipping Name	TETRAHYDROFURAN
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
EPG	14 Liquids - Highly Flammable
UN Number	2056
Hazchem	•2YE
Pack Group	II
Special Provision	No Data Available

Land Transport (New Zealand)

NZS5433

Proper Shipping Name	TETRAHYDROFURAN
Class	3 Flammable Liquids

Subsidiary Risk(s)	No Data Available
EPG	14 Liquids - Highly Flammable
UN Number	2056
Hazchem	•2YE
Pack Group	II
Special Provision	No Data Available

Land Transport (United States of America)

US DOT

Proper Shipping Name	TETRAHYDROFURAN
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
ERG	127 Flammable Liquids (Polar / Water-Miscible)
UN Number	2056
Hazchem	2YE
Pack Group	II
Special Provision	No Data Available

Sea Transport

IMDG Code

Proper Shipping Name	TETRAHYDROFURAN
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
UN Number	2056
Hazchem	2YE
Pack Group	II
Special Provision	No Data Available
EMS	FE,SD
Marine Pollutant	No

Air Transport

IATA DGR

Proper Shipping Name	TETRAHYDROFURAN
Class	3 Flammable Liquids
Subsidiary Risk(s)	No Data Available
UN Number	2056
Hazchem	2YE
Pack Group	II
Special Provision	No Data Available

National Transport Commission (Australia)

Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Dangerous Goods Classification	Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)
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15. REGULATORY INFORMATION

General Information No Data Available

Poisons Schedule (Aust) Not scheduled

Environmental Protection Authority (New Zealand)

Hazardous Substances and New Organisms Amendment Act 2015

Approval Code HSR001224

National/Regional Inventories

Australia (AICS)	Listed
Canada (DSL)	Listed
Canada (NDSL)	Not Determined
China (IECSC)	Listed
Europe (EINECS)	203-726-8
Europe (REACH)	01-2119444314-46-XXXX
Japan (ENCS/METI)	Not Determined
Korea (KECI)	Listed
Malaysia (EHS Register)	Not Determined
New Zealand (NZIoC)	Listed
Philippines (PICCS)	Listed
Switzerland (Giftliste 1)	Not Determined
Switzerland (Inventory of Notified Substances)	Not Determined
Taiwan (NCSR)	Not Determined
USA (TSCA)	Not Determined

16. OTHER INFORMATION

Related Product Codes TEFURA0995, TEFURA1000, TEFURA1001, TEFURA1002, TEFURA1003, TEFURA1004, TEFURA1005, TEFURA1006, TEFURA1007, TEFURA1008, TEFURA1009, TEFURA1010, TEFURA1011, TEFURA1012, TEFURA1013, TEFURA1014, TEFURA1015, TEFURA1016, TEFURA1017, TEFURA1018, TEFURA1019, TEFURA1020, TEFURA1100, TEFURA1500, TEFURA2000, TEFURA2500, TEFURA3000, TEFURA3500, TEFURA3600, TEFURA3601, TEFURA3700, TEFURA4000, TEFURA4001, TEFURA4500, TEFURA5000, TEFURA5010, TEFURA5500, TEFURA6000, TEFURA7000, TEFURA8000, TEFURA9000, TEFURA9990

Revision 3

Revision Date 29 Oct 2015

Reason for Issue updated sds

Key/Legend < Less Than
> Greater Than

AICS Australian Inventory of Chemical Substances

atm Atmosphere

CAS Chemical Abstracts Service (Registry Number)

cm² 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/cm³ 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/m³ 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
m³ Cubic Metre
mbar Millibar
mg Milligram
mg/24H Milligrams per 24 Hours
mg/kg Milligrams per Kilogram
mg/m³ 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 Health 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