

MATERIAL SAFETY DATA SHEET**TETRAHYDROFURAN**

PRODUCT CODE NUMBER(S): 8900-1, 8900-2, 8901-2, 8901-7, 8903-2, 8904-2, 8900-30, CAL 1347

PRODUCT IDENTIFICATION

Chemical Name and Synonyms: Tetrahydrofuran;
THF; Tetramethylene oxide; Diethylene oxide; Oxolane;
1,4-Epoxybutane

Chemical Family: Cycloaliphatic ether

Chemical Formula: CH₂CH₂CH₂CH₂O

Product Use: Laboratory solvent

Manufacturer's Name and Address:

Caledon Laboratories Ltd.
40 Armstrong Avenue
Georgetown, Ontario L7G 4R9

Telephone No: (905) 877-0101

Fax No: (905) 877-6666

Emergency Telephone No: CANUTEC (613) 996-6666

HAZARDOUS INGREDIENTS OF MATERIALS

Ingredients	%	TLV Units	CAS No.
Tetrahydrofuran	>99	50 ppm (TWA) 100 ppm (STEL)	109-99-9

PHYSICAL DATA

Physical State: Liquid

Odour and Appearance: Clear, colourless liquid, strong ether-like odour

Odour Threshold (ppm): 2.48 - 3.47 ppm (recognition);
61.2 ppm (distinct odour). Good warning properties.

Vapour Pressure (mm Hg): 131.5 mm Hg at 20°C

Vapour Density (Air = 1): 2.49

Evaporation Rate: 8 (n-butyl acetate = 1)

Boiling Point (degrees C): 66°C

Freezing Point (degrees C): -108.5°C

pH: ~7 (aqueous solution)

Specific Gravity: 0.9

Coefficient of Water/Oil distribution: LogP (oct) = 0.46

SHIPPING DESCRIPTION

UN: 2056

T.D.G. Class: 3

Pkg. Group: II

REACTIVITY DATA

Chemical Stability: Stable if properly inhibited. In absence of inhibitor, forms potentially explosive peroxides upon standing in air. If peroxides accumulate above 1%, mixture becomes thermally explosive. Hygroscopic; absorbs moisture from air.

Incompatibility with other substances: Incompatible with strong oxidizers, acids, bases. Vigorous reaction with bromine. Any peroxides in the product can react violently with alkalis. Not corrosive to metals. Will attack some forms of plastics, rubber, coatings.

Reactivity: Polymerization can occur in presence of cationic initiators such as selected Lewis acids or strong proton acids. Avoid heat, sparks, open flame, exposure to light,

all ignition sources, incompatible or combustible materials, generation of mist.

Hazardous Decomposition Products: If not inhibited, can form potentially explosive peroxides upon standing in air.

FIRE AND EXPLOSION DATA

Flammability: Extremely flammable liquid. Ignites readily at room temperature. Even dilute solutions may be flammable. Can accumulate static charge by flow or agitation. Vapour readily forms explosive mixtures with air. Vapours are heavier than air and may travel to distant ignition source and flash back. Closed containers may rupture violently when exposed to fire.

Extinguishing Media: CO₂, dry chemical, foam. Water may be ineffective for extinguishing, but as spray or fog may be used to cool containers, disperse vapours, and dilute chemical to non-flammable solution. Fight fire from upwind, from a safe distance. Firefighters must wear protective equipment (NIOSH/OSHA approved self-contained breathing apparatus) and clothing (Bunker Gear) sufficient to prevent inhalation of mists or vapours, and contact with skin and eyes. Closed containers may rupture violently during fire; withdraw immediately in case of rising sound from vent or discoloration of tank.

Flash Point (Method Used): -17°C (TCC)

Autoignition Temperature: 321°C

Upper Flammable Limit (% by volume): 11.8

Lower Flammable Limit (% by volume): 1.8

Hazardous Combustion Products: CO_x

Sensitivity to Impact: None if pure. If contaminated with peroxides, may explode on impact.

Sensitivity to Static discharge: Vapour readily ignited by static discharge. Liquid can accumulate static charge by flow or agitation.

TOXICOLOGICAL PROPERTIES AND HEALTH DATA**Toxicological Data:**

LD₅₀: (oral, rat) 1,650 mg/kg

LC₅₀: (rat) 21,000 ppm/3h

Effects of Acute Exposure to Product:

Inhaled: Irritating to respiratory tract and other mucous membranes. CNS depressant. May cause coughing, shortness of breath, nausea, headache, dizziness, intoxication and loss of consciousness. 25,000 ppm has been reported lethal to humans; duration not given. May aggravate existing pulmonary/bronchial disease. Severe overexposure can cause pulmonary edema which may be fatal. Symptoms (shortness of breath, cyanosis) may appear several hours after exposure. In animal testing, long term inhalation caused CNS depression, liver effects.

In contact with skin: Irritating to skin. Prolonged exposure may cause drying and dermatitis. May be absorbed through skin with symptoms as in "Inhaled".

In contact with eyes: Severe eye irritant. High concentrations of vapour are irritating. Liquid causes severe irritation, eye corrosion with corneal or conjunctival ulceration, and possible permanent damage.

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Ingested: No specific human information available. May cause burning sensation in the mouth and throat, nausea, and vomiting. Animal testing indicates low oral toxicity. Liver damage may result from ingestion of large amounts. May be aspirated into the lungs during ingestion or vomiting, which can cause pulmonary edema, chemical pneumonitis, and death.

Effects of Chronic Exposure to Product:

Prolonged or repeated exposure may cause liver or kidney damage, conjunctivitis, dermatitis.

Carcinogenicity: Not listed as a carcinogen by IARC, ACGIH, NTP.

Teratogenicity: No evidence of teratogenic effects in animal studies except at doses that were maternally toxic.

Reproductive Effects: No human information available No effects on fertility or reproduction in a two-generation animal study.

Mutagenicity: No evidence of any mutagenic effects

Synergistic Products: None known

PREVENTIVE MEASURES

Engineering Controls: Non-sparking, grounded exhaust ventilation, separate from other ventilation systems.

Respiratory Protection: Dust/mist mask. Fumehood. Up to 2,000 ppm: NIOSH/OSHA approved continuous flow supplied-air respirator, or full face-piece chemical cartridge respirator with organic vapour cartridges, or powered air-purifying respirator with organic vapour cartridges. Higher or unknown concentrations, as in fire or spill conditions: positive-pressure, self-contained breathing apparatus, or positive-pressure, full face-piece supplied-air respirator with auxiliary positive-pressure self-contained breathing apparatus.

Eye Protection: Chemical safety goggles or face shield.

Skin Protection: Barrier (PE/PA/PE), Silver Shield/4H (polyethylene/ethylene vinyl alcohol), Responder, Trelchem HPS, Tychem BR/LV, Tychem TK gloves. Impermeable apron, boots, overalls as required to prevent contact.

Other Personal Protective Equipment: Safety shower and eyebath in work area.

Leak and Spill Procedure: Evacuate area, and provide maximum ventilation. Eliminate all sources of ignition. Cleanup personnel must be thoroughly trained in the handling of hazardous materials, and must wear protective equipment and clothing sufficient to prevent inhalation of mists or vapours and contact with skin and eyes. Do not touch spilled material. Stop or reduce discharge if safe to do so. Contain spill and collect using inert absorbent material. Prevent from entering sewers or waterways. Collect contaminated adsorbent in labelled containers and hold for disposal. Wash site of spill thoroughly with detergent and water.

Waste Disposal: Follow all federal, provincial, and local regulations.

Handling Procedures and Equipment: EXTREMELY FLAMMABLE, TOXIC LIQUID AND VAPOUR. Workers must be thoroughly trained in the hazards of this material and its safe use, and must wear appropriate protective clothing and equipment. May form peroxides on lon-standing; do not distill its peroxide level is >0.05%. Post "No Smoking" signs. Ground and bond equipment to prevent static charge accumulation. Use non-sparking tools. Avoid splash filling. Keep aisles and exits clear of obstruction. Keep workplace free of incompatible or combustible materials. Avoid contact with skin and eyes and inhalation of vapours. Avoid generating vapours or mists. Use the smallest amount possible for the purpose, in a designated area with adequate ventilation. Keep containers closed when not in use. Do not return contaminated material to the original

container. Have absorbents readily available for leaks or spills. Have appropriate fire extinguishers available. Empty containers may contain hazardous residues; treat with extreme caution.

Storage Requirements: Store in suitable, labelled containers, in a cool, dry, well-ventilated area, out of direct sunlight and away from strong oxidizers, corrosives, and other incompatible materials. Storage facilities should be made of fire-resistant materials. Provide raised sills and trenches to drain to a safe area. Keep away from heat, sparks, flames, and all sources of ignition. Protect from damage, and inspect frequently for signs of leaking. Treat empty containers with caution, as they may contain hazardous residues. Do not re-use containers. Use drums on a first in, first out basis.

FIRST AID MEASURES**Specific Measures:**

Eyes: Immediately flush eyes with gently running water for ten to fifteen (10-15) minutes, holding eyelids open during flushing. Take care not to flush contaminated water into unaffected eye. Obtain medical attention immediately.

Skin: Remove contaminated clothing(including shoes, watches, belts, and rings). Wash affected areas with large amounts of running water, for five to ten (5-10) minutes, or until no trace of chemical remains. If irritation persists, get medical attention.

Inhalation: IMMEDIATELY remove casualty from contaminated area to fresh air (caution must be used by rescuers to avoid exposure to contaminating fumes). Remove any sources of ignition. Give oxygen and get medical attention for any breathing difficulty. If breathing has stopped give artificial respiration. If breathing and pulse are absent give CPR. Immediately obtain medical attention. Stay with casualty until medical assistance is reached.

Ingestion: DO NOT INDUCE VOMITING. If the casualty is alert and not convulsing, give 2 to 4 glasses of water to dilute the material. Get medical attention immediately. If spontaneous vomiting occurs, have casualty lean forward to avoid breathing in of emesis. Rinse mouth and administer more water.

REFERENCES USED

- CCINFO disc: Cheminfo
Budavari: The Merck Index, 12th ed., 1997
Royal Society of Chemistry: Material Safety Data Sheets, Vol. 1, 1992
Sax, Lewis: Hawley's Condensed Chemical Dictionary, 11th ed., 1987
Suppliers' Material Safety Data Sheets

ADDITIONAL INFORMATION

Date Issued: November 1, 1988

Revision: December 2011

MSDS: 8900-1, 8900-2, 8901-2, 8901-7, 8903-2, 8904-2, 8900-30, CAL 1347

Proposed WHMIS Designation: B2; D2B (eye irritant)

Prepared by: Caledon Laboratories Ltd. (905) 877-0101
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