

MATERIAL SAFETY DATA SHEET**tert-BUTYL METHYL ETHER**

PRODUCT CODE NUMBER(S): 7000-1, 7000-2, 7001-2

PRODUCT IDENTIFICATION**Chemical Name and Synonyms:** *tert-Butyl methyl ether; Methyl-tert-butyl ether; MTBE***Chemical Family:** *Saturated aliphatic ether***Chemical Formula:** $C_5H_{12}O$ **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**

<i>Ingredients</i>	<i>%</i>	<i>TLV Units</i>	<i>CAS No.</i>
<i>tert-Butyl methyl ether</i>	<i>>98</i>	<i>40 ppm</i>	<i>1634-04-4</i>

PHYSICAL DATA**Physical State:** *Liquid***Odour and Appearance:** *Clear, colourless liquid; mild characteristic ether-like odour***Odour Threshold (ppm):** *0.05-0.13 ppm; good warning properties, threshold >10x TLV***Vapour Pressure (mm Hg):** *201 mm Hg at 20°C***Vapour Density (Air = 1):** *3.1***Evaporation Rate:** *1.6 (Ethyl ether = 1)***Boiling Point (°C):** *55.2°C***Freezing Point (°C):** *-109°C***pH:** *Not available; probably neutral***Specific Gravity:** *0.741 @ 20°C***Coefficient of Water/Oil distribution:** *LogP(oct) = 1.06***SHIPPING DESCRIPTION****UN:** 2398**T.D.G. Class:** 3**Pkg. Group:** II**REACTIVITY DATA****Chemical Stability:** *Stable in air, unstable in strong acid solutions. Unlike many ethers, MTBE barely forms peroxides in air.***Incompatibility with other substances:** *May react violently, with increased risk of fire and explosion, with oxygen and strong oxidizing agents, Lewis or mineral acids. Not corrosive to common metals, such as carbon steel, stainless steel, aluminum, copper, brass. Attacks some types of rubber, plastics and coatings.***Reactivity:** *Avoid heat, sparks, open flame, all other sources of ignition, incompatible materials, generation of mist.***Hazardous Decomposition Products:** *CO₂, CO, and various hydrocarbons. May form dangerous peroxides in air, but not as readily as other ethers.***FIRE AND EXPLOSION DATA****Flammability:** *Extremely flammable liquid and vapour. Readily ignites at room temperature. Vapours form flammable/explosive mixtures with air at or above -28°C. Vapour is heavier than air and may travel considerable distance to source of ignition and flash back. Liquid can float on water and may spread fire. Can accumulate in confined spaces and cause flammability or toxicity hazard. Closed containers may rupture violently when heated.***Extinguishing Media:** *Alcohol-resistant foam, polymer foam, carbon dioxide, or dry chemical. Foams are not very effective; no filmforming effect occurs. Water is ineffective for fighting fire, but as spray or fog can be used to cool containers and disperse vapours or flush spills away from ignition sources. Fight fire from upwind, from a safe distance. Firefighters must wear NIOSH/MSHA approved full face-piece, positive-pressure self-contained breathing apparatus and chemical splash suit or full Bunker Gear. Containers may explode in heat of fire; withdraw immediately in case of rising sound from vent or discoloration of tank.***Flash Point (Method Used):** *-28°C (CC)***Autoignition Temperature:** *435°C***Upper Flammable Limit (% by volume):** *8.4***Lower Flammable Limit (% by volume):** *1.6***Hazardous Combustion Products:** *CO₂, CO, and various hydrocarbons***Sensitivity to Impact:** *None***Sensitivity to Static discharge:** *Liquid will not accumulate static charge by flow or agitation; electrical conductivity of methyl tert-butyl ether is high. Mixtures of vapour and air at concentrations in the flammable range may be ignited by a static discharge of sufficient energy.***TOXICOLOGICAL PROPERTIES AND HEALTH DATA****Toxicological Data:****LD₅₀:** *(oral, rat) 2,963 mg/kg; (dermal, rabbit) >10 g/kg***LC₅₀:** *(rat) 23,600 ppm/4h***Effects of Acute Exposure to Product:****Inhaled:** *Severely irritating to upper respiratory tract, so tolerance for exposure is usually limited. 75 ppm is extremely irritating. Higher concentrations would be expected to cause central nervous system depression, with nausea and vomiting, headache, drowsiness.***In contact with skin:** *No human information available. Mild to moderate irritant, based on animal testing. May be absorbed but slowly enough that toxicity is not expected.***In contact with eyes:** *Liquid is a mild irritant; high vapour concentrations cause irritation, tearing, redness based on animal testing. No eye irritation was reported in human volunteers exposed to 50 ppm for 1-2 hours.***Ingested:** *Rapidly absorbed with systemic effects (see "Inhaled", but relatively low toxicity, based on animal information. May cause irritation of throat and gastrointestinal tract. Not a typical route of exposure. If aspirated during ingestion or vomiting, can cause severe lung irritation, and possibly pulmonary edema, respiratory failure, cardiac arrest and death.*

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Effects of Chronic Exposure to Product:

Prolonged or repeated contact may cause dermatitis.
Prolonged or repeated inhalation may cause kidney damage.

Carcinogenicity: Confirmed animal carcinogen in. Relevance to humans unknown. Classified as A3 (animal carcinogen) by ACGIH.

Teratogenicity: No human information available; teratogenic in animal tests only at doses which are toxic to the mother.

Reproductive Effects: No human information available; animal tests are generally negative.

Mutagenicity: No human information available. Negative in tests with animals and cultured mammalian, bacteria and yeast cells.

Synergistic Products: None known

PREVENTIVE MEASURES

Engineering Controls: Non-sparking, grounded ventilation system, separate from other ventilation systems, and electrical equipment that does not provide a source of ignition.

Respiratory Protection: Up to 500 ppm: NIOSH/MSHA approved organic vapour cartridge respirator, or powered air-purifying respirator with organic vapour cartridge. Higher or unknown concentrations, as in fire or spill conditions: positive pressure, full facepiece self-contained breathing apparatus, or positive pressure, full face-piece air-supplied respirator with an auxiliary positive pressure self-contained breathing apparatus.

Eye Protection: Chemical goggles and/or face shield.

Skin Protection: Barrier (PE/PA/PE), Silver Shield/4H (polyethylene/ethylene vinyl alcohol), Tychem BR/LV, Tychem SL, Tychem TK gloves. Other impermeable protective clothing, apron, coveralls, boots, sufficient to prevent contact.

Other Personal Protective Equipment: Eye wash and safety shower in work area.

Leak and Spill Procedure: Evacuate area. Ventilate area before re-entering. Eliminate all ignition sources. Cleanup personnel must be thoroughly trained in the hazards of this chemical and must wear protective equipment and clothing sufficient to prevent inhalation of mist of vapours and contact with skin, eyes and clothing. Do not touch spilled material. Prevent from entering sewers and waterways. Stop or reduce discharge if safe to do so. Contain spill with inert absorbent (sand, earth). Transfer to container for removal by disposal company. Contaminated absorbent may pose the same hazards as the spilled product; treat with caution. Use water spray to disperse vapours or to flush liquid spill away from fire exposure. Wash site of spill thoroughly with water.

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

Handling Procedures and Equipment: EXTREMELY FLAMMABLE LIQUID & VAPOUR. Eliminate all sources of ignition and have all engineering controls operating before handling. Personnel working with this chemical must be thoroughly trained regarding its hazards, and its safe use, and must wear appropriate protective equipment and clothing. Ground and bond all equipment to prevent static charge accumulation. Use non-sparking tools. Post "No Smoking" signs. Can form potentially explosive peroxides upon long standing in air. Do not distill if test shows more than 0.05% peroxides present; these may explode upon concentration by distillation. Sudden release of hot vapours may result in ignition; published autoignition values may not be valid in some chemical processes; actual process conditions must be analysed to establish safe operating temperatures. Use smallest amount

possible for the purpose in a designated area with appropriate ventilation. Avoid generating vapour or mist. Avoid all contact with eyes, skin or clothing. Keep containers closed when not in use.

Storage Requirements: Store in suitable, labelled containers, in a cool, dry, well-ventilated area, out of direct sunlight and away from all sources of ignition and incompatible or combustible materials. Keep tightly closed when not in use. Protect from damage and inspect regularly for signs of leaking or damage. Keep storage area clear of combustible materials. Ground and bond equipment and containers to prevent a static charge buildup. Use spark-resistant tools and avoid splash filling of containers. Storage facilities should be made of fire-resistant materials, and should have raised sills and trenches to drain to a safe area. 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 twenty (10-20) minutes, holding eyelids open during flushing. Take care not to flush contaminated water into unaffected eye. Get medical attention.

Skin: Immediately remove contaminated clothing (including rings, watches, belts and shoes). Flush exposed area with large amounts of warm running water and non-abrasive soap until no evidence of chemical remains. If irritation persists, get medical attention. Decontaminate clothing before reuse, or discard.

Inhalation: Remove to fresh air (caution must be used by rescuers to avoid exposure to contaminating fumes). Eliminate all ignition sources. If breathing is difficult, give oxygen. If breathing has stopped give artificial respiration. 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, have them drink 2 to 3 glasses of water to dilute the material. If spontaneous vomiting occurs, have casualty lean forward to avoid breathing in of emesis. Rinse mouth and administer more water.

REFERENCES USED

- CCINFO disc: MSDS's, May 2007
Budavari: The Merck Index, 12th ed., 1997
Sax, Lewis: Hawley's Condensed Chemical Dictionary, 11th ed., 1987
Sax: Dangerous Properties of Industrial Chemicals, 5th ed., 1979
Suppliers' Material Safety Data Sheets

ADDITIONAL INFORMATION

Date Issued: March 1, 1989

Revision: May 2010

MSDS: 7000-1, 7000-2, 7001-2

Proposed WHMIS Designation: B2; D2B (irritant)

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