SAFETY DATA SHEET

TEDIA®
High Purity Solvents

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METHYL TERT-BUTYL ETHER

SDS No. M0147

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Methyl tert-Butyl Ether
Synonyms: MTBE, Methyl t-Butyl Ether, 2-Methoxy-2-methylpropane; t-Butyl Methyl Ether; Methyl 1,1-dimethyl Ethyl Ether
Recommended Use: This product is recommended for laboratory and manufacturing use only. It is not recommended for drug, food or household use.

2. HAZARDS IDENTIFICATION

Classification:
Flammable Liquids: GHS Category 2
Skin Irritation: GHS Category 2

Label Elements
Signal Word: DANGER!
Hazard Statements:
H225 – Highly flammable liquid and vapor.
H315 – Causes skin irritation.
Precautionary Statements:
P210 – Keep away from heat/ sparks/ open flames/ hot surfaces. – No smoking.
P243 – Take precautionary measures against static discharge.
P280 – Wear protective gloves/protective clothing/eye protection/face protection.
P303+P361+P353 – IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P332+P313 – If skin irritation occurs: Get medical advice/ attention.
P403+P235 – Store in a well-ventilated place. Keep cool.
P501 – Dispose of contents/ container to an approved waste disposal plant.

Emergency Overview

Causes irritation to eyes, skin, and respiratory tract. Aspiration hazard if swallowed. May cause central nervous system damage. Highly flammable liquid and vapor. Vapor may cause flash fire. Target Organs: Central nervous system, reproductive system, and kidneys.

HMIS Rating:
Health – 2 Flammability – 3 Physical Hazard – 0 PPE – User supplied
NOTE: HMIS ratings use a numbering scale that ranges from 0 - 4 to indicate the degree of hazard. A value of zero means the chemical presents no hazard while a value of four indicates a high hazard. These ratings are based on the inherent properties of this chemical under expected conditions of normal use and are not intended to be used in emergency situations. PPE is determined by the user based on their needs and conditions.

3. COMPOSITION AND INFORMATION ON INGREDIENTS

Ingredient	CAS No	Percent	Hazardous
Methyl tert-Butyl Ether	1634-04-4	100%	Yes

4. FIRST-AID MEASURES

Inhalation: Get medical aid immediately. Remove to fresh air. If breathing is labored or with coughing, give 100% supplemental oxygen. If not breathing, begin artificial respiration. DO NOT give mouth-to-mouth resuscitation. If breathing has ceased, apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Ingestion: Aspiration hazard. Get medical aid immediately. Do not induce vomiting. If conscious and alert, give 2-3 cups of milk or water. Never give anything by mouth to an unconscious person.
Skin Contact: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover irritated skin with an emollient or anti-bacterial cream. Soap and cold water may be used. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact: Check for and remove contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.
Notes to Physician: Treat symptomatically and supportively.

5. FIRE FIGHTING MEASURES

Flammability: Highly flammable liquid and vapor (GHS Category 2)
Auto-ignition Temperature: 224° C (435° F)
Flash Point: -28° C (-18° F)
Flammable Limits: Lower Limit – 1.6 vol %, Upper Limit – 15.1 vol %
Products of Combustion: Will decompose into highly toxic and irritating gases (Peroxides, formic acid, butyl formate, methyl radicals, carbon monoxide, and carbon dioxide) under fire conditions.
Specific Fire Hazards: As in any fire, always wear self-contained breathing apparatus in pressure-demand (MSA/NIOSH approved or equivalent), and full protective gear. Use water spray to keep fire exposed containers cool. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. Liquid floats on water and may travel to a source of ignition and spread fire.
Specific Explosion Hazards: May form explosive peroxides. Containers may explode in the heat of a fire.
Fire Fighting Media: Use water spray to cool fire-exposed containers. Water may be ineffective. Material is lighter than water and insoluble in water. Fire could easily be spread in an area where water can't be contained. Use water spray, dry chemical, carbon dioxide, or chemical foam. Do not use solid streams of water.
National Fire Protective Association: Health - 2, Flammability - 3, Reactivity - 0
NOTE: NFPA ratings use a numbering scale that ranges from 0 - 4 to indicate the degree of hazard. A value of zero means the chemical presents no hazard while a value of four indicates a high hazard. They are for use by emergency personnel to address the hazards that are presented by short term, acute exposure to this product under fire, spill, or similar emergencies. Ratings involve data and interpretations that may vary from company to company.

6. ACCIDENTAL RELEASE MEASURES

Absorb spilled liquid with sorbent pads, socks, or other inert material such as vermiculite, sand, or earth. Provide ventilation to the affected area and remove all ignition sources. Avoid run-off into storm sewers and ditches that lead to waterways. Approach the spill from upwind and pick up absorbed material and place it in a suitable container. Use only non-sparking tools and equipment. A vapor suppressing foam may be used. Always use proper personal protective equipment as described in section 8.

7. HANDLING AND STORAGE

Precautions: Always use proper personal protective equipment as described in section 8. Wash thoroughly after handling. Ground and bond containers when transferring material. Use spark-proof tools and explosion-proof equipment. Avoid contact with eyes, skin, and clothing. Remove contaminated clothing and wash before reuse. Empty containers contain product residue (liquid and vapor) and can be dangerous. Keep container tightly closed and away from heat, spark, and flame. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks, or open flames. Do not allow to evaporate to near dryness. Use with adequate ventilation. Avoid breathing vapor or mist.
Storage: Keep in a flammables area away from heat, sparks, flame, and all sources of ignition. Keep in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. In the presence of atmospheric oxygen, ethers generally form unstable peroxides, but no peroxides were detected in unstabilized MTBE after storage for 52 months. MTBE has a significantly decreased formation of peroxides compared with other ethers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or using the material should be equipped with eyewash station and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Personal Protection: Wear protective chemical goggles or appropriate eye protection. Use appropriate protective gloves and protective clothing to prevent skin exposure. Chemical-resistant nitrile gloves should be used during routine handling. Disposable nitrile gloves may be recommended for intermittent use. PVC, Neoprene, Viton, Butyl, or natural rubber gloves are not recommended. A respiratory protection program that meets OSHA 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever possible. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.
Exposure Limits:
ACGIH – 50 ppm TWA;
NIOSH – None
OSHA Final PELs – None
OSHA Vacated PELs - None

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State and Appearance: Clear, colorless liquid.
Odor: turpentine mild odor
Molecular Formula: $(CH_3)_3COCH_3$
Molecular Weight: 88.15
Auto-ignition Temperature: 224° C (435° F)
Flash Point: -28° C (-18° F)
Flammable Limits: Lower Limit – 1.6 vol %, Upper Limit – 15.1 vol %
pH: Not available.
Boiling Point: 54-56° C @ 760 mm Hg
Freezing/Melting Point: -110° C
Decomposition Temperature: Not available
Specific Gravity: 0.74
Vapor Density (Air=1): 3.1
Vapor Pressure: 268 mbar @ 20° C.

Viscosity: 0.36 mpa @ 20° C
Solubility: 51 g/L @ 20° C

10. STABILITY AND REACTIVITY

Stability: Stable at room temperature in closed containers under normal storage and handling.
Conditions to Avoid: Incompatible materials, light, ignition sources, excess heat, prolonged exposure to air.
Incompatibility with Various Substances: Oxidizing agents, strong acids, amines, ammonia, chlorinated solvents, plastics, aldehydes (e.g. acetaldehyde, acrolein, chloral, formaldehyde), caustics (e.g. ammonia, ammonium hydroxide, calcium hydroxide, potassium hydroxide, sodium hydroxide).
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide, peroxides, formic acid, butyl formate, methyl radicals, acetone.
Hazardous Polymerization: Has not been reported.

11. TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, skin absorption, skin contact
Acute Exposure Hazards:

INHALATION HAZARD: Inhalation of vapors may irritate the respiratory tract. Overexposure may cause central nervous system depression with lightheadedness, nausea, vomiting, headache, and unconsciousness. Greater exposure may cause muscle weakness, numbness of the extremities, unconsciousness and suffocation. May cause kidney damage.
INGESTION HAZARD: Aspiration hazard. May cause effects similar to those of inhalation. May produce headache, nausea, fatigue, dizziness, and unconsciousness. Aspiration into lungs may cause chemical pneumonitis, which may be fatal. May cause central nervous system depression.
SKIN CONTACT HAZARD: Causes skin irritation. Causes symptoms similar to inhalation. May be harmful if absorbed through the skin.
EYE CONTACT HAZARD: Cause eye irritation, redness, and pain.

Chronic Exposure Hazards: May cause cancer according to animal studies. Repeated inhalation may cause nasal and tracheal inflammation. Chronic exposure may cause liver damage. Adverse reproductive effects have been reported in animals. MTBE has been reported to induce lymphomas, leukemias. And testicular tumors in rats exposed by the oral route. Inhalation studies have produced liver tumors in mice and kidney tumors in rats.

Animal Toxicity:
Inhalation, mouse: LC50 = 141 g/m^3/15M;
Inhalation, mouse: LC50 = 28,000 mg/m^3/2H;
Inhalation, rat: LC50 = 23,576 ppm/4H;
Inhalation, rat: LC50 = 41,000 mg/m^3/4M;
Oral, mouse: LD50 = 5960 uL/kg;
Oral, rat: LD50 = 4 g/kg;
Carcinogenicity:
ACGIH – A3, confirmed animal carcinogen with unknown relevance to humans
California, NTP, IARC – Not listed
Epidemiology: No information found.
Teratogenicity: Possible effects observed.
Reproductive Effects:
TCLo (inhalation, rat) = 8000 ppm/6H, Effects on newborn – viability index (e.g. # alive at day 4 per # born alive)
TCLo Inhalation, mouse) = 4000 ppm/6H, Reproductive-effects on embryo or fetus-fetotoxicity (except death e.g. stunted fetus) – developmental Abnormalities: musculoskeletal system
Mutagenicity: No information found.
Neurotoxicity: No information found.

12. ECOLOGICAL INFORMATION

Ecotoxicity:

Fish: Fathead minnow: LC50 = 110 mg/L, 96H, unspecified
Fish: Fathead minnow: LC50 = 706 mg/L, 30 days old, flow-through, 24-26 degrees
Fish: Leuciscus idus: LC50 = >100 mg/L, 48H,
Bacteria: Phytobacterium phosphoreum: EC50 = 11.4-55 mg/L, 5, 15, 30 minutes, Microtox test, 15 degrees
Bacteria: Pseudomonas putida: EC50 = ca. 700 mg/L, 18H, Bringmann-Kuhn test
Daphnia: EC50 = 651 mg/L, 48H,
Log POW = 1,06

Environmental Fate: Not biodegradable. Avoid entering into water or underground waters. Do not empty into drains.

13. DISPOSAL CONSIDERATIONS

Material that cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Processing, use, or contamination of this product may change the waste management options. Waste generators must decide if discarded material is a hazardous waste. State and local disposal regulations may differ from federal disposal definitions found in 40 CFR 261.3. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. TRANSPORT INFORMATION

US DOT
Proper Shipping Name: Methyl tert-Butyl Ether
Hazard Class: 3
UN Number: UN2398
Packing Group: II

IMDG
Proper Shipping Name: Methyl tert-Butyl Ether
Hazard Class: 3
UN Number: UN2398
Packing Group: II

IATA
Proper Shipping Name: Methyl tert-Butyl Ether
Hazard Class: 3
UN Number: UN2398
Packing Group: II

15. REGULATORY INFORMATION

US Federal Regulations:
CERCLA Hazardous Substances: CAS# 1634-04-4 – 1000 lb final RQ; 454 kg final RQ
SARA Section 302: Does not have a TPQ
SARA Codes: CAS# 1634-04-4 – immediate, delayed, fire
Section 313: MTBE (CAS# 1634-04-4) is subject to SARA Title III Section 313 and 40 CFR 373 reporting requirements.
Clean Air Act: CAS# 1634-04-4 is listed as a hazardous air pollutant (HAP).
OSHA: Not considered highly hazardous by OSHA.

US State Regulations:
CAS# 1634-04-4 is on the following state right-to-know lists: New Jersey, Pennsylvania, Minnesota, nd Massachusetts
California Prop 65: This product contains no chemicals known to the State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Originally Prepared: 10/24/2006

Last Revised: 10/26/2020 – Updated hazard statements, and precautionary statements in Section 2.

The information contained herein is based on current knowledge and experience; no responsibility is accepted that the information is sufficient or correct in all cases. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers and the protection of the environment.

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