SAFETY DATA SHEET

TEDIA® High Purity Solvents

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All non-emergency numbers should be directed to Customer Service at 800-PURITY1

ETHYL ETHER, UNSTABILIZED — SDS No. M0105

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Ethyl Ether, Unstabilized
Synonyms: Diethyl Ether; 1, 1'Oxybisethane; Ethyl Oxide; Diethyl Oxide
Recommended Use: This product is recommended for laboratory and manufacturing use only. It is not recommended for drug, food or household use.

HAZARDS IDENTIFICATION

Classification:
Flammable Liquids: GHS Category 1
Organic Peroxides: GHS Category D
Acute Toxicity, Oral: GHS Category 4
Eye Irritation: GHS Category 2A
Specific Target Organ Exposure, single exposure: GHS Category 3

Label Elements
Signal Word: DANGER!
Hazard Statements:

H224 – Extremely flammable liquid and vapor.
H241 - Heating may cause a fire or explosion.
H302 – Harmful if swallowed.
H319 – Causes serious eye irritation.
H336 – May cause drowsiness or dizziness.

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: Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.
P410 – Protect from sunlight.

Emergency Overview

Causes irritation to skin and eyes. Breathing vapors may cause dizziness and drowsiness. Aspiration hazard. May be harmful if swallowed. Extremely flammable liquid and vapor. Vapor may cause flash fire. Static electrical hazard. May form explosive peroxides. This material has been reported to be susceptible to autoxidation and therefore should be classified as peroxidizable. Air and light sensitive. Hygroscopic. Target Organs: Central nervous system, respiratory system, skin, and eyes.

HMIS Rating:

Health – 2* Flammability – 4 Physical Hazard – 2 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
Ethyl Ether	60-29-7	>99%	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 unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.
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: Persons with kidney disease, chronic respiratory disease, liver disease, or skin disease may be at increased risk from exposure to this product. Alcoholic beverage consumption may enhance the toxic effects of this product. Treat symptomatically and supportively.

5. FIRE FIGHTING MEASURES

Flammability: Extremely flammable liquid and vapor (GHS Category 1)
Auto-ignition Temperature: 180-190^{o} C
Flash Point: -45^{o} C (-49^{o} F)
Flammable Limits: Lower Limit – 1.9 vol %, Upper Limit – 36 vol %
Products of Combustion: Will decompose into highly toxic and irritating gases (Peroxides, 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. Material will readily ignite at room temperature. 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. Will be easily ignited by heat, sparks, or flame. May re-ignite after spark is extinguished. Vapors can spread along the ground and collect in low or confined areas. Water may be ineffective. Liquid floats on water and may travel to a source of ignition and spread fire.
Specific Explosion Hazards: May form explosive peroxides. Vapors may form explosive mixture with air. Containers may explode in the heat of a fire.
Fire Fighting Media: Use water spray to cool fire-exposed containers. For small fires, use dry chemical, carbon dioxide, water spray, or alcohol-resistant foam. Water may be ineffective. For large fires, use water spray, fog, or alcohol-resistant foam. Do not use solid streams of water. Cool containers with flooding quantities of water until well after fire is out.

National Fire Protective Association: Health - 2, Flammability - 4, 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. Take precautions against static discharge. Keep container tightly closed and away from heat, spark, and flame. Handle under an inert atmosphere. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks, or open flames. If peroxide formation is suspected, do not open or move. 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. Store protected from light under an inert atmosphere. Keep away from oxidizing agents. Containers should be dated when opened and tested periodically for the presence of peroxides. Should crystals form in a peroxidizable liquid, peroxidation may have occurred and the product should be considered extremely dangerous. In this instance, containers should only be opened remotely by professionals. Store at room temperature or below. Do not exceed 86^{o} F. Do not open unless contents have been at 72^{o} F or below for at least 24 hours. Ethyl ether may for explosive peroxides on long standing or after exposure to light or air. All peroxidizable substances should be stored away from heat and light and be protected from ignition sources.

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 – 400 ppm TWA; 500 ppm STEL
NIOSH – 1900 ppm IDLH
OSHA Final PELs – 400 ppm TWA, 1200 mg/m^3 TWA
OSHA Vacated PELs - 400 ppm TWA, 1200 mg/m^3 TWA

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State and Appearance: Clear liquid, APHAS – 10 max.
Odor: Sweetish, aromatic odor

Odor Threshold: 8.9 ppm
Molecular Formula: $(C_2H_5)_2O$
Molecular Weight: 74.12
Auto-ignition Temperature: 180-190° C
Flash Point: -45° C (-49° F)
Flammable Limits: Lower Limit – 1.9 vol %, Upper Limit – 36 vol %
pH: Not available.
Boiling Point: 34.6° C @ 760 mm Hg
Freezing/Melting Point: -116.3° C
Decomposition Temperature: Not available
Specific Gravity: <0.7079 g/ml
Vapor Density (Air=1): 2.55
Vapor Pressure: 442 mm Hg @ 20° C.
Evaporation Rate (Butyl Acetate = 1): 37.5
Viscosity: 0.2448 cp @ 20° C
Solubility: Slightly soluble
Conductivity: Nonconductive; Conductivity = 30 pS/m; Dielectric Constant = 4.6; Relaxation Time Constant = 1.4 seconds

10. STABILITY AND REACTIVITY

Stability: Under normal storage conditions, peroxidizable compounds can form and accumulate peroxides which may explode when subjected to heat or shock. This material is most hazardous when peroxide levels are concentrated by distillation or evaporation.
Conditions to Avoid: Light, ignition sources, exposure to air, electrical sparks, exposure to flame, heat.
Incompatibility With Various Substances: Strong oxidizing agents, strong acids.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide, peroxides.
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

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

INHALATION HAZARD: Inhalation of vapors may cause drowsiness and dizziness. Exposure to high concentrations may cause narcosis, nausea, and unconsciousness.
INGESTION HAZARD: Aspiration hazard. May cause headache, headache, excitement, nausea, fatigue, vomiting, stupor, and coma. May cause central nervous system depression characterized by excitement followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma, and possible death due to respiratory failure. Aspiration into lungs may cause chemical pneumonitis, which may be fatal.
SKIN CONTACT HAZARD: Causes skin irritation. May be absorbed through the skin. Prolonged or repeated exposure may cause drying and cracking of skin.
EYE CONTACT HAZARD: Cause moderate eye irritation, redness, and pain. Ethyl alcohol may cause severe eye irritation and possible chemical conjunctivitis and/or corneal damage.

Chronic Exposure Hazards: Prolonged or repeated skin contact may cause defatting or dermatitis. Prolonged or repeated exposure can cause psychic abnormalities such as anxiety, depression, and excitability. Laboratory experiments have resulted mutagenic effects. Prolonged exposure to vapor may cause eye injury. Repeated exposure may be habit forming. Prolonged or repeated exposure can cause liver or kidney damage.
Animal Toxicity:
Inhalation, mouse: LC50 = 31,000 ppm/30M;
Inhalation, rat: LC50 = 32,000 ppm/4H;
Oral, rat: LD50 = 1215 mg/kg;
Skin, rat, LD50 = 14.2 g/kg
Carcinogenicity: Not listed by ACGIH, California, NTP, or IARC
Epidemiology: No information found.

Teratogenicity: No information found.
Reproductive Effects: No information found.
Mutagenicity:
DNA inhibition; mouse embryo = 2850 mg/L;
Neurotoxicity: No information found.

12. ECOLOGICAL INFORMATION

Ecotoxicity:
Fish: Fathead minnow: LC50 = 2560 mg/L, 96H;
Aquatic invertebrates: Water flea: EC50 = 165 mg/L, 24H;
Algae: Green algae: NOEC = 100 mg/L, 72H;
If ethyl ether is released to soil, it will be subject to volitization. It will be expected to exhibit high mobility in soil, and therefore, can be expected to leach into groundwater. If ethyl ether is released to water, it will not be expected to significantly adsorb to sediment or suspended particulate matter, bioconcentrate in aquatic organisms, or hydrolyze.
Environmental Fate: Ethyl ether will not significantly photooxidize via reaction with photochemically produced hydroxyl radicals in water. Ethyl ether in surface water will be subject to rapid volitization with estimated half lives of 3.1 hr and 1.5 days. It will not be expected to hydrolyze in water or soil. If ethyl ether is released to the atmosphere, it will be expected to exist almost entirely in the vapor phase. It will be susceptible to photooxidation via vapor phase reaction with photochemically produced hydroxyl radicals with a half-life of 29 hours.

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. This material is a “U” listed waste (U117 – ignitable waste).

14. TRANSPORT INFORMATION

US DOT
Proper Shipping Name: Diethyl Ether
Hazard Class: 3
UN Number: UN1155
Packing Group: I

IMDG
Proper Shipping Name: Diethyl Ether
Hazard Class: 3
UN Number: UN1155
Packing Group: I

IATA
Proper Shipping Name: Diethyl Ether
Hazard Class: 3
UN Number: UN1155
Packing Group: I

15. REGULATORY INFORMATION

US Federal Regulations:
CERCLA Hazardous Substances: CAS# 60-29-7 – 100 lb final RQ; 45.4 kg final RQ

SARA Section 302: Does not have a TPQ
SARA Codes: CAS# 60-29-7 – immediate, fire, sudden release of pressure, reactive
Section 313: Ethyl Ether (CAS# 60-29-7) is not subject to SARA Title III reporting requirements.
OSHA: Not considered highly hazardous by OSHA.

US State Regulations:

CAS# 60-29-7 is on the following state right-to-know lists: New Jersey, Pennsylvania, and Massachusetts
California Prop 65: This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Originally Prepared: 10/24/2006
Last Revised: 9/17/2014 – Updated hazard categories and hazard statements in Section 2. Updated toxicity information in Section 11. Updated Ecotoxicity information in Section 12.

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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