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| MSDS Material Safety Data Sheet | |
| From: Mallinckrodt Baker, Inc. 222 Red School Lane Phillipsburg, NJ 08865 |  Mallinckrodt CHEMICALS |
|  | |
| 24 Hour Emergency Telephone: 908-859-2151 CHEMTREC: 1-800-424-9300 | |
| National Response in Canada CANUTEC: 613-996-6666 | |
| Outside U.S. and Canada Chemtrec: 703-527-3887 | |
| NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals. | |
| All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance. | |

ETHYL ETHER

1. Product Identification

Synonyms: Ether; ether, anhydrous; Diethyl ether; 1,1'Oxybisethane;ethyl oxide; diethyl oxide; Ethyl ether anhydrous;
CAS No.: 60-29-7
Molecular Weight: 74.12
Chemical Formula: C₂H₅OC₂H₅
Product Codes:
J.T. Baker: 9238, 9244, 9246, 9248, 9250
Mallinckrodt: 0848

2. Composition/Information on Ingredients

| Ingredient | CAS No | Percent | Hazardous |
|---------------|---------|-----------|-----------|
| Diethyl Ether | 60-29-7 | 99 - 100% | Yes |

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 4 - Extreme (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 2 - Moderate (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

Irritant. General anesthesia by inhalation can occur. Continued exposure may lead to respiratory failure or death. Early symptoms include irritation of nose and throat, vomiting, and irregular respiration, followed by dizziness, drowsiness, and unconsciousness.

Ingestion:

Irritating to the mucous membranes. Ingestion of 1 or 2 ounces may be fatal. Because of volatility the stomach becomes distended, which may cause belching. Other symptoms can include vomiting, unconsciousness, and coma.

Skin Contact:

Irritating to the skin and mucous membranes by drying effect. Can cause dermatitis on prolonged exposure. May be absorbed through skin.

Eye Contact:

May cause irritation, redness and pain. Prolonged exposures to high concentrations of vapor can cause eye damage.

Chronic Exposure:

Repeated exposures may be habit forming. Prolonged exposures may result in headache, drowsiness, excitation, and psychic disturbances. Teratogenic effects are possible.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems or impaired liver, kidney or respiratory function may be more susceptible to the effects of this substance. Alcoholic beverage consumption can enhance the toxic effects of this substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:

DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Call a physician immediately.

Skin Contact:

Remove any contaminated clothing. Wash skin with soap or mild detergent and water for at least 15 minutes. Call a physician.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Flash point: -45C (-49F) CC

Autoignition temperature: 160C (320F)

Flammable limits in air % by volume:

lcl: 1.9; ucl: 36.0

Dangerous highly flammable liquid.

Explosion:

Containers may explode when involved in a fire. Above flash point, vapor-air mixtures are explosive within flammable limits noted above. May form explosive peroxides on long standing or after exposure to air or light. May explode when brought in contact with nitric acid. Sensitivity to mechanical impact: Yes, if peroxides are formed. Sensitive to static discharge.

Fire Extinguishing Media:

Dry chemical, foam or carbon dioxide. Treat as a flammable gas in a fire situation. Water spray may be used to keep fire exposed containers cool. Water is ineffective as an extinguishing agent.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. This highly flammable liquid must be kept from sparks, open flame, hot surfaces, and all sources of heat and ignition. Vapors can flow along surfaces to distant ignition source and flash back.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB? solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials. Storage and use areas should be No Smoking areas. Bond and ground containers when transferring liquid. Isolate from other combustible material. Protect from direct sunlight. Protect against static electricity and lightning for large quantity storage rooms, protect with automatic sprinkler systems and total flooding carbon dioxide systems. The reactivity hazard may be increased on longstanding due to peroxide formation. Ether is subject to peroxide formation in opened containers and should be protected from exposure to air. When low peroxide ether is required, use only material from an unopened can. Do not allow to evaporate to near dryness. Addition of water or appropriate reducing agents will lessen peroxide formation. Any ether remaining in opened containers that has not been consumed/used after 2-3 days, should be discarded. Store At A Temperature Not Exceeding 30C (86F). DO NOT OPEN Unless Contents Are At Room Temperature (72F) or Below For At Least 24 Hours. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):
400 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
400 ppm (TWA), 500 ppm STEL

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. 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. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. An organic vapor respirator is predicted to have a short service life (less than 30 minutes at concentrations of ten times the TLV/PEL) when used with this material.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Other Control Measures:

Shoes should be conductive and nonsparking.

9. Physical and Chemical Properties

Appearance:

Clear, colorless liquid.

Odor:

Sweet, ethereal odor.

Solubility:

8.43% by wt in H₂O @ 15C; 6.05% by wt in H₂O @ 25C.

Specific Gravity:

0.71 at 20C/4C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

No information found.

Boiling Point:

35C (95F)

Melting Point:

-123C (-189F)

Vapor Density (Air=1):

2.6

Vapor Pressure (mm Hg):

440 @ 20C (68F) (ether)

Evaporation Rate (BuAc=1):

37.5

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Heat, light, and long standing contribute to instability. Reacts with air to form explosive peroxides.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Can react dangerously with acetyl peroxide, liquid oxygen, bromoazide, chlorine, and strong oxidizers such as nitrates. Avoid heat, flame, other sources of ignition, and exposure to light, air.

Conditions to Avoid:

Heat, flame, ignition sources, incompatibles, light, and air.

11. Toxicological Information

Toxicological Data:

Oral rat LD50: 1215 mg/kg; investigated as a tumorigen and mutagen; irritation eye rabbit: 100 mg moderate; skin rabbit 360 mg open mild

Reproductive Toxicity:

See Chronic Health Hazards.

| -----\Cancer Lists\----- | | | |
|--------------------------|----------------------|-------------|---------------|
| Ingredient | ---NTP Carcinogen--- | | IARC Category |
| | Known | Anticipated | |
| Diethyl Ether (60-29-7) | No | No | None |

12. Ecological Information

Environmental Fate:

When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is not expected to biodegrade. When released into water, this material is not expected to biodegrade. When released into the water, this material is expected to have a half-life of less than 1 day. When released to water, this material is expected to quickly evaporate. This material is not expected to significantly bioaccumulate. This material has a log octanol-water partition coefficient of less than 3.0. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is not expected to be degraded by photolysis. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:

The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, DIETHYL ETHER

Hazard Class: 3

UN/NA: UN1155

Packing Group: I

Information reported for product/size: 215L

International (Water, I.M.O.)

Proper Shipping Name: DIETHYL ETHER

Hazard Class: 3

UN/NA: UN1155

Packing Group: I

Information reported for product/size: 215L

International (Air, I.C.A.O.)

Proper Shipping Name: RQ, DIETHYL ETHER

Hazard Class: 3

UN/NA: UN1155

Packing Group: I

Information reported for product/size: 215L

15. Regulatory Information

| -----\Chemical Inventory Status - Part 1\----- | | | | |
|--|------|-----|-------|-----------|
| Ingredient | TSCA | EC | Japan | Australia |
| Diethyl Ether (60-29-7) | Yes | Yes | Yes | Yes |

| -----\Chemical Inventory Status - Part 2\----- | | | | |
|--|--------------|-----|------|-------|
| Ingredient | ---Canada--- | | | |
| | Korea | DSL | NDSL | Phil. |
| Diethyl Ether (60-29-7) | Yes | Yes | No | Yes |

| -----\Federal, State & International Regulations - Part 1\----- | | | | |
|---|--|--|--|--|
|---|--|--|--|--|

| Ingredient | -SARA 302- | | -SARA 313- | |
|-------------------------|------------|-----|------------|----------------|
| | RQ | TPQ | List | Chemical Catg. |
| Diethyl Ether (60-29-7) | No | No | No | No |

| -----\Federal, State & International Regulations - Part 2\----- | | | |
|---|--------|--------|--------|
| Ingredient | -RCRA- | | -TSCA- |
| | CERCLA | 261.33 | 8(d) |
| Diethyl Ether (60-29-7) | 100 | U117 | Yes |

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: Yes (Pure / Liquid)

Australian Hazchem Code: 3YE

Poison Schedule: None allocated.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 Flammability: 4 Reactivity: 1

Label Hazard Warning:

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

Label Precautions:

May form explosive peroxides.

Keep away from heat, sparks and flame.

Keep container closed.

Use only with adequate ventilation.

Avoid breathing vapor.

Do not get in eyes, on skin, or on clothing.

Wash thoroughly after handling.

Store At A Temperature Not Exceeding 30C (86F).DO NOT OPEN Unless Contents Are At Room Temperature (72F) or Below For At Least 24 Hours.

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases call a physician.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

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