1. Product and Company Identification

Material name: ETHYL ETHER

Version #: 02
Revision date: 08-26-2011
CAS #: 60-29-7
Product Codes: J.T.Baker: 9244, 9246, 9250
Macron: 0847, 0848, 11612

Synonym(s): Ether; ether, anhydrous; Diethyl ether; 1,1'Oxybisethane; ethyl oxide; diethyl oxide; Ethyl ether anhydrous;

Manufacturer: Avantor Performance Materials, Inc.
Address: 3477 Corporate Parkway
Suite #200
Center Valley, PA 18034
US

Customer Service: 855-282-6867
24 Hour Emergency: 908-859-2151
Chemtrec: 800-424-9300

2. Hazards Identification

Emergency overview: DANGER

Extremely flammable liquid and vapor - vapor may cause flash fire. Will be easily ignited by heat, spark or flames. Forms explosive peroxides.

Harmful if inhaled, absorbed through skin, or swallowed. Causes skin and eye irritation. Causes respiratory tract irritation. High vapor concentrations may cause drowsiness and irritation of the eyes or respiratory tract. May cause adverse reproductive effects - such as birth defects, miscarriages, or infertility based on animal data.

OSHA regulatory status: This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).

Potential health effects:

Routes of exposure:

Inhalation: Ingestion. Skin contact. Eye contact.

Eyes: Causes eye irritation. High vapor/aerosol concentrations may be irritating.
Skin: Harmful if absorbed through skin. Causes skin irritation. Prolonged or repeated contact with skin may cause redness, itching, irritation and eczema/chapping.

Inhalation: Harmful if inhaled. Causes respiratory tract irritation. In high concentrations, vapors and aerosol mists have a narcotic effect and may cause headache, fatigue, dizziness and nausea.

Ingestion: Harmful if swallowed. May cause central nervous system effects. Irritating. May cause nausea, stomach pain and vomiting.


Chronic effects: May cause adverse reproductive effects - such as birth defects, miscarriages, or infertility based on animal data. Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis.

Potential environmental effects: The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
3. Composition / Information on Ingredients

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS #</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETHYL ETHER</td>
<td>60-29-7</td>
<td>99 - 100</td>
</tr>
</tbody>
</table>

4. First Aid Measures

First aid procedures

- **Eye contact**
  Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention.

- **Skin contact**
  In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

- **Inhalation**
  Move to fresh air. If breathing is difficult, give oxygen. If breathing stops, provide artificial respiration. Get medical attention immediately.

- **Ingestion**
  Call a physician or poison control center immediately. Do NOT induce vomiting. Never give anything by mouth to a victim who is unconscious or is having convulsions. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Notes to physician

Treat symptomatically. Symptoms may be delayed.

General advice

Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire Fighting Measures

Flammable properties

HIGHLY FLAMMABLE! Vapors may cause a flash fire or ignite explosively. Vapors may travel considerable distance to a source of ignition and flash back. Heat may cause the containers to explode. May form explosive peroxides.

Extinguishing media

- **Suitable extinguishing media**

- **Unsuitable extinguishing media**
  Do not use water jet as an extinguisher, as this will spread the fire.

Protection of firefighters

- **Specific hazards arising from the chemical**
  Can be ignited easily and burns vigorously. Vapor from the solvent may accumulate in container headspace resulting in flammability hazard.

- **Protective equipment and precautions for firefighters**
  Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. Move containers from fire area if you can do so without risk. For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if possible. If not, withdraw and let fire burn out. Some of these materials, if spilled, may evaporate leaving a flammable residue. Cool containers exposed to flames with water until well after the fire is out.

- **Special protective equipment for firefighters**
  As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

- **Specific methods**
  In the event of fire and/or explosion do not breathe fumes. Use water spray to cool unopened containers.

Hazardous combustion products

Carbon monoxide and carbon dioxide.

6. Accidental Release Measures

Personal precautions

Wear appropriate protective equipment and clothing during clean-up. Keep unnecessary personnel away. Keep upwind. Keep out of low areas. Ventilate closed spaces before entering them. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Local authorities should be advised if significant spillages cannot be contained.

Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not contaminate water. Avoid discharge into drains, water courses or onto the ground.
Methods for containment

ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop the flow of material, if this is without risk. Prevent entry into waterways, sewer, basements or confined areas. Dike the spilled material, where this is possible.

Methods for cleaning up

Use only non-sparking tools. All equipment used when handling the product must be grounded.

Large Spills: Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Dike far ahead of spill for later disposal.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Collect in a non-combustible container for prompt disposal.

Never return spills in original containers for re-use. Clean surface thoroughly to remove residual contamination. Clean up in accordance with all applicable regulations.

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

7. Handling and Storage

Handling

DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Take precautionary measures against static discharges. Contact with air and light may form explosive peroxides. If peroxide formation is suspected, do not open or move container. Addition of water or appropriate reducing materials will lessen peroxide formation. Wear appropriate personal protective equipment. Avoid breathing mist or vapor. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling. See Section 8 of the MSDS for Personal Protective Equipment.

Storage

Keep away from food, drink and animal feedingstuffs. Keep out of the reach of children. Contact with air and light may form explosive peroxides. Nitrogen blanketing of containers is recommended. Keep container tightly closed in a cool, well-ventilated place. Ground container and transfer equipment to eliminate static electric sparks. Comply with all national, state, and local codes pertaining to the storage, handling, dispensing, and disposal of flammable liquids.

8. Exposure Controls / Personal Protection

ACGIH

<table>
<thead>
<tr>
<th>Material</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETHYL ETHER (60-29-7)</td>
<td>STEL</td>
<td>500.000 ppm</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>400.000 ppm</td>
</tr>
</tbody>
</table>

Occupational exposure limits

<table>
<thead>
<tr>
<th>U.S. - OSHA</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETHYL ETHER (60-29-7)</td>
<td>PEL</td>
<td>400.000 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1200.0000 mg/m3</td>
</tr>
</tbody>
</table>

Engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Explosion proof exhaust ventilation should be used.

Personal protective equipment

Eye / face protection

Chemical goggles and face shield are recommended.

Skin protection

Wear appropriate chemical resistant clothing. Wear appropriate chemical resistant gloves.

Respiratory protection

Respirator type: Chemical respirator with organic vapor cartridge and full facepiece. Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection.
Provide eyewash station and safety shower. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical & Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Clear</td>
</tr>
<tr>
<td>Color</td>
<td>Colorless</td>
</tr>
<tr>
<td>Odor</td>
<td>Sweet. Ether-like</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>Not available</td>
</tr>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Form</td>
<td>Liquid</td>
</tr>
<tr>
<td>pH</td>
<td>Not available</td>
</tr>
<tr>
<td>Melting point</td>
<td>-189.4 °F (-123.3 °C)</td>
</tr>
<tr>
<td>Freezing point</td>
<td>-189.4 °F (-123.3 °C)</td>
</tr>
<tr>
<td>Boiling point</td>
<td>95 °F (34.6 °C) 101.325 kPa</td>
</tr>
<tr>
<td>Flash point</td>
<td>-49 °F (-45 °C) Closed Cup</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>37.5 BuAc</td>
</tr>
<tr>
<td>Flammability limits in air, upper, % by volume</td>
<td>36.5 %</td>
</tr>
<tr>
<td>Flammability limits in air, lower, % by volume</td>
<td>1.9 %</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>71.73 kPa at 25°C</td>
</tr>
<tr>
<td>Vapor density</td>
<td>2.55</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>0.7134</td>
</tr>
<tr>
<td>Relative density</td>
<td>Not available</td>
</tr>
<tr>
<td>Solubility (water)</td>
<td>80 g/l</td>
</tr>
<tr>
<td>Partition coefficient (n-octanol/water)</td>
<td>0.89</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>320 °F (160 °C)</td>
</tr>
<tr>
<td>Percent volatile</td>
<td>100 %</td>
</tr>
<tr>
<td>Molecular weight</td>
<td>74.12 g/mol</td>
</tr>
<tr>
<td>Molecular formula</td>
<td>C4-H10-O</td>
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</table>

10. Chemical Stability & Reactivity Information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical stability</td>
<td>Instability caused by air, light, heat, sparks. May form explosive peroxides. Keep under nitrogen.</td>
</tr>
<tr>
<td>Conditions to avoid</td>
<td>Heat, flames and sparks. Exposure to air.</td>
</tr>
<tr>
<td>Hazardous decomposition products</td>
<td>At thermal decomposition temperatures, carbon monoxide and carbon dioxide.</td>
</tr>
<tr>
<td>Possibility of hazardous reactions</td>
<td>Hazardous polymerization does not occur.</td>
</tr>
</tbody>
</table>

11. Toxicological Information

<table>
<thead>
<tr>
<th>Toxicological data</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td></td>
</tr>
<tr>
<td>ETHYL ETHER (60-29-7)</td>
<td>Acute Inhalation LC50 Rat: 32000 mg/l 4.00 Hours</td>
</tr>
<tr>
<td></td>
<td>Acute Oral LD50 Rat: 1121 mg/kg</td>
</tr>
<tr>
<td>Sensitization</td>
<td>Not a skin sensitizer.</td>
</tr>
</tbody>
</table>
Acute effects
Harmful if inhaled, absorbed through skin, or swallowed.

Local effects
Irritating to eyes, respiratory system and skin. High vapor concentrations may cause drowsiness and irritation of the eyes or respiratory tract.

Chronic effects
Organic solvents may be absorbed into the body by inhalation and ingestion and cause permanent damage to the nervous system, including the brain. Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis.

Carcinogenicity
This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

IARC Monographs. Overall Evaluation of Carcinogenicity
ETHYL ETHER (CAS 60-29-7) 3 Not classifiable as to carcinogenicity to humans.

Skin corrosion/irritation
Causes skin irritation.

Epidemiology
No epidemiological data is available for this product.

Mutagenicity
No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Neurological effects
High vapor/aerosol concentrations (attainable only at elevated temperatures) may cause central nervous system effects such as dizziness, drowsiness or headaches. Central and/or peripheral nervous system damage.

Reproductive effects
Suspected of damaging the unborn child. Suspected of damaging fertility.

Teratogenicity
Components in this product have been shown to cause birth defects and reproductive disorders in laboratory animals.

Symptoms and target organs

12. Ecological Information

Ecotoxicological data
Product | Test Results
--- | ---
ETHYL ETHER (60-29-7) | LC50 Fathead minnow (Pimephales promelas): 2560 mg/l 96.00 hours

Ecotoxicity
The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Environmental effects
Ecological injuries are not known or expected under normal use. An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Persistence and degradability
Expected to biodegrade slowly.

Partition coefficient (n-octanol/water)
0.89

13. Disposal Considerations

Waste codes
US RCRA Hazardous Waste U List: Reference
ETHYL ETHER (CAS 60-29-7) U117

Disposal instructions
Dispose of this material and its container to hazardous or special waste collection point. Incinerate the material under controlled conditions in an approved incinerator. All wastes must be handled in accordance with local, state and federal regulations.

Contaminated packaging
Since emptied containers retain product residue, follow label warnings even after container is emptied. Residual vapors may explode on ignition; do not cut, drill, grind, or weld on or near this container. Offer rinsed packaging material to local recycling facilities.

14. Transport Information

DOT
Basic shipping requirements:
UN number UN1155
Material name: ETHYL ETHER
MSDS ID: E2340  Version #: 02  Revision date: 08-26-2011

15. Regulatory Information

US federal regulations
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

CERCLA (Superfund) reportable quantity
ETHYL ETHER: 100.0000

Superfund Amendments and Reauthorization Act of 1986 (SARA)
Hazard categories
Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - Yes
Pressure Hazard - No
Reactivity Hazard - Yes

Section 311 hazardous chemical
Yes
Inventory status

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>Yes</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

State regulations

This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - New Jersey Community RTK (EHS Survey): Reportable threshold

ETHYL ETHER (CAS 60-29-7) 500 LBS

US - Pennsylvania RTK - Hazardous Substances: Listed substance

ETHYL ETHER (CAS 60-29-7) Listed.

Saf-T-Data

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

16. Labeling Info

Label Hazard Warning

DANGER

Extremely flammable liquid and vapor - vapor may cause flash fire. Will be easily ignited by heat, spark or flames. Forms explosive peroxides. Harmful if inhaled, absorbed through skin, or swallowed. Irritating to eyes, respiratory system and skin. High vapor concentrations may cause drowsiness and irritation of the eyes or respiratory tract. May cause adverse reproductive effects - such as birth defects, miscarriages, or infertility based on animal data.

Label Precautions

Keep away from heat, sparks and flame. Contact with air and light may form explosive peroxides. Avoid breathing dust/fume/gas/mist/vapors/spray. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling. Keep container closed.

Label First Aid

Immediately flush eyes with plenty of water for at least 15 minutes. Flush skin thoroughly with water. If gas/fume/vapor/dust/mist from the material is inhaled, remove the affected person immediately to fresh air. Get medical attention immediately. IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

17. Other Information

NFPA ratings

Health: 2
Flammability: 4
Instability: 1
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Issue date: 08-26-2011

This data sheet contains changes from the previous version in section(s):

Exposure Controls / Personal Protection: Respiratory protection