1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Ethyl ether
Cat No.: E134-1; E134-4; E134-20; E136-150; E137RS-19; E138-1; E138-4; E138-20; E138-500; E138RS-19; E138RS-28; E138RS-50; E492-4; E492-20
Synonyms: Diethyl ether; Ethyl oxide; Ether (Laboratory/BHT Stabilized/Certified ACS)
Recommended Use: Laboratory chemicals

2. HAZARDS IDENTIFICATION

Target Organs: Central nervous system (CNS), Eyes, Respiratory system, Skin, Liver

Potential Health Effects

Acute Effects

Principle Routes of Exposure

Eyes: Irritating to eyes.
Skin: Irritating to skin. May be harmful in contact with skin. Repeated exposure may cause skin dryness or cracking.
Inhalation: May cause drowsiness and dizziness. May cause irritation of respiratory tract. May be harmful if inhaled.
Ingestion: Harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Aspiration hazard if swallowed - can enter lungs and cause damage.

DANGER!

Emergency Overview
Extremely flammable liquid and vapor. Vapor may cause flash fire. May form explosive peroxides. Harmful if swallowed. Irritating to eyes and skin. Vapors may cause drowsiness and dizziness. Aspiration hazard if swallowed - can enter lungs and cause damage. May cause irritation of respiratory tract. Repeated exposure may cause skin dryness or cracking.
Hygroscopic.

Appearance: Colorless
Physical State: Liquid
odor: aromatic

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 703-527-3887

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Revision Number 1
Creation Date: 15-Apr-2009
Revision Date: 26-Sep-2009
Chronic Effects

May cause adverse liver effects. Mutagenic effects have occurred in experimental animals.

See Section 11 for additional Toxicological information.

Aggravated Medical Conditions

Central nervous system disorders. Preexisting eye disorders. Skin disorders.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Haz/Non-haz</th>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ethyl ether</td>
<td>60-29-7</td>
<td>&gt;95</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

Eye Contact
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact
Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation
Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Obtain medical attention.

Ingestion
Do not induce vomiting. Call a physician or Poison Control Center immediately.

Notes to Physician
Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Flash Point
-45°C / -49°F

Method
No information available.

Autoignition Temperature
160°C / 320°F

Explosion Limits

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>36.0 vol %</td>
</tr>
<tr>
<td>Lower</td>
<td>1.9 vol %</td>
</tr>
</tbody>
</table>

Suitable Extinguishing Media
CO₂, dry chemical, dry sand, alcohol-resistant foam. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media
Water may be ineffective.

Hazardous Combustion Products
No information available.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity to mechanical impact</td>
<td>No information available.</td>
</tr>
<tr>
<td>Sensitivity to static discharge</td>
<td>No information available.</td>
</tr>
</tbody>
</table>

Specific Hazards Arising from the Chemical
Extremely flammable. Risk of ignition. Vapors may travel to source of ignition and flash back. Vapors may form explosive mixtures with air. Containers may explode when heated. May form explosive peroxides.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA Health Flammability Instability Physical hazards
1 4 1 N/A

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions
Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges. Avoid contact with skin, eyes and clothing.

Environmental Precautions
Should not be released into the environment.

Methods for Containment and Clean Up
Remove all sources of ignition. Soak up with inert absorbent material. Take precautionary measures against static discharges. Keep in suitable and closed containers for disposal.

7. HANDLING AND STORAGE

Handling
Wear personal protective equipment. Handle under an inert atmosphere. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing. Do not breathe vapors or spray mist. Keep away from open flames, hot surfaces and sources of ignition. If peroxide formation is suspected, do not open or move container.

Storage
Flammables area. Store under an inert atmosphere. Keep away from open flames, hot surfaces and sources of ignition. May form explosive peroxides. 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, the container should only be opened remotely by professionals.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Measures
Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting/equipment.

Exposure Guidelines

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl ether</td>
<td>TWA: 400 ppm STEL: 500 ppm</td>
<td>(Vacated) TWA: 400 ppm</td>
<td>IDLH: 1900 ppm</td>
</tr>
<tr>
<td></td>
<td>(Vacated) TWA: 1200 mg/m³</td>
<td>(Vacated) STEL: 500 ppm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Vacated) TWA: 1500 mg/m³</td>
<td>TWA: 1200 mg/m³ TWA: 400 ppm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Quebec</th>
<th>Mexico OEL (TWA)</th>
<th>Ontario TWAEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl ether</td>
<td>TWA: 1210 mg/m³ TWA: 400 ppm STEL: 500 ppm STEL: 1520 mg/m³</td>
<td>TWA: 1200 mg/m³ TWA: 400 ppm STEL: 1500 mg/m³ STEL: 500 ppm</td>
<td>TWA: 1210 mg/m³ TWA: 400 ppm STEL: 1515 mg/m³ STEL: 500 ppm</td>
</tr>
</tbody>
</table>
NIOSH IDLH: Immediately Dangerous to Life or Health

Personal Protective Equipment

Eye/face Protection
- Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection
- Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection
- Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State
- Liquid
Appearance
- Colorless
Odor
- Aromatic
Odor Threshold
- No information available.
pH
- No information available.
Vapor Pressure
- 587 mbar at 20 °C
Vapor Density
- 2.55 (Air = 1.0)
Viscosity
- 0.2448 cP at 20 °C
Boiling Point/Range
- 34.6°C / 94.3°F
Melting Point/Range
- -116°C / -176.8°F
Decomposition temperature
- No information available.
Flash Point
- -45°C / -49°F
Evaporation Rate
- (Butyl Acetate = 1.0)
Specific Gravity
- 0.714
Solubility
- Slightly soluble in water
log Pow
- No data available
Molecular Weight
- 74.12
Molecular Formula
- C4H10O

10. STABILITY AND REACTIVITY

Stability
Conditions to Avoid
Incompatible Materials
- Strong oxidizing agents, Strong acids
Hazardous Decomposition Products
- Carbon monoxide (CO), Carbon dioxide (CO2), peroxides
Hazardous Polymerization
- Hazardous polymerization does not occur.
Hazardous Reactions
- May form explosive peroxides.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity
Component Information

<table>
<thead>
<tr>
<th>Component</th>
<th>LD50 Oral</th>
<th>LD50 Dermal</th>
<th>LC50 Inhalation</th>
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<tr>
<td>Ethyl ether</td>
<td>1215 mg/kg (Rat)</td>
<td>20 mL/kg (Rabbit)</td>
<td>Not listed</td>
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</table>

Irritation
Irritating to eyes and skin

Toxicologically Synergistic Products
No information available.

Chronic Toxicity

Carcinogenicity
There are no known carcinogenic chemicals in this product

Sensitization
No information available.

Mutagenic Effects
Mutagenic effects have occurred in experimental animals.

Reproductive Effects
No information available.

Developmental Effects
No information available.

Teratogenicity
No information available.

Other Adverse Effects
See actual entry in RTECS for complete information.

Endocrine Disruptor Information
No information available

12. ECOLOGICAL INFORMATION

Ecotoxicity

<table>
<thead>
<tr>
<th>Component</th>
<th>Freshwater Algae</th>
<th>Freshwater Fish</th>
<th>Microtox</th>
<th>Water Flea</th>
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<tbody>
<tr>
<td>Ethyl ether</td>
<td>Not listed</td>
<td>Not listed</td>
<td>EC50 = 5600 mg/L 15 min</td>
<td>EC50 = 165 mg/L/24h</td>
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Persistence and Degradability
No information available

Bioaccumulation/ Accumulation
No information available

Mobility

<table>
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<tr>
<th>Component</th>
<th>log Pow</th>
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<tbody>
<tr>
<td>Ethyl ether</td>
<td>0.82</td>
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</table>

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification
14. TRANSPORT INFORMATION

DOT

<table>
<thead>
<tr>
<th>UN-No</th>
<th>UN1155</th>
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<tbody>
<tr>
<td>Proper Shipping Name</td>
<td>DIETHYL ETHER</td>
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<tr>
<td>Hazard Class</td>
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<tr>
<td>Packing Group</td>
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TDG

<table>
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<tr>
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<td>Packing Group</td>
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IATA

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<tr>
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<td>DIETHYL ETHER</td>
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<tr>
<td>Hazard Class</td>
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<td>Packing Group</td>
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IMDG/IMO

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<th>UN1155</th>
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<tbody>
<tr>
<td>Proper Shipping Name</td>
<td>DIETHYL ETHER</td>
</tr>
<tr>
<td>Hazard Class</td>
<td>3</td>
</tr>
<tr>
<td>Packing Group</td>
<td>I</td>
</tr>
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</table>

15. REGULATORY INFORMATION

International Inventories

<table>
<thead>
<tr>
<th>Component</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>NLP</th>
<th>PICCS</th>
<th>ENCS</th>
<th>AICS</th>
<th>CHINA</th>
<th>KECL</th>
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<tbody>
<tr>
<td>Ethyl ether</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>200-467-2</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>KE-27690</td>
<td>X</td>
</tr>
</tbody>
</table>

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

**U.S. Federal Regulations**

**TSCA 12(b)** Not applicable

**SARA 313**
Not applicable

**SARA 311/312 Hazardous Categorization**

<table>
<thead>
<tr>
<th></th>
<th>Acute Health Hazard</th>
<th>Chronic Health Hazard</th>
<th>Fire Hazard</th>
<th>Sudden Release of Pressure Hazard</th>
<th>Reactive Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl ether</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Clean Water Act**

Not applicable

**Clean Air Act**

Not applicable

**OSHA**

Not applicable

**CERCLA**

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

<table>
<thead>
<tr>
<th>Component</th>
<th>Hazardous Substances RQs</th>
<th>CERCLA EHS RQs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl ether</td>
<td>100 lb</td>
<td>-</td>
</tr>
</tbody>
</table>

**California Proposition 65**

This product does not contain any Proposition 65 chemicals.

**State Right-to-Know**

<table>
<thead>
<tr>
<th>Component</th>
<th>Massachusetts</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Illinois</th>
<th>Rhode Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl ether</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

**U.S. Department of Transportation**

Reportable Quantity (RQ): Y
DOT Marine Pollutant: N
DOT Severe Marine Pollutant: N

**U.S. Department of Homeland Security**

This product contains the following DHS chemicals:

<table>
<thead>
<tr>
<th>Component</th>
<th>DHS Chemical Facility Anti-Terrorism Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl ether</td>
<td>7500 lb STQ</td>
</tr>
</tbody>
</table>
Other International Regulations

Mexico - Grade
Severe risk, Grade 4

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
B2  Flammable liquid

16. OTHER INFORMATION

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Tel: (412) 490-8929

Creation Date
15-Apr-2009

Print Date
26-Sep-2009

Revision Summary
"***", and red text indicates revision

Disclaimer
The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS