BORON TRIFLUORIDE ETHERATE

1. Product Identification

Synonyms: Ethyl ether, compd. with Boron fluoride (BF*3) (1:1); Boron trifluoro[1,1'-oxybis [ethane]]-(T-4); boron trifluoride diethyl etherate  
CAS No.: 109-63-7  
Molecular Weight: 141.93  
Chemical Formula: (CH3CH2)O.BF3  
Product Codes: C698

2. Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No</th>
<th>Percent</th>
<th>Hazardous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boron, Trifluoro[1,1'-oxybis[ethane]]-, (T-4)-</td>
<td>109-63-7</td>
<td>98 - 100%</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3. Hazards Identification

Emergency Overview

DANGER: CORROSIVE. FLAMMABLE LIQUID AND VAPOR. VAPOR, MIST AND LIQUID CAUSE BURNS TO ALL BODY TISSUES. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS KIDNEYS. CAUSES ANESTHETIC EFFECTS. WATER REACTIVE.

Potential Health Effects

Inhalation:
Corrosive. Extremely destructive to tissues of the mucous membranes and upper respiratory tract. Symptoms may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. Inhalation may be fatal as a result of spasm inflammation and edema of the larynx and bronchi, chemical
pneumonitis and pulmonary edema.

**Ingestion:**
Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. Can cause sore throat, vomiting, diarrhea.

**Skin Contact:**
Extremely destructive to skin. May be absorbed through skin with symptoms paralleling inhalation.

**Eye Contact:**
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.

**Chronic Exposure:**
Chronic exposure may affect kidneys and lungs, may cause anemia.

**Aggravation of Pre-existing Conditions:**
Persons with pre-existing skin disorders, or impaired kidney or pulmonary function may be more susceptible to the effects of this agent.

### 4. First Aid Measures

**Inhalation:**
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

**Ingestion:**
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

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

**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: 40°C (104°F) CC
Flammable limits in air % by volume:
LEL: 1.9; UEL: 36
Combustible!

**Explosion:**
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Flammable vapors that are heavier than air may accumulate in low areas and/or spread along ground away from handling site. Flashback along vapor trail may occur. Sealed containers may rupture when heated. Contact with strong oxidizers may cause fire. 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.

**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.

### 6. Accidental Release Measures
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. 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):
  2.5 mg(F)/m³ for fluorides
- ACGIH Threshold Limit Value (TLV):
  2.5 mg(F)/m³ for fluorides, A4- Not classifiable as a human carcinogen

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):
This substance has poor warning properties. If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airtight hood, or full-facepiece self-contained breathing apparatus.

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:
There is insufficient data in the published literature to assign complete numerical SAF-T-DATA* ratings and laboratory protective equipment for this product. Special precautions must be used in storage, use and handling. Protective equipment for laboratory bench use should be chosen using professional judgment based on the size and type of reaction or test to be conducted and the available ventilation, with overriding consideration to minimize contact with the chemical.

9. Physical and Chemical Properties

Appearance:
Colorless, fuming liquid.

Odor:

Pungent odor.

Solubility:
Decomposes in water.

Density:
1.12 @25°C / 4°F

pH:
No information found.

% Volatiles by volume @ 21°C (70°F):
100

Boiling Point:
126°C (259°F)

Melting Point:
-58°C (-72°F)

Vapor Density (Air=1):
4.9

Vapor Pressure (mm Hg):
4.2 @ 20°C (68°F)

Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Immediately hydrolyzed by moisture in air.

Hazardous Decomposition Products:
Burning may produce carbon monoxide, carbon dioxide and other toxic materials including hydrogen fluoride.

Hazardous Polymerization:
No information found.

Incompatibilities:
Acids, bases, alcohol, water, metal hydrides, and alkali metals. Corrodes steel.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>NTP Carcinogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boron, Trifluoro[1,1'-oxybis[ethane]]-, (t-4) - (109-63-7)</td>
<td>None</td>
</tr>
</tbody>
</table>

12. Ecological Information

Environmental Fate:
No information found.

Environmental Toxicity:
No information found.
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:** BORON TRIFLUORIDE DIETHYL ETHERATE  
**Hazard Class:** 8, 3  
**UN/NA:** UN2604  
**Packing Group:** I  
**Information reported for product/size: 1KG**

**International (Water, I.M.O.)**

**Proper Shipping Name:** BORON TRIFLUORIDE DIETHYL ETHERATE  
**Hazard Class:** 8, 3.1  
**UN/NA:** UN2604  
**Packing Group:** I  
**Information reported for product/size: 1KG**

15. Regulatory Information

**Ingredient:** Boron, Trifluoro[1,1'-oxybis[ethane]], (t-4)-  
**(109-63-7)**

**Chemical Inventory Status - Part 1**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>TSCA</th>
<th>EC</th>
<th>Japan</th>
<th>Australia</th>
</tr>
</thead>
</table>
| Boron, Trifluoro[1,1'-oxybis[ethane]], (t-4)-  
(109-63-7) | Yes | Yes | Yes | Yes |

**Chemical Inventory Status - Part 2**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Korea</th>
<th>DSL</th>
<th>NDSL</th>
<th>Phil.</th>
</tr>
</thead>
</table>
| Boron, Trifluoro[1,1'-oxybis[ethane]], (t-4)-  
(109-63-7) | Yes | Yes | No | Yes |

**Federal, State & International Regulations - Part 1**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>RQ</th>
<th>TPQ</th>
<th>List</th>
<th>Chemical Catg.</th>
</tr>
</thead>
</table>
| Boron, Trifluoro[1,1'-oxybis[ethane]], (t-4)-  
(109-63-7) | No | No | No | No |

**Federal, State & International Regulations - Part 2**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CERCLA</th>
<th>TSCA</th>
<th>261.33</th>
<th>9(d)</th>
</tr>
</thead>
</table>
| Boron, Trifluoro[1,1'-oxybis[ethane]], (t-4)-  
(109-63-7) | No | No | No |

Chemical Weapons Convention: No  
TSCA 12(b): No  
CDEA: No  
SARA 311/312: Acute: Yes  Chronic: Yes  Fire: Yes  Pressure: No  
Reactivity: Yes  (Pure / Liquid)
Australian Hazchem Code: 4WE
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: 3 Flammability: 2 Reactivity: 1 Other: Water reactive
Label Hazard Warning:
DANGER! CORROSIVE. FLAMMABLE LIQUID AND VAPOR. VAPOR, MIST AND LIQUID CAUSE BURNS TO ALL BODY TISSUES. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS KIDNEYS. CAUSES ANESTHETIC EFFECTS. WATER REACTIVE.
Label Precautions:
No SAF-T-DATA Ratings have been developed for this product. Read and follow all warnings, precautions, instructions and other safety and handling information on the label and MSDS.
Do not breathe mist or fumes.
Do not get in eyes, on skin, or on clothing.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat, sparks and flame.
Avoid contact with water.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
New 16 section MSDS format, all sections have been revised.
Disclaimer:
**********************************************************************************

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
**********************************************************************************

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)