SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name: Boron trifluoride methyl etherate
Product Number: 218847
Brand: Aldrich
CAS-No.: 353-42-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company: Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO  63103
UNITED STATES

Telephone: +1 314 771-5765
Fax: +1 800 325-5052

1.4 Emergency telephone

Emergency Phone #: 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

- Flammable liquids (Category 4), H227
- Chemicals which, in contact with water, emit flammable gases (Category 1), H260
- Acute toxicity, Oral (Category 4), H302
- Acute toxicity, Inhalation (Category 4), H332
- Skin corrosion (Category 1A), H314
- Serious eye damage (Category 1), H318
- Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
- Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Kidney, H373
- Short-term (acute) aquatic hazard (Category 3), H402

For the full text of the H-Statements mentioned in this Section, see Section 16.
### 2.2 GHS Label elements, including precautionary statements

**Pictogram**

A red flame, a skull and crossbones, a skull and crossbones with two exclamation points, and a red exclamation point.

**Signal Word**

Danger

**Hazard statement(s)**

- **H227** Combustible liquid.
- **H260** In contact with water releases flammable gases which may ignite spontaneously.
- **H302 + H332** Harmful if swallowed or if inhaled.
- **H314** Causes severe skin burns and eye damage.
- **H335** May cause respiratory irritation.
- **H373** May cause damage to organs (Kidney) through prolonged or repeated exposure if inhaled.
- **H402** Harmful to aquatic life.

**Precautionary statement(s)**

- **P210** Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
- **P223** Do not allow contact with water.
- **P231 + P232** Handle under inert gas. Protect from moisture.
- **P260** Do not breathe mist or vapors.
- **P264** Wash skin thoroughly after handling.
- **P270** Do not eat, drink or smoke when using this product.
- **P271** Use only outdoors or in a well-ventilated area.
- **P273** Avoid release to the environment.
- **P280** Wear protective gloves/ protective clothing/ eye protection/ face protection.
- **P301 + P312 + P330** IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
- **P301 + P330 + P331** IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
- **P303 + P361 + P353** IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
- **P304 + P340 + P310** IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
- **P305 + P351 + P338 + P310** IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
- **P314** Get medical advice/ attention if you feel unwell.
- **P335 + P334** Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
- **P363** Wash contaminated clothing before reuse.
- **P370 + P378** In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
- **P402 + P404** Store in a dry place. Store in a closed container.
- **P403 + P233** Store in a well-ventilated place. Keep container tightly closed.
- **P403 + P235** Store in a well-ventilated place. Keep cool.
- **P405** Store locked up.
- **P501** Dispose of contents/ container to an approved waste disposal plant.
SECTION 3: Composition/information on ingredients

3.1 Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>boron trifluoride-dimethyl ether complex (1:1)</td>
<td>Flam. Liq. 4; 1; Acute Tox. 4; Skin Corr. 1A; Eye Dam. 1; STOT SE 3; STOT RE 2; Aquatic Acute 3; H227, H260, H302, H332, H314, H318, H335, H373, H402</td>
<td>&lt;= 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Hydrofluoric (HF) acid burns require immediate and specialized first aid and medical treatment. Symptoms may be delayed up to 24 hours depending on the concentration of HF. After decontamination with water, further damage can occur due to penetration/absorption of the fluoride ion. Treatment should be directed toward binding the fluoride ion as well as the effects of exposure. Skin exposures can be treated with a 2.5% calcium gluconate gel repeated until burning ceases. More serious skin exposures may require subcutaneous calcium gluconate except for digital areas unless the physician is experienced in this technique, due to the potential for tissue injury from increased pressure. Absorption can readily occur through the subungual areas and should be considered when undergoing decontamination. Prevention of absorption of the fluoride ion in cases of ingestion can be obtained by giving milk, chewable calcium carbonate tablets or Milk of Magnesia to conscious victims. Conditions such as hypocalcemia, hypomagnesemia and cardiac arrhythmias should be monitored for, since they can occur after exposure. First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
First treatment with calcium gluconate paste. In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician immediately.
In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most), avoid vomiting (risk of perforation). Call a physician immediately. Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
Water Foam

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen fluoride
Borane/boron oxides
Combustible.
Vapors are heavier than air and may spread along floors.
May not get in touch with: Water
Forms explosive mixtures with air on intense heating.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert. For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.
6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols. Keep workplace dry. Do not allow product to come into contact with water.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep away from heat and sources of ignition. Never allow product to get in contact with water during storage. Handle and open container with care. Do not store in glass

Storage class
Storage class (TRGS 510): 4.3: Hazardous materials, which set free flammable gases upon contact with water

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>boron trifluoride-dimethyl ether complex (1:1)</td>
<td>353-42-4</td>
<td>TWA</td>
<td>0.1 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>0.7 ppm</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
required

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type ABEK
The entrepreneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance
Form: clear, liquid
Color: dark brown

b) Odor
No data available

c) Odor Threshold
0.1 ppm

d) pH
No data available

e) Melting point/freezing point
Melting point/range: -15 °C (5 °F) - lit.
f) Initial boiling point and boiling range
   126 - 127 °C 259 - 261 °F - lit.
g) Flash point
   62 °C (144 °F) - closed cup
h) Evaporation rate
   No data available
i) Flammability (solid, gas)
   No data available
j) Upper/lower flammability or explosive limits
   Upper explosion limit: 21.6 % (V)
   Lower explosion limit: 6.4 % (V)
k) Vapor pressure
   62 hPa at 50 °C (122 °F)
   23.1 hPa at 20 °C (68 °F)
l) Vapor density
   No data available
m) Density
   1.239 g/cm³ at 25 °C (77 °F) - lit.
   Relative density
   No data available
n) Water solubility
   No data available
o) Partition coefficient: n-octanol/water
   No data available
p) Autoignition temperature
   No data available
q) Decomposition temperature
   > 120 °C (> 248 °F) -
r) Viscosity
   1.45 mm²/s at 20 °C (68 °F) -
s) Explosive properties
   No data available
t) Oxidizing properties
   No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
Forms explosive mixtures with air on intense heating.
A range from approx. 15 Kelvin below the flash point is to be rated as critical.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature).

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Reacts dangerously with glass.
Strong heating.
Moisture.
10.5 Incompatible materials
glass

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 326 mg/kg
Remarks: The value is given in analogy to the following substances: Boron trifluoride dihydrate
LC50 Inhalation - Rat - 4 h - 1.21 mg/l - aerosol

(OECD Test Guideline 403)
Remarks: The value is given in analogy to the following substances: Boron Trifluoride Dermal: No data available
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Corrosive

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Corrosive

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA’s list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation.
Remarks: The value is given in analogy to the following substances: Boron Trifluoride

Specific target organ toxicity - repeated exposure
Inhalation - May cause damage to organs through prolonged or repeated exposure.
- Kidney
Remarks: The value is given in analogy to the following substances: Boron Trifluoride
Aspiration hazard
No data available

11.2 Additional Information

RTECS: ED8400000
Fluoride ion can reduce serum calcium levels possibly causing fatal hypocalcemia. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Cough, Shortness of breath, Headache, Nausea

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish
 static test LC50 - Leuciscus idus (Golden orfe) - 22 - 46 mg/l - 96 h (DIN 38412)
 Remarks: The value is given in analogy to the following substances: Boron trifluoride dihydrate

Toxicity to daphnia and other aquatic invertebrates
 static test EC50 - Daphnia magna (Water flea) - 21.3 mg/l - 48 h (ISO 6341)
 Remarks: The value is given in analogy to the following substances: Boron trifluoride dihydrate

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
 PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
 Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.
SECTION 14: Transport information

DOT (US)
UN number: 2965  Class: 4.3 (8, 3)  Packing group: I
Proper shipping name: Boron trifluoride dimethyl etherate
Reportable Quantity (RQ): Poison Inhalation Hazard: No

IMDG
UN number: 2965  Class: 4.3 (3, 8)  Packing group: I  EMS-No: F-G, S-O
Proper shipping name: BORON TRIFLUORIDE DIMETHYL ETHERATE

IATA
UN number: 2965  Class: 4.3 (3, 8)  Packing group: I
Proper shipping name: Boron trifluoride dimethyl etherate
IATA Passenger: Not permitted for transport

SECTION 15: Regulatory information

SARA 302 Components
boron trifluoride-dimethyl ether complex (1:1)  CAS-No.  Revision Date
353-42-4  2007-03-01

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard, Reactivity Hazard, Acute Health Hazard

Massachusetts Right To Know Components
boron trifluoride-dimethyl ether complex (1:1)  CAS-No.  Revision Date
353-42-4  2007-03-01

Pennsylvania Right To Know Components
boron trifluoride-dimethyl ether complex (1:1)  CAS-No.  Revision Date
353-42-4  2007-03-01

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to
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Version: 6.3  Revision Date: 08/02/2023  Print Date: 08/12/2023