Standard Operating Procedure

Boron trifluoride diethyl etherate

*This is an SOP template and is not complete until: 1) lab specific information is entered into the box below 2) lab specific protocol/procedure is added to the protocol/procedure section and
3) SOP has been signed and dated by the PI and relevant lab personnel.*

 Print a copy and insert into your
*Laboratory Safety Manual* and *Chemical Hygiene Plan*.
Refer to instructions for assistance.

|  |  |
| --- | --- |
| **Department:** | Click here to enter text. |
| **Date SOP was written:** | Click here to enter a date. |
| **Date SOP was approved by PI/lab supervisor:** | Click here to enter a date. |
| **Principal Investigator:** | Click here to enter text. |
| **Internal Lab Safety Coordinator/Lab Manager:** | Click here to enter text. |
| **Lab Phone:** | Click here to enter text. |
| **Office Phone:** | Click here to enter text. |
| **Emergency Contact:** | Click here to enter text. |
| *(Name and Phone Number)* |
| **Location(s) covered by this SOP:** | Click here to enter text. |
| *(Building/Room Number)* |

**Type of SOP:** ☐ Process ☒Hazardous Chemical ☐ Hazardous Class

**Purpose**

Boron trifluoride diethyl etherate is a strong Lewis acid that is highly flammable and corrosive. It can react violently and/or explosively upon contact with water or moist air. It can be used as a polymerization catalyst for preparing oxymethylene copolymers and for radical polymerization of styrene. In addition, it can be used in this capacity for alpha olefin oligomerization. Other uses include catalysis of the alkylation of allylic alcohols and phenols, and for the preparation of indole derivatives and diterpenes.

**Physical & Chemical Properties/Definition of Chemical Group**

CAS#: 109-63-7

Class: **Pyrophoric, Water Reactive, Flammable, Corrosive**

Molecular Formula: C4H10BF3O

Form (physical state): Liquid (Fuming liquid)

Color: Colorless when pure. Pale yellow to dark with impurities.

Boiling point: 126-127 °C

**Potential Hazards/Toxicity**

Reacts violently and/or explosively with water. May ignite or explode on contact with moist air. Flammable liquid and vapor. Corrosive. Incompatible with strong oxidizing agents, acids, bases, alcohols, and alkali metals. Causes eye and skin burns. May cause irreversible eye damage. May cause severe respiratory tract irritation. May cause severe digestive tract irritation and permanent damage.

**Personal Protective Equipment (PPE)**

**Respirator Protection**

Where risk assessment shows air-purifying respirators are appropriate, use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Respirators should be used only under any of the following circumstances:

* As a last line of defense (i.e., after engineering and administrative controls have been exhausted
* When Permissible Exposure Limit (PEL) has exceeded or when there is a possibility that PEL will be exceeded
* Regulations require the use of a respirator
* An employer requires the use of a respirator
* There is potential for harmful exposure due to an atmospheric contaminant (in the absence of PEL)
* As PPE in the event of a chemical spill clean-up process

Lab personnel intending to use/wear a respirator mask must be trained and fit-tested by ORS and should contact occhealt@uga.edu. This is a UGA requirement described in more detail in the [UGA Respiratory Protection Plan](https://esd.uga.edu/sites/default/files/respiratoryprotection.pdf) and supported by the [Office of Research Occupational Health and Safety Program](https://research.uga.edu/ohsp/).

**Hand Protection**

Handle with nitrile or chloroprene gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

NOTE: Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with boron trifluoride diethyl etherate.

Refer to glove selection chart from the links below:

<http://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf>

OR

<http://www.allsafetyproducts.biz/page/74172>

OR

<http://www.showabestglove.com/site/default.aspx>

OR

<http://www.mapaglove.com/>

**Eye Protection**

ANSI-approved safety glasses or goggles. Face shield is also recommended.

**Skin and Body Protection**

Flame-resistant lab coats should be worn. These laboratory coats must be appropriately sized for the individual and be buttoned to their full length. Laboratory coat sleeves must be of a sufficient length to prevent skin exposure while wearing gloves. Full-length pants and close-toed shoes must be worn at all times by all individuals that are occupying the laboratory area. The area of skin between the shoe and ankle should not be exposed.

**Hygiene Measure**

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

**Engineering Controls**

The material should be used in a glove-box filled with inert gas or in a closed system with inert gas in a certified fume hood.

**First Aid Procedures**

**If inhaled**

Move to fresh air immediately. If breathing is difficult, give oxygen. If breathing has ceased, apply artificial respiration. Seek medical aid immediately.

**In case of skin contact**

Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Seek medical aid immediately.

**In case of eye contact**

Rinse thoroughly with plenty of water for at least 30 minutes lifting upper and lower eyelids and removing contact lenses. Seek medical aid immediately.

**If swallowed**

Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupful of milk or water. Never give anything by mouth to an unconscious person. Seek medical aid immediately.

**Special Handling and Storage Requirements**

**Precautions for safe handling:** Avoid contact with skin, eyes, and clothing. Wash thoroughly after handling. Use only in a well-ventilated area. Do not allow contact with water, moist air, and steam. Keep away from heat, sparks, flame, and sources of ignition. No smoking. Do not ingest or inhale. This product may be under pressure; cool before opening. Discard contaminated shoes.

**Conditions for safe storage:** Store in a tightly closed container. Keep under an inert gas. Keep away from water. Store in flammables area. Do not store in metal containers. Label as pyrophoric. Store in a secondary container.

**Spill and Accident Procedure**

**Chemical Spill Dial 911**

**24-7 On-Call Response to Research, Environment, Health or Safety Concerns Dial 2-5561 from a campus phone or 706-542-5561 from a non-campus line.**

**Spill** – Follow the procedures set out in the [UGA Chemical and Laboratory Safety Manual.](http://research.uga.edu/docs/units/safety/manuals/Chemical-Laboratory-Safety-Manual.pdf)

[If there are any chemical-specific protocols for responding to a spill, insert them here or mark “none”:]

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# **Medical Emergency Dial 911**

**Life Threatening Emergency, After Hours, Weekends and Holidays** – Dial **911** or the emergency phone numbers listed at the beginning of the UGA Chemical and Laboratory Safety Manual.

*Note: All incidents that result in an injury or property damage must be reported to ORS / ESD using a University Incident/Accident Report.*

**Non-Life Threatening Emergency** – Follow the instructions in the UGA Chemical and Laboratory Safety Manual.

*Note: All incidents that result in an injury or property damage must be reported to ORS / ESD using a University Incident/Accident Report.*

**Decontamination/Waste Disposal Procedure**

**For general hazardous waste disposal procedures, see Appendix H of the UGA Chemical and Laboratory Safety Manual.**

**Chemical Specific Procedures: [to be inserted or marked as “none”]**

Wearing proper PPE, decontaminate equipment and bench tops using soap and water. Dispose of the used boron trifluoride diethyl etherate and disposables contaminated with boron trifluoride diethyl etherate as hazardous waste.

**Safety Data Sheet (SDS) Location**

UGA personnel can access Online SDS through a link in the upper left corner of the ESD home page (<https://esd.uga.edu>) and logging in by using their UGA email user name and password.

**Protocol/Procedure (Add lab specific Protocol/Procedure here)**

**NOTE**

Any deviation from this SOP requires approval from PI.

**Documentation of Training** (signature of all users is required)

* Prior to conducting any work with boron trifluoride diethyl etherate, designated personnel must provide training to his/her laboratory personnel specific to the hazards involved in working with this substance, work area decontamination, and emergency procedures.
* The Principal Investigator must provide his/her laboratory personnel with a copy of this SOP and access to the SDS provided by the manufacturer.
* The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate laboratory safety training or refresher training within the last 12 months.

**Principal Investigator SOP Approval**

Print name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Approval Date:

I have read and understand the content of this SOP:

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| **Name** | **Signature** | **Date** |
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