Standard Operating Procedure

Borane-tetrahydrofuran complex, 1.0 M THF

*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**

Borane-tetrahydrofuran complex, 1.0 M THF is a highly flammable liquid or vapor. Contact with water releases flammable gases. May form explosive peroxides. It is harmful if ingested or absorbed through the skin and may be harmful if inhaled. It causes irritation to the gastrointestinal tract, respiratory tract, skin, and eyes. It may cause cancer. Borane-tetrahydrofuran complex in 1.0 M THF is used in organic chemistry to reduce nylon surface amide groups to secondary amines.

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

CAS#: Borane-tetrahydrofuran: 14044-65-6, THF: 109-99-9

Class: **Flammable, water reactive, harmful by ingestion, irritant, carcinogen**

Molecular Formula: C4H11BO in C4H10O

Form (physical state): Liquid

Color: Colorless

Boiling point: 65.5 - 66.5 °C

**Potential Hazards/Toxicity**

Borane-tetrahydrofuran complex, 1.0 M THF is a highly flammable liquid and vapor. Contact with water releases flammable gases. May react violently or form explosive mixtures with water or moist air. May form explosive peroxides. Handle and store under inert gas and protect from moisture. It is harmful if ingested or absorbed through the skin and may be harmful if inhaled. It causes irritation to the gastrointestinal tract, respiratory tract, skin, and eyes. Eye contact may result in permanent damage. May cause headache, nausea, vomiting, and narcotic effects. Prolonged contact may cause defatting and dermatitis. It may cause cancer. Boron affects the central nervous system. THF has a permissible exposure limit (PEL) of 590 mg/m3.

**Personal Protective Equipment (PPE)**

**Respirator Protection**

Use a full-face respirator with multi-purpose combination (US) respirator cartridges.

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 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: THF permeates standard nitrile gloves in less than 1 minute. Minimize contact with THF.

NOTE: Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with borane-tetrahydrofuran complex, 1.0 M THF.

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, tight-fitting glasses/goggles. Face shields are 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 Measures**

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

**Engineering Controls**

Work with this chemical in a certified ducted fume hood. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

**First Aid Procedures**

**If inhaled**

Move person into fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Consult a physician.

**In case of skin contact**

Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing. Consult a physician.

**In case of eye contact**

Flush eyes with plenty of water for at least 15 minutes lifting upper and lower eyelids and removing contact lenses. Consult a physician.

**If swallowed**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. If victim is conscious and alert, rinse mouth with water. Consult a physician.

**Special Handling and Storage Requirements**

**Precautions for safe handling:** Avoid contact with skin, eyes, and clothing. Avoid inhalation and ingestion. Use spark-proof tools and explosion-proof equipment. Provide adequate ventilation. Keep away from heat and other sources of ignition - No smoking. Prevent build-up of electrostatic charge.

**Conditions for safe storage:** Keep container tightly closed in a cool, dry, and well-ventilated area. Opened containers must be carefully resealed and kept upright to prevent leakage. Never allow contact with water. Build-up of pressure from thermal decomposition may cause containers to burst. Open and handle with care. Store in flammables area. Store away from heat and light. Handle and store under inert gas. Containers should be dated when opened and used up or disposed of within 1 year of the open/received date. Recommended storage temperature is 2-8 °C. Avoid acids, acid chlorides, acid anhydrides, alcohols, oxidizing agents, and oxygen.

**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 (chemical name) and disposables contaminated with (chemical name) 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)**

Click here to enter text.

**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 borane-tetrahydrofuran complex, 1.0 M THF, 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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