**THIS IS A TEMPLATE/BASIC STARTING POINT. CUSTOMIZE THIS TEMPLATE WITH INFORMATION PERTINENT TO YOUR SETUP AND THE PROCEDURE YOU WILL BE USING/YOUR GROUP’S PERSONAL USE.**

STANDARD OPERATING PROCEDURE

Use this form to document the Health & Safety information associated with the procedure.

|  |  |
| --- | --- |
| **Procedure Title:** | 2-mercaptoethanol (**β-Mercaptoethanol, 2-Hydroxyethylmercaptan, BME)**   |
|  |  |
| **Dept:** |  |  | **Bldg/Rm:** |  |  | **Supervisor:** |  |

**Circumstances of Use:**

2-mercaptoethanol is a clear, colorless liquid with an unpleasant odor (similar to rotten eggs). It is commonly used in the lab to reduce disulfide bonds and can act as a scavenger for hydroxyl radicals.

**Health and safety information for materials used:** (briefly describe the hazards associated with the materials and/or equipment **OR** document your hazard assessment in Section II)

Always read and understand the safety data sheet (SDS) for a chemical before use or storage.

* β-mercaptoethanol (BME) has a very low odor threshold (0.12-0.64 ppm) and smells similar to the odorant used in natural gas. If the odor becomes widespread, people in nearby areas may suspect a natural gas leak, which may lead to calls to the fire department and/or evacuation of the building, which can be inconvenient and disruptive.
* BME can be toxic if ingested, and fatal if inhaled or absorbed through the skin.
* Vapors can irritate the eyes, mucous membranes, and respiratory tract. Symptoms of inhalation exposure may include coughing, sore throat, and/or shortness of breath.
* When BME is heated to decomposition, toxic fumes including sulfur oxides and carbon oxides will be emitted.
* BME is combustible as a liquid or vapor
* Reactions of BME with strong acids or alkali metals will release flammable hydrogen gas.

**Hazard Control Measures:**

(Lab coat, eye and hand protection, and fully enclosed shoes must be selected as required by Section D of the ISU Laboratory Safety Manual.)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| [ ]  | Latex gloves | [ ]  | Insulated gloves | [ ]  | Face shield | [ ]  | Respirator |
| [x]  | Nitrile gloves | [ ]  | Safety glasses | [x]  | Lab coat | [x]  | Fume hood |
| [ ]  | Neoprene gloves | [ ]  | Vented goggles | [ ]  | Apron | [ ]  | Biosafety cabinet |
| [ ]  | Vinyl gloves | [x]  | Splash goggles | [ ]  | Dust mask | [ ]  | Glove box |
| [x]  | Fully enclosed shoes | [ ]  | Flame resistant lab coat |

At a minimum, double-glove using nitrile laboratory gloves and wear a lab coat and safety glasses when working with BME. If BME comes into contact with your gloves, change them immediately. If there is a possibility of splashing, wear chemical splash goggles and/or a face shield.

**Work Practice Control Measures:**

* Read and understand the Safety Data Sheet (SDS) before beginning work.
* BME is incompatible with metals, oxidizing agents, acids, alkalis, calcium hypochlorite, aliphatic amines, and isocyanates.
* Purchase and use in the smallest practical quantities for the experiment being performed.
* Know the location of the nearest fire extinguisher before beginning work.
* Eliminate ignition sources such as open flames and hot surfaces.
* Keep containers closed as much as possible when not in use.
* Be aware of skin absorption as a possible route of exposure. Plan work so that minimal glove contact is expected (double-glove if you are wearing nitrile), and purchase appropriate (neoprene, etc.) gloves for cleaning up small spills.
* If glove contact occurs, change gloves immediately.

**Transportation and Storage:**

* Do not store near sources of ignition, oxidizing agents, acids, alkaline compounds, or any other incompatible materials.
* Store BME in a well-ventilated area.
* The container must be tightly closed, resealed, and stored upright to avoid leakage.
* Store in a sealed secondary container.
* Avoid storing on the floor.
* Transport toxic liquids in secondary containment, preferably a polyethylene or other non-reactive acid/solvent bottle carrier.
* Suitable fire control devices (such as fire extinguishers) must be available at locations where flammable or combustible liquids are stored. Contact EH&S Fire Safety at 515-294-5359 for installation of appropriate devices.
* Open flames shall not be permitted in flammable or combustible liquid storage areas. A “No Open Flames” sign must be conspicuously posted in these areas.

**Waste Disposal Procedures:**

Contact EH&S Environmental Programs at 4-5359 immediately to arrange for pick-up and disposal.

Handle and store waste following the guidelines above while accumulating wastes and awaiting chemical waste pickup. Waste must be disposed of following the [Waste and Recycling Guidelines.](https://publications.ehs.iastate.edu/warg/)

**First Aid Procedures:**

**General advice**

Move out of dangerous area. Consult a physician. Show the SDS to the attending physician.

**In case of skin contact**

Immediately wash with soap and water and remove contaminated clothing.

**In case of eye contact**

Immediately rinse eyes with copious amounts of water for 15 minutes while occasionally lifting upper and lower eyelids. Seek medical attention.

**If inhaled**

Move the person to fresh air immediately and seek medical attention if large amounts were inhaled.

**If swallowed**

Seek medical attention immediately.

**All accidents and injuries occurring at work or in the course of employment must be reported to the employee's supervisor as soon as possible (even if no medical attention is required). Report all incidents and exposures here:** [**https://www.ehs.iastate.edu/services/occupational/accidents-injuries**](https://www.ehs.iastate.edu/services/occupational/accidents-injuries)

**Spill/Release Containment, Decontamination, and Clean Up Procedures:**

Employees in the area should be prepared to clean up minor spills confined to the chemical fume hood. Wearing appropriate gloves (e.g. neoprene, butyl rubber, Silver Shield), splash goggles, lab coat (and impermeable apron, if available), use an inert absorbent material (vermiculite, oil dry) to clean up the spill. Do not use combustible materials (e.g. paper towels) to absorb spill. Contaminated PPE and clean-up materials must be placed in a sealed container for pick-up by EH&S (see waste disposal section for more information).

Large spills or any spills outside of the fume hood of β-mercaptoethanol must be referred EH&S 294-5359.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Written By:** |  |  | **Date:** |  |
|  |  |  |  |  |
| **Approved By:** |  |  | **Date:** |  |

 (PI or Lab Supervisor)

**HAZARD ASSESSMENT**

Use the hierarchy of controls to document the hazards and the

corresponding control measure(s) involved in each step of the procedure.

Consider *elimination or substitution* of hazards, if possible.

*Engineering Control(s):* items used to isolate the hazard from the user (i.e. fume hood, biosafety cabinet).

*Administrative Control(s):* policies/programs to limit the exposure to the hazard (i.e. authorizations, designated areas, time restrictions, training).

*Required PPE*: indicate PPE including specific material requirements if applicable (i.e. flame resistant lab coat, type of respirator or cartridge).

|  |  |  |  |
| --- | --- | --- | --- |
| **Hazard** | **Engineering Control(s)** | **Administrative Control(s)** | **Required PPE**  |
| Exposure to BME - irritation of the eyes (potential for corneal scarring), nose, and skin (potential for sensitization/allergy), headache, dizziness, urinary disturbances, pulmonary edema, and respiratory distress or failure | Work in a fume hood | Read the SDS and have it available to give to medical personnel | Gloves, splash goggles, lab coat, fully enclosed shoes, long pants |
|  Toxic by ingestion, inhalation, dermal contact |   |  Read the SDS and have it available to give to medical personnel  |  Gloves, splash goggles, lab coat, fully enclosed shoes, long pants |
|  Combustible – produces toxic gases  |  Work in a fume hood | Understand how to operate a fire extinguisher safely |   |
| **INSERT SPECIFIC HAZARDS/CONTROLS HERE** |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Training Record**

Use the following table to record the training associated with this Standard Operating Procedure.

|  |  |  |
| --- | --- | --- |
| **Print Name** | **Signature** | **Date** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |