**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.

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| **Procedure Title:** | General Chemical Handling |
|  |  |
| **Dept:** |  |  | **Bldg/Rm:** |  |  | **Supervisor:** |  |

**General Hazards:**

Hazards vary widely for each chemical – consult the Safety Data Sheet before beginning use of any laboratory chemical.

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

**Personal Protective Equipment:**

The minimum PPE for entry into any laboratory is gloves, eye protection, fully enclosed shoes, and a laboratory coat. It is also recommended that long pants be worn.

While PPE requirements vary according to the hazards of the chemical, there are some universal personal protective equipment requirements for some hazard classes:

* The appropriate type of glove will vary – consult the SDS and glove manufacturer to determine which type of glove is appropriate for each material.
* Corrosive liquids – splash goggles, or safety glasses with face shield must be worn to protect eyes from permanent damage. An apron may also be appropriate.
* Flammable and pyrophoric materials: flame resistant laboratory coat
* Some chemicals may require use of a respirator if a fume hood is not available.

**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.)

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| --- | --- | --- | --- | --- | --- | --- | --- |
| [ ]  | Latex gloves | [ ]  | Insulated gloves | [ ]  | Face shield | [ ]  | Respirator |
| [x]  | Nitrile gloves | [x]  | 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 |

**General Considerations**

1. The first step in planning any experiment involves collecting information on all chemicals and materials to be used. Read the Safety Data Sheet (SDS) to learn of the hazardous properties and follow the appropriate precautions.
2. Facilities, equipment, and ventilation systems shall be designed, installed, and operating in a manner which reduces human exposure to these materials. If any of these are deficient, all work shall cease until the safety problems are resolved.
3. Prior to beginning any new experiment, project, or task, a safety analysis shall be conducted to determine if proper safeguards are in place for minimizing hazards such as toxicity and flammability. In addition, chemical and physical characteristics and compatibility of materials and processes shall be considered.
4. All work involving hazardous materials shall be performed in an operating fume hood or in a glove box, if available.
5. In all cases involving highly toxic compounds, trays, pails, or other secondary confinement systems should be used to contain spills and to aid in clean-up.
6. All experiments shall be clearly labelled, so if an accident should occur while you are absent, those who are present are aware of the compounds involved in the accident.

**Examples of Handling Procedures**

1. **Flammable Materials** [hexanes, toluene, etc.]

Transfer of the liquid from the storage bottle to the receiving vessel should always be conducted in a fume hood, away from any ignition sources. The operator should wear gloves, a laboratory coat and goggles during this operation. Any spills should be cleaned up and disposed of by procedures given in the SDS for the specific compound. It is a good idea to carry out any transfer of these liquids with all vessels in secondary containment capable of containing any liquid spilled. All subsequent handling of the material should be done in closed vessels when possible. Any vapors emitted during subsequent manipulations must be vented to the fume hood, or if operations are performed on the vacuum manifold, vapors shall be trapped in a liquid-nitrogen cold trap located between the reaction or distillation vessel and the vacuum pumps. In all operations the work should be carefully planned so as to avoid accidental release of liquid or vapor into the environment. Wastes containing these materials must be stored in tightly capped containers with an orange tag attached.

1. **Non-volatile Solids** [inorganics, many organics]

These materials may all be handled in air for weighing and transfer. However the handling must be done on a tray or confined work space so that any spills are easily cleaned up. Solutions prepared from the solids must be contained in glassware which can be sealed if storage is necessary. Handling of the solutions must be conducted on spill-containment trays and in the fume hood if vapors or mists are likely to be emitted (as in the evaporation of an aqueous solution at elevated temperature).

1. **Highly Toxic Compounds** [cyanides, ammonia, lead compounds, etc.]

These materials shall be used in the minimum amounts necessary and only when required to accomplish specific tasks. The solid materials may be weighed on a balance, but all glassware and reagent bottles must be contained on spill trays or other suitable secondary confinement apparatus. All solutions must be prepared and manipulated in the fume hood.

**Waste Disposal Procedures:**

Generated waste should be disposed of as outlined in the [Waste and Recycling Guidelines](https://publications.ehs.iastate.edu/warg/). Chemical wastes shall not be flushed down the sink or put in with the general garbage. Contaminated clothing should not be worn again until washed.

**First Aid Procedures:**

**General advice**

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

**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 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).**

<http://www.ehs.iastate.edu/occupational/accidents-injuries>

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

**IMPORTANT NOTE:**

 An immediate assessment of the situation should be made. The nature of the material involved, the amount, and the location will dictate the most appropriate action. For example, spilling 5 grams of a non-toxic solid in the spill tray can be handled relatively easily, whereas a large amount of spilled volatile toxic compound outside a fume hood is a very serious matter. **IF THE SPILL IS SERIOUS OR IF YOU ARE UNSURE, CALL EH&S (515-294-5359) AND ASK FOR ASSISTANCE.**

**General Procedures to be used in the event of a spill**.

1. Notify workers and occupants in the immediate area to avoid the area.
2. If any chemical has contacted your eyes or skin, wash thoroughly using the eyewash and/or shower as necessary. Any protective clothing that may have been contaminated by toxic chemicals should be disposed of as toxic wastes as outlined in the Waste Disposal Procedures.
3. If the spill requires evacuation of the area or laboratory, notify your Supervisor for posting warning signs in the area, until the area has been cleaned.
4. Before returning to the spill, understand the neutralization and/or cleanup process for the specific compound spilled.
5. Persons not wearing the appropriate PPE and clothing should be restricted from the spill/leak area until cleanup has been completed.
6. If the spill is not a serious threat to the lab environment and can be cleaned up by the worker, the following procedures shall be followed:

**Solid Chemical Spills**

1. Cover the solid material with wet paper towels (using water or other appropriate solvent).
2. Avoid spreading the compound as much as possible. Do not dry sweep if the compound is

hazardous or toxic!

1. If the material is flammable, remove all sources of ignition.
2. Ventilate the spill area.
3. Carefully pick up the bulk of the material with a scoop. If a broom and dustpan are used, they must then be completely decontaminated or disposed of as hazardous waste.
4. With wet paper towels, wipe up remaining small traces of material.
5. Follow the appropriate process to decontaminate the area.
6. Dispose of the residues according to the Waste Disposal procedure.

**Liquid chemical spills**

1. Ventilate the spill area.
2. If the material is flammable, remove all ignition sources.
3. Surround the area with an absorbent material (Solusorb, paper towels, sodium

bicarbonate, sand, spill pillows, or vermiculite).

1. Carefully spread more absorbent onto the spill and try to avoid creating aerosols. Allow enough time to soak up the liquid.
2. Carefully scoop up the material and follow steps 5-8 above.

**If the spill is determined to be too large or serious for you to clean up,** call EH&S (294-5359) for assistance.

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| **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).

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| --- | --- | --- | --- |
| **Hazard** | **Engineering Control(s)** | **Administrative Control(s)** | **Required PPE**  |
| **Ethanol** – flammable, eye irritation, skin irritation, respiratory/inhalation effects - dizziness | Fume hood |  | Gloves, safety glasses/goggles, laboratory coat |
|  **Concentrated Hydrochloric acid** – chemical burns, irreversible eye damage, lung irritation, target organ damage | Fume Hood | Don’t work alone in the laboratory | Neoprene or other acid-resistant gloves, splash goggles, laboratory coat (apron is recommended), long pants |
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|  |  |  |  |
| **INSERT SPECIFIC HAZARDS/CONTROLS HERE FOR CHEMICALS USED IN YOUR LAB** |  |  |  |
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**Training Record**

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

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