

I. STANDARD OPERATING PROCEDURE

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

Procedure Title: Chemical handling

Dept: EEOB **Bldg/Rm:** 431 Bessey **Supervisor:** Jonathan F. Wendel

Procedure Overview: (brief description of the project)

1. Instructs group members in the safe use of chemicals.
2. Establishes designated areas for use of chemicals.
3. Outlines decontamination and emergency spill procedures.
4. Documents emergency plans for spills.

Additional Training

1. Laboratory Safety: Core Concepts
2. Fire Safety and Extinguisher Training
3. Laboratory Safety: Chemical Storage and Fume Hoods

Hazard Control Measures:

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

<input type="checkbox"/> Latex gloves	<input type="checkbox"/> Insulated gloves	<input type="checkbox"/> Face Shield	<input type="checkbox"/> Respirator
<input checked="" type="checkbox"/> Nitrile gloves	<input checked="" type="checkbox"/> Safety glasses	<input checked="" type="checkbox"/> Lab Coat	<input checked="" type="checkbox"/> Fume hood
<input type="checkbox"/> Neoprene gloves	<input type="checkbox"/> Vented goggles	<input type="checkbox"/> Apron	<input type="checkbox"/> Biosafety cabinet
<input type="checkbox"/> Vinyl gloves	<input type="checkbox"/> Splash goggles	<input type="checkbox"/> Dust mask	<input type="checkbox"/> Glove box
<input checked="" type="checkbox"/> Closed Toe/Closed Heel Shoes		<input type="checkbox"/> Flame Resistant Lab coat	

Other Control Measures:

When using hazardous liquids, goggles are required if a splash hazard exists.

Special Handling Procedures and Storage Requirements:

Group Policy

- A. Careful consideration must be used when dealing with all chemicals, particularly acutely poisonous (highly toxic) material. Data on specific chemicals can also be located in the Safety Data Sheets (SDS) files or directly on the chemical container label. As outlined in the Laboratory Safety Manual, if less toxic or non-toxic chemicals can be materials used which are not detrimental to the

experiment, they shall be obtained and used. However, if such reasonable substitutes cannot be found, the following procedures shall be followed.

- B. All compounds shall be handled as if they are highly toxic, unless it is known to the contrary.
- C. All laboratory work must be performed with the proper Personal Protection Equipment (PPE), including goggles or glasses, gloves, lab coat, and closed toed shoes. Additional protection may be necessary, depending on the process.

General Considerations

- A. The first step in planning any experiment involves collecting information on all chemicals and materials to be used. Read the SDS read the appropriate SDS to learn of the hazardous properties and follow the appropriate precautions.

If any of the chemicals or materials are on the [Carcinogens, Reproductive Toxins and Teratogens list](#), the procedures outlined on the appropriate SOP's shall be followed. Otherwise, follow the procedures listed here.

- B. 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.
- C. 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.
- D. The minimum PPE for handling all chemicals in the laboratory shall be safety goggles/glasses, lab coat, nitrile gloves, and closed toed shoes. A glove bag provides good protection and containment when using highly toxic materials.
- E. All work involving highly toxic materials shall be performed in an operating fume hood or in a glove box.
- F. 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.

- G. All experiments using highly toxic materials shall be clearly labelled as such, using a sign or tag, signed and dated. In any event, it is always a good idea to label your experiments so if an accident should occur while you are absent, those who are present are aware of the compounds involved in the accident.
- H. Food, drink, tobacco products, gum, medications or cosmetics are not allowed in areas where chemical materials are used or stored.
- I. In general, exercise caution to prevent exposure of personnel and/or the environment.
- J. When in doubt, consult either the Safety Representative, Supervisor, or EH&S at 4-5359.

Examples of Handling Procedures

A. 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 rubber gloves, a laboratory coat and goggles during this operation. Any spills should be cleaned up and disposed of by procedures given in the SDS sheet for the specific compound. It is a good idea to carry out any transfer of these liquids with all vessels located in a tray 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 and the contents must be identified.

B. 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). Rubber gloves must always be worn during handling of either the solids or solutions.

C. **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. These materials must be handled with rubber gloves and protective clothing (lab coat or vinyl apron). 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](#). 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.

- A. Notify workers and occupants in the immediate area to avoid the area.
- B. Clear away from the spill/leak at once. 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.
- C. If the spill requires evacuation of the area or laboratory, notify the Supervisor, Safety Representative, or Safety Coordinator for posting warning signs (Tag Out) in the area, until the area has been cleaned.
- D. Before returning to the spill, the employee should be made aware of the neutralization process for the specific compound spilled.
- E. Persons not wearing the appropriate PPE and clothing should be restricted from the spill/leak area until cleanup has been completed.
- F. 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:
 - 1. **Solid Chemical Spills**
 - a. Cover the solid material with wet paper towels (using water or other appropriate solvent). Avoid spreading the compound as much as possible. Do not dry sweep if the compound is hazardous or toxic!
 - b. If the material is flammable, remove all sources of ignition.
 - c. Ventilate the spill area.
 - d. 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.
 - e. With wet paper towels, wipe up remaining small traces of material.
 - f. Follow the appropriate neutralization process to decontaminate the area.
 - g. Dispose of the residues according to the Waste Disposal procedure.
 - 2. **Liquid chemical spills**
 - a. Ventilate the spill area.
 - b. If the material is flammable, remove all ignition sources.
 - c. Surround the area with an absorbent material (Solusorb, paper towels,

sodium bicarbonate, sand, spill pillows, or vermiculite).

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

If the spill is determined to be **SERIOUS** in nature, the following cleanup precautions shall be taken if cleanup is to be done by group members:

- G. Call EH&S to ask for advice and assistance.
- H. The minimum PPE and clothing that should be worn during the cleanup consists of:
 1. respirator, with the appropriate cartridge or a self-contained breathing apparatus
 2. disposable jump suit, shoe protectors and head cover
 3. safety glasses, and
 4. two pairs of disposable gloves, with the inner pair taped to the sleeve cuff of the jump suit.
- I. No one is to enter the spill area alone. Only when accompanied by another appropriately dressed individual may a person enter the spill area.

Using Substances Requiring Special Procedures? No ☐ Yes ☐

(If Yes; identify authorized personnel, designate a use area and specify specialized safety precautions here. Refer to Section B in the ISU Laboratory Safety Manual for details.)

Written By: Downloaded from ISU EH&S SOP library **Date:** 11/28/17

Approved By: _____ **Date:** _____
(PI or Lab Supervisor)

II. 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

III. Training Record

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

Print Name	Signature	Date

Note: Attach to or file with written materials and methods