

GENERAL USE SOP FOR HIGHLY ACTUELY TOXIC MATERIALS

1. Process or Equipment Description

This standard operating procedure (SOP) is intended to provide general guidance on how to safely work with materials having high acute toxicity, also referred to as highly toxic materials. This SOP is generic in nature and only addresses safety issues specific to high acute toxicity of chemicals. In some instances, several general use SOPs may be applicable for a specific chemical (i.e., for carbon monoxide gas, general use SOPs for highly toxics, flammables, and compressed gases could apply). If you have questions concerning the applicability of any item listed in this SOP contact the PI, Laboratory Director or Supervisor of your lab or Environmental Health and Safety & Emergency Management (EHSEM).

2. Hazardous Chemicals/Class of Hazardous Chemicals

A highly toxic materials is considered a chemical falling within any of the following categories:

1. A chemical with a median lethal dose (LD50) of 50 mg or less per Kg of body weight when administered orally to albino rats weighing between 200 and 300 gm each.
2. A chemical with a median lethal dose (LD50) of 200 mg or less per Kg of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 Kg each.
3. A chemical that has a median lethal concentration (LC50) in air of 5000 ppm by volume or less of gas or vapor, or 50 mg per liter or less of mist, fume, or dust, when administered continuous inhalation for 1 hours (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 gm each.

3. Control of Hazards - General

Although the specific SOPs will vary according to the material used, the following guidelines are generally applicable for projects involving highly toxic materials:

1. Use the smallest amount of chemical that is consistent with the requirements of the work to be performed.
2. Use containment devices (such as lab fume hoods or glove boxes) when: (i) volatilizing these substances, (ii) manipulating substances that may generate aerosols, and (iii) performing laboratory procedures that may result in uncontrolled release of the substance.
3. Use high efficiency particulate air (HEPA) filters, carbon filters, or scrubber systems with containment devices to protect effluent and vacuum lines, pumps, and the environment whenever feasible.
4. Use ventilated containment to weigh out solid chemicals. Alternatively, the tare method can be used to prevent inhalation of the chemical. While working in a laboratory hood, the chemical is added to a pre-weighed container. The container is then sealed and can be re-weighed outside of the hood. If chemical needs to be added or removed, this manipulation is carried out in the hood. In this manner, all open chemical handling is conducted in the laboratory hood.

3a. Engineering/Ventilation Controls

Use a properly functioning fume hood when handling highly toxic materials. If the process does not permit the handling of such materials in a fume hood, contact EHSEM for reviewing the adequacy of ventilation measures.

3b. Personal Protective Equipment

GENERAL USE SOP FOR HIGHLY ACTUELY TOXIC MATERIALS

At minimum, safety glasses, lab coat, long pants, and closed toed shoes are to be worn when entering laboratories having hazardous chemicals.

Additionally:

- When handling hazardous chemicals or contacting potentially contaminated surfaces, protective gloves are to be worn. For proper selection of glove material, review [chemical MSDS](#) and [EHSEM's glove use webpage](#).
- Goggles (vs. safety glasses) are appropriate in the processes where splash and spray is foreseeable.
- For hazardous chemicals that are toxic via skin contact/absorption, additional protective clothing (i.e., faceshield, apron, oversleeves) is appropriate where chemical contact with body/skin is foreseeable.

4. Special Handling Procedures and Storage Requirements

Ensure secondary containment and segregation of incompatible chemicals per guidance within the UM-Dearborn Chemical Hygiene Plan. Also, follow any substance specific storage guidance provided in MSDS documentation.

5. Spill and Accidental Procedures

Prompt response to chemical spills is critical to protect worker health & safety and to mitigate adverse affects to the environment. For further guidance, refer to [EHSEM's chemical spill response webpage](#).

Laboratory personnel who work with hazardous chemicals are to be provided the opportunity to receive medical attention/consultation when:

- A spill, leak, explosion or other occurrence results in a hazardous exposure (potential overexposure).
- Symptoms or signs of exposure to a hazardous chemical develop.

6. Waste Disposal

Highly toxic materials intended for disposal are considered hazards wastes. For general guidance regarding waste disposal, contact EHSEM at (3-4914).

7. Minimum Training Requirements

- General Lab Safety Training
- Lab Specific Training

8. Approval Required

Consult with PI regarding need for prior approval. Laboratory personnel shall seek and the PI must provide prior approval of any chemical usage involving the use of restricted chemicals.

9. Decontamination Procedures

Personnel: Immediately after working with highly acutely toxic materials remove gloves and wash hands and arms with soap and water.

GENERAL USE SOP FOR HIGHLY ACTUELY TOXIC MATERIALS

Consult **MSDS** for guidance on appropriate first aid. Where medical attention is required, ensure to bring along **MSDS(s) of chemical(s)** to aid medical staff in proper diagnosis and treatment.

Area: Decontamination procedures vary depending on the material being handled. The toxicity of some materials can be neutralized with other reagents. All surfaces should be wiped with the appropriate cleaning agent following dispensing or handling. Waste materials generated should be treated as a hazardous waste.

Equipment: Decontaminate vacuum pumps or other contaminated equipment (glassware) before removing them from the designated area.

10. Designated Area

For use of highly toxic materials, a designated area shall be established where limited access, special procedures, knowledge, and work skills are required. A designated area can be the entire laboratory, a specific laboratory workbench, or a laboratory hood. Designated areas must be clearly marked with signs that identify the chemical hazard and include an appropriate warning; for example: WARNING! HYDROFLUORIC ACID WORK AREA – HIGHLY TOXIC MATERIAL.

- Upon leaving the designated area, remove any personal protective equipment worn and wash hands, forearms, face, and neck.
- After each use (or day), wipe down the immediate work area and equipment to prevent accumulation of chemical residue.
- At the end of each project, thoroughly decontaminate the designated area before resuming normal laboratory work in the area.