

Working with Particularly Hazardous Chemicals

The OSHA Laboratory Standard requires as part of the Chemical Hygiene Plan that provisions for additional employee protection be included for work involving particularly hazardous substances. These substances include “select carcinogens”, reproductive toxins, and substances which have a high degree of acute toxicity.

The OSHA Laboratory Standard states that for work involving particularly hazardous substances, specific consideration must be given to the following provisions where appropriate:

- Establishment of a designated area.
- Use of containment devices such as fume hoods or glove boxes.
- Procedures for safe removal of contaminated waste.
- Decontamination procedures.

EH&S can assist researchers by providing information on working with particularly hazardous substances. General guidelines and recommendations for the safe handling, use, and control of hazardous chemicals and particularly hazardous substances can be found in [Safety Data Sheets](#) and other references such as [Prudent Practices in the Laboratory](#) and [Safety in Academic Chemical Laboratories](#).

A partial list of particularly hazardous chemicals can be found here: [OSHA Particularly Hazardous Substances](#). In the research laboratory, it is possible that researchers may work with particularly hazardous chemicals that have not been defined as such through OSHA or NIOSH. If products laboratory personnel are working with have the characteristics of select carcinogens, reproductive toxins, or substances with a high degree of acute toxicity, those products should be treated with the same level of responsibility by personnel.

Establishment of a Designated Area

For work involving particularly hazardous substances, laboratories should establish a designated area where particularly hazardous substances can only be used. In some cases, a designated area could be an entire room out of a suite of rooms, or could mean one particular fume hood within a laboratory. The idea is to designate one area so that everyone in the laboratory is aware of where the particularly hazardous substances can only be used.

In establishing designated areas, Principal Investigators and laboratory supervisors may want to restrict the use of a particularly hazardous substance to a fume hood, glove box or other containment device. This information should be included as part of the laboratory’s SOPs and covered during in-lab training.

Establishing a designated area not only provides better employee protection, but can help minimize the area where potential contamination of particularly hazardous substances could occur. Once a designated area is established, a sign should be posted (on a fume hood for example) indicating that the area is designated for use with particularly hazardous substances and naming the substance(s). Special PPE requirements and/or special waste and spill cleanup procedures should be posted or documented clearly in the lab SOP’s. Once the experiment has ended, decontamination should be implemented before removing the posting.

Decontamination & Safe Removal of Contaminated Materials and Waste

Some particularly hazardous substances may require special procedures for safe disposal of both waste and/or contaminated materials. Appropriate decontamination methods (while wearing PPE) should be

employed after chemical use. When in doubt, contact EH&S to determine proper decontamination and disposal procedures. These methods should be included as part of the laboratory's SOPs form and everyone working in the lab should be trained on those procedures.

Guidelines for Working with Particularly Hazardous Substances

Laboratory staff should always practice good housekeeping, use engineering controls, wear proper PPE, develop and follow SOPs, and receive appropriate training when working with any chemicals. The following special guidelines should be adhered to when working with particularly hazardous substances:

- Substitute less hazardous chemicals if possible to avoid working with particularly hazardous substances and keep exposures to a minimum.
- Always obtain prior approval from the Principal Investigator before ordering any particularly hazardous substances. Review the use of these materials with the research supervisor. Identify potential routes of exposure and identify containment and protective measures, including the use of a fume hood or glove box, and the use of appropriate PPE. Review emergency response procedures for spills or chemical exposures. Review procedures annually or whenever a procedural change is made.
- Plan your experiment in advance, including layout of apparatus and chemical and waste containers that are necessary.
- Before working with any particularly hazardous substance, review chemical resources for any special decontamination/deactivation procedures and ensure you have the appropriate spill cleanup materials and absorbent on hand.
- Ensure that you have the appropriate PPE, particularly gloves (check glove selection charts or call EH&S at 644-6895). PPE should include gloves, a lab coat, safety goggles, and if warranted – a respirator. If a respirator will be used, contact EH&S to enroll in the Respirator Program. Always wash hands after chemical use.
- Always use the minimum quantities of chemicals necessary for the experiment. If possible, add buffer directly to the original container while working in a fume hood and make dilutions directly.
- If possible, purchase premade solutions to avoid handling powders. If you have to use powders, weigh them in a fume hood or glove box. It is advisable to surround the weighing area with wetted paper towels to facilitate cleanup.
- Always use a fume hood or other containment device for procedures that may result in the generation of aerosols, vapors or particulates. Confirm that the fume hood is functioning properly before use.
- Particularly hazardous substances should be stored by themselves in clearly marked trays or secondary containers indicating what the hazard is i.e. "Carcinogens," "Reproductive Toxins", etc.
- Do not work alone with chemicals of high acute toxicity (examples include cyanide, hydrofluoric acid, diisopropylfluorophosphate)
- Use and Store Chemicals only in designated restricted areas posted with special warning signs
- Always practice good personal hygiene, especially frequent hand washing, even if wearing gloves while handling chemicals.

- If a major spill occurs outside a fume hood or glove box, evacuate the area and contact EH&S. Cleanup crew must wear protective attire and equipment. If clothing or shoes become contaminated, these should be removed and contained in a plastic bag. Contact EH&S for guidance.
- Contact EH&S for proper disposal instructions. Store contaminated waste in closed, properly labeled impervious containers. Store waste containers in such a manner that they will not break (use compatible absorbent materials or secondary containers).
- Notify the supervisor or any incidents of exposure or spills. A hard copy of the SDS should be on hand to guide clean-up operations or medical response. Obtain the SDS at <https://www.safety.fsu.edu/sections/safetydatasheets.php> Refer to [Workers' Compensation-Reporting an Injury](#) to obtain medical follow up for a chemical exposure.

Prior Approval

The OSHA Laboratory Standard requires Chemical Hygiene Plans to include information on “the circumstances under which a particular laboratory operation, procedure or activity shall require prior approval”, including “provisions for additional employee protection for work with particularly hazardous substances” such as "select carcinogens," reproductive toxins, and substances which have a high degree of acute toxicity. Prior approval ensures that laboratory workers have received the proper training on the hazards of particularly hazardous substances or with new equipment, and that safety considerations have been taken into account BEFORE a new experiment begins.

While EH&S can provide assistance in identifying circumstances when there should be prior approval before implementation of a particular laboratory operation, the ultimate responsibility of establishing prior approval procedures lies with the Principal Investigator or laboratory supervisor.

Principal Investigators or laboratory supervisors must identify operations or experiments that involve particularly hazardous substances (such as "select carcinogens," reproductive toxins, and substances which have a high degree of acute toxicity) and highly hazardous operations or equipment that require prior approval. They must establish the guidelines, procedures, and approval process that would be required. This information should be documented in the laboratory's or department's SOPs. The SOP (link to form) should be signed by the Principle Investigator or Laboratory Supervisor, indicating approval of the experiment, methods and safety precautions.

Examples where Principal Investigators or laboratory supervisors should consider requiring their laboratory workers to obtain prior approval include:

- Experiments that require the use of particularly hazardous substances such as "select carcinogens," reproductive toxins, and substances that have a high degree of acute toxicity, highly toxic gases, cryogenic materials and other highly hazardous chemicals or experiments involving radioactive materials, high powered lasers, etc.
 - Where a significant change is planned for the amount of chemicals to be used for a routine experiment such as an increase of 10% or greater in the quantity of chemicals normally used.
 - When a new piece of equipment is brought into the lab that requires special training in addition to the normal training provided to laboratory workers.
 - When a laboratory worker is planning an experiment that involves highly hazardous chemicals or operations.
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Additional Information and Resources:

- [OSHA Standard for Toxic and Hazardous Substances](#)
- [Particularly Hazardous Chemical approval form](#)
- [FSU SDS link](#)