

8. Highly Toxic Chemicals

Standard operating procedures (SOP) are intended to provide you with general guidance on how to safely work with a specific class of chemical or hazard. This SOP is generic in nature. It addresses the use and handling of substances by hazard class only. In some instances multiple SOPs may be applicable for a specific chemical (i.e., both the SOPs for flammable liquids and carcinogens would apply to benzene). If you have questions concerning the applicability of any items listed in this procedure, contact Vanderbilt Environmental Health and Safety (322-2057) or the Principal Investigator of your laboratory. Specific written procedures are the responsibility of the principal investigator.

If compliance with all the requirements of this standard operating procedure is not possible, the principal investigator must develop a written procedure that will be used in its place. This alternate procedure must provide the same level of protection as the SOP it replaces. Vanderbilt Environmental Health and Safety is available to provide guidance during the development of alternate procedures.

A list of highly toxic chemicals is included in Appendix D of the chemical hygiene plan.

Training:

All Vanderbilt employees who work with hazardous chemicals must be apprised of the hazards of chemicals present in their work area. This training must be provided before initial assignment and before new exposure situations. Before a lab worker may begin work with Highly Toxic Chemicals they must be trained on the lab specific Standard Operating Procedure for these materials.

The primary factors that lab workers need to be trained on in regard to highly toxic chemicals are the identity and location of highly toxic chemicals in the lab, the procedures for handling these materials, the toxic effects associated with both acute and chronic exposures, antidote and other first aid measure that should be taken upon exposure to a highly toxic chemical and any other protective measures.

Securing of gas cylinders:

See Appendix O, section 10

Decontamination procedures:

Personnel: Wash hands and arms with soap and water immediately after handling highly toxic chemicals.

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.

Designated area:

All locations within the laboratory where highly toxic, carcinogenic or reproductive hazards are handled should be demarcated with designated area caution tape. Areas that should be designated include all fume hoods, sinks and bench tops where the highly toxic, carcinogenic or reproductive hazards are handled. An entire laboratory may be considered a designated area if the PI determines the need for such chemicals to be handled in the entire laboratory. A lab worker may

designate an area only during the time the chemical is used and then remove the designated area sign/tape. Only lab workers trained on the particular hazards found in a designated area should work in that area

Where feasible highly toxic chemicals should be manipulated over plastic-backed disposable paper covered work surfaces. These disposable work surfaces minimize work area contamination and simplify clean up.

Emergency procedure:

Emergency procedures, which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptom of overexposure, must be developed. The procedures should address as a minimum the following:

- Who to contact: University police, Vanderbilt Environmental Health and Safety, and the Principal investigator of the laboratory including evening phone number.
- The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)
- The method used to alert personnel in nearby areas of potential hazards.
- Specific first aid treatment required by the type of highly toxic material(s) handled in the laboratory. (Student Health Clinic or Occupational Health Clinic should be consulted for first aid procedures.)

Eye protection:

Eye protection in the form of safety glasses must be worn at all times when handling highly toxic chemicals. Ordinary (street) prescription glasses do not provide adequate protection and cannot pass the rigorous test for industrial safety glasses. Adequate safety glasses must meet the requirements of the Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87. 1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes, therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn.

Eyewash:

Where the eyes or body of any person may be exposed to highly toxic chemicals, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. Bottle type eyewash stations are not acceptable.

Glove (dry) box:

Certain highly toxic chemicals must be handled in a glove box rather than a fume hood. Vanderbilt Environmental Health and Safety (322-2057) or the Principal Investigator will determine if this is required.

Gloves:

Gloves should be worn when handling highly toxic chemicals. Nitrile gloves provide adequate protection against accidental hand contact with small quantities of most laboratory chemicals. However, when larger quantities are handled or regular contact is involved more protective gloves should be used. Lab workers should contact VEHS for advice on chemical resistant glove selection when direct or prolonged contact with hazardous chemicals is anticipated. A glove assessment chart can be found in Appendix H.

Hazard assessment:

Hazard assessment should focus on proper use and handling procedures, the education of employees concerning the health risk posed by highly toxic materials, and on the demarcation of designated areas.

Lab hood:

Manipulation of highly toxic chemicals should be carried out in a fume hood. If the use of a fume hood proves impractical refer to the section on special ventilation.

All areas where highly toxic chemicals are stored or manipulated must be labeled as a designated area.

Labels:

Containers: All highly toxic chemicals must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas or abbreviations are not acceptable.

Notification:

You should notify Vanderbilt Environmental Health and Safety prior to the initial use of highly toxic substances. Notification is also required following significant changes in procedures or the quantity of materials used.

Protective apparel:

Appropriate lab attire (lab coats, closed-toe shoes and long-sleeved clothing) should be worn when handling highly toxic chemicals. Additional protective clothing should be worn if the possibility of skin contact is likely.

Safety shielding:

Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of highly toxic chemicals, which pose this risk, should occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all laboratory occupants, are acceptable.

Safety shower:

A safety shower should be available in a nearby location where the highly toxic chemicals are used.

Signs and labels:

Doorways: The hazard identification sign must demarcate where carcinogens, reproductive hazards, and/or highly toxic chemicals are stored or used.

Special storage:

Highly toxic chemicals must be stored in a designated area.

Special ventilation:

Manipulation of highly toxic chemicals outside of a fume hood may require special ventilation controls in order to minimize exposure to the material. Fume hoods provide the best protection against exposure to highly toxic chemicals in the laboratory and are the preferred ventilation control device. Handle highly toxic chemicals in a fume hood where possible. If the use of a fume hood proves impractical attempt to work in a glove box or in an isolated area on the laboratory bench top.

If your research does not permit the handling of highly toxic chemicals in a fume hood, or glove box, you must contact VEHS for further instruction.

All areas where highly toxic chemicals are stored or manipulated must be labeled as a designated area.

Spill response:

Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This should occur prior to the use of any highly toxic chemical.

In the event of a spill alert personnel in the area that a spill has occurred. Do not attempt to handle a large spill of highly toxic chemicals. Vacate the laboratory immediately and call for assistance.

- Vanderbilt University Police Department 1-1911 or 322-2745.

Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

Vacuum protection:

Evacuated glassware can implode and eject flying glass, and splattered chemicals. Vacuum work involving highly toxic chemicals must be conducted in a fume hood, glove box or isolated in an acceptable manner.

Mechanical vacuum pumps must be protected using cold traps and, where appropriate, filtered to prevent particulate release. The exhaust for the pumps must be vented into an exhaust hood.

Waste disposal:

All materials contaminated with highly toxic chemicals should be disposed of as a hazardous waste. Wherever possible, attempt to design research in a manner that reduces the quantity of waste generated. Questions regarding waste pick up should be directed to Vanderbilt Environmental Health and Safety. This office can also assist you in minimizing waste generation. Fact sheets for chemical waste management can be found in Appendix N.