

Chemistry Department Standard Operating Procedure

Title: Acutely Toxic Gases

Updated: October 2010-Prabha Dwivedi

A list of acutely toxic gases should be available outside of the laboratory where the gas is being used or stored.

Securing of gas cylinders

Cylinders of compressed gases must be handled as high-energy sources. When storing or moving a cylinder, have the cap securely in place to protect the stem. Use suitable racks, straps, chains or stands to support cylinders. For the full procedure see SOP for handling compressed gas cylinders.

Decontamination procedures

Personnel: Wash hands and arms with soap and water immediately after handling acutely toxic gases.

Designated area

All locations within the laboratory where acutely toxic gases are handled should be posted. This includes all fume hoods and bench tops where the acutely toxic gases are handled.

Emergency procedure

Emergency procedures that 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, and Office of Environmental Health and Safety, 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

Special first aid treatment required by the type of acutely toxic material(s) handled in the laboratory

Eye protection

Eye protection in the form of safety glasses must be worn at all times when handling acutely toxic gases. Ordinary (street) prescription glasses do not provide adequate protection. (Contrary to popular opinion these glasses 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 acutely toxic gases, 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.

Fume hood

Manipulation of acutely toxic gases must be carried out in a fume hood. All areas where acutely toxic gases are stored or manipulated must be labeled.

Glove (dry) box

Some processes involving acutely toxic gases may be performed in a properly vented glove box rather than a fume hood.

Gloves

Gloves should be worn when handling acutely toxic gases. Disposable latex or nitrile gloves provide adequate protection against accidental hand contact with small quantities of most laboratory chemicals.

Hazard assessment

Hazard assessment should focus on the education of employees concerning the health risk posed by acutely toxic gases, on proper use and handling procedures, the demarcation of designated areas, and emergency evacuation and notification procedures in the event of a spill.

Protective apparel

Lab coats, closed toed shoes, and long sleeved clothing must be worn when handling acutely toxic gases. The Principle Investigator will determine the need for additional protective equipment on a case-by-case basis.

Safety shielding

Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of acutely toxic gases that 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 or drench shower should be available in a nearby location where the acutely toxic gases are used.

Signs and labels

Doorways: The room sign must be labeled with contact information for the principle investigator and another designated contact person. This information must have information to contact a responsible party 24 hours a day.

Containers: All acutely toxic gas cylinders must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.

Special storage

Acutely toxic gases must be stored in a designated area. Special ventilation of the stored cylinders is required and must be approved by the Principle Investigator.

Continuous monitoring devices that will alert staff of a release of the acutely toxic gas is required for certain gases.

The Principle Investigator must determine the quantity of an acutely toxic gas that may be stored safely in a laboratory.

Special ventilation

Manipulation of acutely toxic gases outside of a fume hood will require special ventilation controls in order to minimize exposure to the material. Fume hoods provide the best protection against exposure to acutely toxic gases in the laboratory and are the preferred ventilation control device. Always attempt to handle acutely toxic gases in a fume hood. If your research does not permit the handling of acutely toxic gases in your fume hood you must determine an alternative location to use.

Spill response

In the event of an escape of gas, alert personnel in the area that a spill has occurred. Do not attempt to handle a spill of acutely toxic gases. Vacate the laboratory immediately and call for assistance.

- Office of Environmental Health & Safety 335-3041 or 911
- University Police 911
- This is a 24 hour service.

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

Waste disposal

All empty or partially filled acutely toxic gas cylinders should be returned to the Chemistry Department storeroom to be returned to the supplier. If the supplier does not accept empty or partially filled cylinders, the storeroom will assist in disposal of the cylinders in cooperation with the Environmental Health and Safety Department.