

**SAN DIEGO STATE UNIVERSITY  
ENVIRONMENTAL HEALTH & SAFETY DEPARTMENT**

**STANDARD OPERATING PROCEDURES  
ACUTELY TOXIC GASES**

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 Environmental Health & Safety (619) 594-6778 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.

**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.

**EH&S Notification**

You should notify Environmental Health & Safety (619) 594-6778 prior to the initial use of acutely toxic gases. Notification is also required following significant changes in procedures or the quantity of materials used.

**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 Environmental Health & Safety (619) 594-6778.

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

The quantity of an acutely toxic gas that may be stored in a laboratory will be determined on a case-by-case basis by Environmental Health & Safety (619) 594-6778.

**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.

**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.

## **Respiratory Protection**

### **Fume hood**

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

### **Glove (dry) box**

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

### **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 contact Environmental Health & Safety (619) 594-6778 to review the adequacy of all special ventilation.

## **Protective apparel**

Lab coats, closed toed shoes and long sleeved clothing should be worn when handling acutely toxic gases. The need for additional protective equipment will be determined Environmental Health & Safety (619) 594-6778 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 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.

### **Gloves**

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

## **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 contain a Designated Area Within Caution where carcinogens, reproductive hazards, and/or acutely toxic chemicals are stored or used.

**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. A label for acutely toxic gases is available (part number (S1728C)).

### **Vacuum protection**

Not applicable

### **Waste disposal**

All empty or partially filled acutely toxic gas cylinders should be returned to the supplier. If the supplier does not accept empty or partially filled cylinders, contact Environmental Health & Safety (619) 594-6778 concerning disposal.

### **Designated area**

The room sign for the laboratory must contain a *Designated Areas Within* identifier.

All locations within the laboratory where acutely toxic gases are handled should be demarcated with designated area caution tape and/or posted with designated area caution signs. This includes all fume hoods and bench tops where the acutely toxic gases are handled.

### **Decontamination procedures**

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

### **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.

- Environmental Health & Safety (619) 594-6778
- San Diego State University Public Safety Emergency Number (619) 594-1991 or 911 from a campus phone.

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

### **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, Environmental Health & Safety (619) 594-6778, and 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