



SACRAMENTO STATE

## Acutely Toxic Liquids and Solids

### STANDARD OPERATING PROCEDURE (SOP)

Type of SOP:  Process  Hazardous Chemical  Hazardous Class

All personnel who are subject to these SOP requirements must review a completed SOP and sign the associated training record. Completed SOPs must be readily accessible to laboratory personnel. Electronic access is acceptable. SOPs must be reviewed, and revised where needed, as described in the [CSUS Chemical Hygiene Plan](#). Note that not all hazardous chemicals are appropriately addressed in a single control-banded SOP, and some chemicals are subject to several control-banded SOPs. Unique properties of each chemical must be considered before including it into a control band.

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Date SOP Written: \_\_\_\_\_ Approval Date: \_\_\_\_\_

SOP Prepared by: \_\_\_\_\_  
**NSM Safety Manager**

SOP Reviewed and Approved by (name/signature): \_\_\_\_\_

Department: \_\_\_\_\_

Laboratory Supervisor: \_\_\_\_\_ Phone: \_\_\_\_\_

Lab Manager/  
Safety Coordinator: \_\_\_\_\_ Phone: \_\_\_\_\_

Emergency Contact(s): \_\_\_\_\_ Phone: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Location(s) covered by SOP: Building: \_\_\_\_\_ Lab  
Room #(s): \_\_\_\_\_ Phone: \_\_\_\_\_

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#### 1. HAZARD OVERVIEW

There is a broad spectrum of Acutely Toxic solid and liquid materials. For these materials, a single short-term exposure at low concentrations can cause serious illness or death. Recognition of the hazards associated with the transportation, operation, storage, and disposal of these materials is essential.

## 2. HAZARDOUS CHEMICAL(S)/CLASS OF HAZARDOUS CHEMICAL(S)

An Acutely Toxic Material is a chemical falling within any of the following categories:

- A. 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.
- B. 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.
- C. A chemical that has a median lethal concentration (LC50) in air of 200 ppm by volume or less of gas or vapor, or 2 mg per liter or less of mist, fume, or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 gm each.

Acutely Toxic Material(s) can be identified using the Globally Harmonized System Hazard Codes H300 (Fatal if swallowed), H310 (Fatal in contact with skin) and H330 (Fatal if inhaled). A few examples of common Acutely Toxic Materials used at the CSUS campus include, but are not limited to, the following:

1. Sodium Azide
2. Mercaptoethanol
3. Cyanide salts
4. Mercury compounds

## 3. ENGINEERING/VENTILATION CONTROLS

The following is a general plan for all Acutely Toxic Materials:

- A. Use containment devices (*e.g.*, chemical fume hoods, glove boxes, etc.) when:
  - i. Using volatile and/or semi-volatile substances;
  - ii. Manipulating substances that may generate aerosols; and
  - iii. Performing laboratory procedures that may result in an uncontrolled release.
- B. 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.
- C. Ventilated containment should be used to weigh out solid chemicals (*e.g.*, certified laboratory chemical fume hood). Alternatively, the tare method can be used to prevent inhalation of the chemical. While working in a fume hood, the chemical is added to a pre-weighed container. The container is then sealed and can be re-weighed outside of the fume hood. If a chemical needs to be added or removed, this manipulation is carried out in the fume hood. In this manner, all open chemical handling is conducted in the fume hood.

If you must use Acutely Toxic Materials without engineering or ventilation controls, you must contact the Chemical Hygiene Officer or CSUS EHS for an exposure assessment.

## 4. ADMINISTRATIVE CONTROLS

The following elements are required:

1. Complete the [Laboratory Safety Fundamentals](#) (or approved equivalent) training prior to working in the laboratory;
2. Complete laboratory-specific safety orientation and training on laboratory-specific safety equipment, procedures, and techniques to be used, including any applicable laboratory-specific Laboratory Safety Plan(s), prior to receiving unescorted access to the laboratory;
3. Demonstrate competency to perform the procedures to the Laboratory Supervisor, laboratory-specific Safety Officer, and/or trainer;
4. Be familiar with the location and content of any applicable Safety Data Sheets (SDSs) for the chemicals to be used (online SDSs can be accessed from [MSDSonline](#));
5. Implement good laboratory practices, including good workspace hygiene;
6. Inspect all equipment and experimental setups prior to use;
7. Follow best practices for the movement, handling, and storage of hazardous chemicals (see Chapters 5 and 6 of [Prudent Practices in the Laboratory](#) for more detail). An appropriate spill cleanup kit must be located in the laboratory. Chemical and hazardous waste storage must follow an appropriate segregation scheme and include appropriate labeling. Hazardous chemical waste must be properly labelled, stored in closed containers, in secondary containment, and in a designated location;
8. Do not deviate from the instructions described in this SOP without prior discussion and approval from the PI and/or Laboratory Supervisor.
9. Notify the PI and/or Laboratory Supervisor of any accidents, incidents, near-misses, or upset condition (*e.g.*, unexpected rise or drop in temperature, color or phase change, evolution of gas) involving Acutely Toxic Materials described in this SOP; and
10. Abide by the department or college-specific working alone policy, if applicable.
11. Where feasible, work surfaces should be protected (*e.g.*, disposable absorbent bench paper, aluminum foil, etc.) and must be decontaminated after each use.

## 5. PERSONAL PROTECTIVE EQUIPMENT (PPE)

At a minimum, long pants (covered legs) and closed toe/closed heel shoes (covered feet) are required to enter a laboratory or technical area where hazardous chemicals are used or stored.

In addition to the minimum attire required upon entering a laboratory, the following PPE is required for work with Acutely Toxic Materials:

- A. Eye Protection: Eye protection is required for all work with Acutely Toxic Materials.
  - i. At a minimum ANSI Z87.1-compliant safety glasses are necessary.
  - ii. Splash goggles may be substituted for safety glasses, and are required for processes where splashes are foreseeable or when generating aerosols.
  - iii. Ordinary prescription glasses will NOT provide adequate protection unless they also meet the Z87.1 standard and have compliant side shields.
- B. Body Protection: At a minimum a chemically-compatible laboratory coat that fully extends to the wrist is necessary.

- i. For chemicals that are corrosive and/or toxic by skin contact/absorption additional protective clothing (*e.g.*, face shield, chemically-resistant apron, disposable sleeves, etc.) are required where splashes or skin contact is foreseeable.
- C. **Hand Protection:** When hand protection is needed for the activities described in this SOP define the type of glove to be used based on: A) the chemical(s) being used, B) the anticipated chemical contact (*e.g.*, incidental, immersion, etc.), C) the manufacturers' permeation/compatibility data, and D) whether a combination of different gloves is needed for any specific procedural step or task.

## 6. SPILL AND EMERGENCY PROCEDURES

Follow the guidance for chemical spill cleanup from the [CSUS Chemical Hygiene Plan](#), unless specialized cleanup procedures are described below. Emergency procedure instructions for CSUS campus are contained in the [campus Emergency Response Manual \(ERM\)](#) and in building specific Emergency Action Plans. The emergency exit route is posted in the hallway of each floor of the building. All other locations must describe detailed emergency procedure instructions below.

For spills of solid materials, DO NOT dry sweep. Dry sweeping can result in the hazardous material becoming airborne.

## 7. WASTE MANAGEMENT AND DECONTAMINATION

Hazardous waste must be managed according to [the CSUS Chemical Hygiene Plan](#), and must be [properly labeled](#). In general, hazardous waste must be removed from your laboratory within 12 months of the accumulation start date. Hazardous waste pick up requests must be completed through the RSS WASTE application or EH&S at (916) 278-5165 or (916) 278-2020.

Decontamination procedures vary depending on the material being handled. The toxicity of some materials can be neutralized with other reagents. Carefully inspect work areas to make sure no hazardous materials remain. Following dispensing or handling, all surfaces and equipment should be wiped with the appropriate cleaning agent to prevent accumulation of Acutely Toxic chemical residue, and dispose of cleaning materials properly. Be sure all ignition sources are secured before beginning clean up with flammable liquids. Decontaminate vacuum pumps or other contaminated equipment before removing them from the designated area or before resuming normal laboratory work in the area.

Upon completion of work with Acutely Toxic Materials and/or decontamination of equipment, remove gloves and/or PPE to wash hands and arms with soap and water. Additionally, upon leaving a designated Acutely Toxic Materials work area remove all PPE worn and wash hands, forearms, face and neck as needed. Contaminated clothing or PPE should not be worn outside the lab. Grossly contaminated clothing/PPE and disposable gloves must not be reused.

## **8. DESIGNATED AREA**

Designated area(s) are required for the use and storage of Acutely Toxic Materials. Such areas must be clearly marked with signs that identify the chemical hazard and include an appropriate warning; for example: DANGER! ACUTELY TOXIC MATERIAL WORK AREA!

## **9. DETAILED PROTOCOL**



## Documentation of Standard Operating Procedure Training

*(Signature of all users is required)*

- ✓ Prior to using **Acutely Toxic Solids and Liquids**, laboratory personnel must be trained on the hazards described in this SOP, how to protect themselves from these hazards, and emergency procedures.
- ✓ Ready access to this SOP and to a Safety Data Sheet for each hazardous material described in the SOP must be made available.
- ✓ The Principal Investigator (PI), or the Laboratory Supervisor if the activity does not involve a PI, must ensure that their laboratory personnel have attended appropriate laboratory safety training or refresher training within the last three years.
- ✓ Training must be repeated following **any** revision to the content of this SOP. Training must be documented. This training sheet is provided as one option; other forms of training documentation (including electronic) are acceptable but records must be accessible and immediately available upon request.

**Designated Trainer:** *(signature is required)*

I have read and acknowledge the contents, requirements, and responsibilities outlined in this SOP:

Name	Signature	Trainer Initials	Date