

# UCLA Department of Chemistry and Biochemistry



## Laboratory Safety Manual

Third Edition

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## CHAPTER 1: INTRODUCTION

The purpose of this document is to acquaint personnel in the UCLA Department of Chemistry & Biochemistry with the specific health and safety policies, procedures and practices in the department. Some policies are not simply those of the department but have their legal basis in current local, state, and federal worker safety and environmental laws.

Also provided to incoming personnel to the department is a copy of the American Chemical Society publication, *Safety in Academic Chemistry Laboratories*. The information in this publication provides specific use of compressed gases, use of centrifuges, etc. This information should be used in conjunction with this document which generally addresses issues more specific to Young Hall and the Molecular Sciences Building (Mol Sci).

In 1990, OSHA promulgated the new standard entitled "*Occupational Exposure to Hazardous Chemicals in Laboratories*" (Title 8, California Code of Regulations, 5191). One major provision of the standard is for the implementation of a written **Chemical Hygiene Plan**. **The document presented here and the ACS publication described above shall constitute the Chemical Hygiene Plan for the Department of Chemistry & Biochemistry.**

The information presented should not be considered to be all-inclusive but rather an overview of the large field of chemical health and safety. It is highly recommended that the departmental personnel familiarize themselves with this information **before** an accident occurs. Any questions regarding this document or any health and safety matter should be addressed to the Chemical Safety Office, Room 1217 Young Hall, x63661.

### A. RESPONSIBILITIES

It is the responsibility of all laboratory personnel

- to know the potential occupational hazards in their work areas;
- to follow safe work practices required for their job duties;
- to understand and follow the departments chemical hygiene plan;
- to develop good personal chemical hygiene habits;
- to know what to do in an emergency;
- to report unsafe conditions to the principal investigator or supervisor;
- to report all facts pertaining to exposure incidents or accidents to the principal investigator or supervisor

Principal investigators and supervisory personnel have the primary responsibility for the activities of their staff and for conditions in the rooms and areas under their control. It is their responsibility to:

- acquire knowledge and information needed to provide safe working conditions for all laboratory personnel;
- continually educate all laboratory personnel on the potential hazards associated with a specific task and the precautionary measures (laboratory practices, engineering controls, and personal protective equipment) appropriate for the hazards;
- monitor staff to ensure safe work practices are followed;
- determine the level of protective apparel and equipment required to adequately protect lab personnel;
- ensure self-audits for chemical hygiene, housekeeping and emergency equipment are conducted on a regular basis;
- provide lab specific written standard operating procedures (SOPs) for hazardous chemicals, equipment and processes
- advise and assist in improvement/development of safe work practices;
- investigate accidents and initiate corrective actions which ensure safe working conditions;
- implement new work practices or policies recommended by safety committees or the Office of Environment, Health & Safety;
- meet the legal requirements of governmental legislation for occupational health and safety, and waste disposal as advised by the Office of Environment, Health & Safety

The Office of Environment, Health & Safety is responsible for assisting departments, principal investigators, and supervisory personnel in:

- identifying safety hazards in the laboratory;
- providing technical guidance on matters of laboratory safety;
- developing and conducting training or informational programs for laboratory personnel on health and safety issues;
- developing and improving safe work practices and policies
- investigating accidents and developing corrective actions which ensure safe working conditions;
- meeting the legal requirements of governmental legislation for occupational health and safety, and waste disposal in laboratories.

## **B. THE CHEMICAL HYGIENE STANDARD**

The California Occupational Safety and Health Administration's (Cal/OSHA) Chemical Hygiene Standard requires each laboratory to have a written Chemical Hygiene Plan. The purpose of the Chemical Hygiene Plan is to minimize laboratory personnel exposures to chemical hazards and meet the requirements of the Cal/OSHA Chemical Hygiene Standard. The written Chemical Hygiene Plan must contain the following components:

1. Standard operating procedures (SOP's) relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals.
2. Criteria that the employer will use to determine and implement control measures to reduce employee exposure to hazardous chemicals (i.e.

- engineering controls, personal protective equipment, and personal hygiene practices).
3. A requirement that fume hoods are functioning properly, that all protective equipment shall function properly, and that specific measures shall be taken to ensure proper and adequate performance of such equipment.
  4. Information and training shall be provided to employees to ensure that they are apprised of the hazards of chemicals present in their work area. Information and training may relate to an entire class of hazardous substances to the extent appropriate.
  5. Circumstances that require prior approval from the employer before work is begun.
  6. The employer shall provide all employees who work with hazardous chemicals an opportunity to receive medical attention and consultation, including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances.
  7. Designation of a Chemical Hygiene Officer and the establishment of a Chemical Hygiene Committee.
  8. Provisions for additional employee protection for work with particularly hazardous substances. These include "select carcinogens," reproductive toxins and substances which have a high degree of acute toxicity.

### **C. CHEMICAL HYGIENE OFFICERS**

Michael Wheatley is the Chemical Hygiene Officer for the Department of Chemistry and Biochemistry. Michael Wheatley is the Chemical Safety Officer and can be reached at (310) 206-3661. Office location is at 1217 Young Hall. Each Principal Investigator's (PI's) research group should designate in the space provided below the Chemical Hygiene Officer in their group. This person is responsible for chemical safety in the research group and for maintaining this document.

Some of the duties of the Research Group Chemical Safety Officer include, but are not limited to:

1. Identifying possible hazards and unsafe conditions in the lab and either report them to the lab supervisor or the Department Chemical Safety Officer, or correct the problem.
2. Conduct regular in-house safety inspections for the lab.
3. Ensure that chemicals and chemical waste are properly stored, handled and disposed.
4. Accompany the Department Chemical Safety Officer on department laboratory safety inspections.

RESEARCH GROUP CHEMICAL SAFETY OFFICER:

### **D. INJURY AND ILLNESS PREVENTION PROGRAM**

The purpose of the Injury, Illness Prevention Program (IIPP) is to reduce workplace injuries and illnesses, increase productivity, and promote a safe and healthier working environment. The IIPP is a Cal/OSHA requirement. It has a very broad application encompassing all occupations, including laboratory workers. The IIPP addresses Hazard Communication, Accident Investigation, Hazards Identification (safety inspections), Hazard Mitigation (corrective actions), Training, and Record keeping (documentation). Requirements of the IIPP include:

1. Hazard Identification. Hazard Identification can be accomplished by conducting safety inspections. A laboratory safety survey for this purpose is included in Section 14 of this Manual. In addition, the Hazard Evaluation Guidelines and the Accident Prevention Checklist found in the UCLA IIPP provide guidelines for conducting a survey.
2. Record Keeping. Records of safety training, safety meetings, safety inspections, accident investigations and corrective actions are required to be kept. The UCLA IIPP provides various forms in the Appendix, which can be used, for this purpose.
3. Incident Reporting. All incidences (injuries, accidents, spills), including near misses should be reported and investigated.

**\*Serious injuries and fatalities must be reported to the Chemical safety Officer as soon as possible. Cal/OHSA must be notified within 8 hours of injury. A serious injury is: Amputation, Concussion, crushing, fracture, burn, laceration that requires stitches, laceration with significant bleeding, and hospitalization greater than 24 hours.**

4. Mitigation. All identified hazards must be abated or reported immediately.
5. Compliance. All laboratory personnel must follow standard operating procedures, regulations and university policy. Failure to follow these rules will result in administrative action.

## CHAPTER 2: SUMMARY OF EMERGENCY INFORMATION

### A. GENERAL EMERGENCIES:

#### DIAL 911

For Emergencies which require POLICE, FIRE, or MEDICAL assistance:

Dial 911 from any department phone

Notify the Operations Manager (Ext. 54464, Room 3018A Young Hall), the Chief Administrative officer (Ext. 62629, Room 3014 Young Hall) or the Mail and Information Center (Ext. 54219, Room 3034 Young Hall).

### B. EARTHQUAKES

IF IN THE BUILDING, take cover under a table, desk, or on the floor between the seats in the auditorium. Move away from windows and any apparatus that can fall on you. If in a corridor, sit on the floor next to a wall. Cover your head. Do not use the elevators. Do not attempt to leave the building while there is shaking. If in a laboratory and an evacuation is imminent, try to turn off any equipment or reactions which may present a hazard if left unattended or may not tolerate changes in water or electrical current (e.g. flammable solvent stills, gas lines, electrical appliances, heat or water sensitive reactions).

IF OUTSIDE THE BUILDING, stay outside. Move away from tall buildings, trees, or power lines. Do not go into a parking structure. Report to nearest Disaster Evacuation Area for direction and assistance. The area for the Molecular Sciences and Young Hall buildings is in the Court of Sciences between Young and Boelter Halls (see map, p. 5).

### C. FIRES:

In the event of any fire **DIAL 911 from a CAMPUS PHONE**

If the fire is small (no bigger than a small trashcan fire), and you have been adequately trained on extinguisher use and feel comfortable doing so, you may choose to extinguish the fire.

In the event of a large fire evacuate the area, close the door behind you and warn others.

If your clothes catch on fire, remember to **STOP-DROP-&-ROLL-ROLL-ROLL**. This action will smother the fire. Protect your face with your hands. Safety showers or fire extinguishers are useful only when immediately at hand. **Do not use a fire blanket.** Always obtain medical attention when burned.

ALARM PULL STATIONS: In the MOLECULAR SCIENCES BUILDING, they are located on the east balcony and near the elevator adjacent to the south stairwell on each floor. In YOUNG HALL, they are located in corridors on each floor.

EXTINGUISHERS:

Remember the four basic steps in using a fire extinguisher:

- P-Pull** Pull out the metal pin from the handle
- A-Aim** Aim the nozzle of the extinguisher at the base of the fire
- S-Squeeze** Squeeze the handle
- S-Sweep** Sweep from side to side

All labs are equipped with either dry chemical or carbon dioxide fire extinguishers which are suitable for extinguisher chemical, electrical, or material fires.

Some labs that contain combustible solid metal will be equipped with a special Class D extinguisher.

**D. MEDICAL EMERGENCIES / AMBULANCE:**

**DIAL 911**

DIALING 911 WILL RESULT IN PARAMEDIC RESPONSE IN 5-10 MINUTES. SEE MAP ON PAGE 5 FOR LOCATIONS OF MEDICAL FACILITIES.

**Emergency Medical Treatment:**

EMPLOYEES (Faculty, Staff, Postdocs, and Graduate Students):

Report to Emergency Medicine Center located at the Ronald Reagan medical building, 1<sup>st</sup> floor, room 1419.

310-267-8407 or x 52111

UNDERGRADUATE STUDENTS:

During Monday through Friday, 8:00 a.m. – 5:00 p.m., report to Arthur Ashe Student Health and Wellness Center.

310-825-4073 or x 54073

After hours, report to Emergency Medicine Center located at the Ronald Reagan medical building, 1<sup>st</sup> floor, room 1419.

310-267-8407 or x 52111

**Report all laboratory-related injuries and illnesses to your supervisor and write an accident report.**

## **Non-Emergency Medical Treatment:**

### EMPLOYEES (Faculty, Staff, Postdocs, and Graduate Students):

During Monday through Friday 7:30 a.m. to 4:30 p.m., report to Occupational Health Facility located at the CHS building on the 6<sup>th</sup> floor, room 67-120 for work related injuries.

310-825-6771 or x 56771

### UNDERGRADUATE STUDENTS:

During Monday through Friday, 8:00 a.m. – 5:00 p.m., report to Arthur Ashe Student Health and Wellness Center.

310-825-4073 or x 54073

All laboratories need to maintain **signed** copies of the form "UCLA Employee's Referral Slip for Industrial Injury" (form WC 1000) in a known location in the laboratory in case an injury occurs when your supervisor is not present. Make sure your supervisor, P.I., or department chair has signed the forms.

## **E. POLICE:**

### **DIAL 911**

Use any departmental phone to dial 911 then notify the Operations Manager (Ext. 54464, Rm. 3018A Young Hall), the Chief Administrative officer (Ext. 62629, Room 3014 Young Hall) or the Mail and Information Center (Ext. 54219, Rm. 3034 Young Hall).

## **F. CHEMICAL EXPOSURE**

- **Hazardous Chemical Spill on Skin**
  1. Remove contaminated clothing and flush the affected skin area with water for 15 minutes.
  2. For extensive exposure remove **all** clothing including shoes and undergarments while under the safety shower.
  3. Rinse body thoroughly in emergency shower for at least 15 minutes.
  4. Seek medical attention whether or not symptoms persist. The effects of some chemicals are delayed. Bring the MSDS of the chemical spilled on the skin to the medical treatment facility.
- **Hazardous Chemical Splash into the Eye(s)**
  1. Use the eyewash to immediately rinse eyeball and inner surface of the eyelid with water continuously for 15 minutes. Have someone help hold the eyelids open to ensure an effective wash behind the eyelids.
  2. Seek medical attention whether or not symptoms persist. Bring the MSDS of the chemical splashed into the eye(s) to the medical treatment facility.

- **Inhalation**
  1. Move to fresh air.
  2. Seek medical attention whether or not symptoms persist. Bring the MSDS for the chemical inhaled to the medical treatment facility.

## **G. EMERGENCY AND SAFETY EQUIPMENT:**

### **BASIC FIRST AID KITS:**

IN YOUNG HALL, located at

- The main east-west corridor across from room 1096, 2096, 5096, 6096
- The Mail and Information Center (Rm. 3034)
- The Student Machine Shop (Rm. 1256)
- Receiving (Rm. 1224)
- Lab Support (Rm. 1072)

ALL RESEARCH LABS SHOULD HAVE THEIR OWN FIRST AID KITS

CHEMICAL CLEANUP EQUIPMENT: Exhaust fans, mercury vacuums, and spill clean up materials are located in Room 3120 Molecular Sciences Building and the Emergency Cage across from Room 1060 in Young Hall.

RESPIRATORS (gas masks): filter type for organic vapors and acid gases, but not for fire or where there is a lack of oxygen. **All persons who use respirators must be fit tested and trained.** Contact the Chemical Safety Office at Young Hall, room 1217 or at 310-206-3661 or x 63661. EHS fit tests anyone who needs to use a full or half face respirator.

MERCURY VAPOR DETECTOR: Contact the Chemical Safety Office at Young Hall, room 1217 or 310-206-3661 or x 63661.

RADIOACTIVITY DETECTOR: Contact the Chemical Safety Office at Young Hall, room 1217 or 310-206-3661 or x 63661.

## **H. EMERGENCY REPAIRS:**

**During Working Hours:** Call the Mail and Information Center, Rm. 3034 Young Hall, x 54219.

**All Other Times:** Call Facilities Division 24-hour emergency number, x 59236.

## **I. NON-EMERGENCY PHONE NUMBERS**

For recorded information on state of campus, Dial 1(800) 900-UCLA (Emergency Information Hotline).

Office of Environment, Health and Safety

x 55689

Biological Safety	x 53323
Radiation Safety	x 56995
Campus Police	x 51491
Facilities Trouble Call (24 hours)	x 59236
Arthur Ashe Student Health and Wellness Center	x 54073
Occupational Health Facility	x 56771
UCLA Emergency Medicine Center	x 52111
<b>Poison Control Center</b>	<b>1(800) 222-1222</b>

**Department of Chemistry and Biochemistry**

Mail and Information Center	x 54219
Chemical Safety Officer → <b>Michael Wheatley</b>	x 63661
Department Disaster Coordinator	x 51156
Chief Administrative Officer	x 62629
Chairman's Office	x 53958
Operations Manager	x 54464

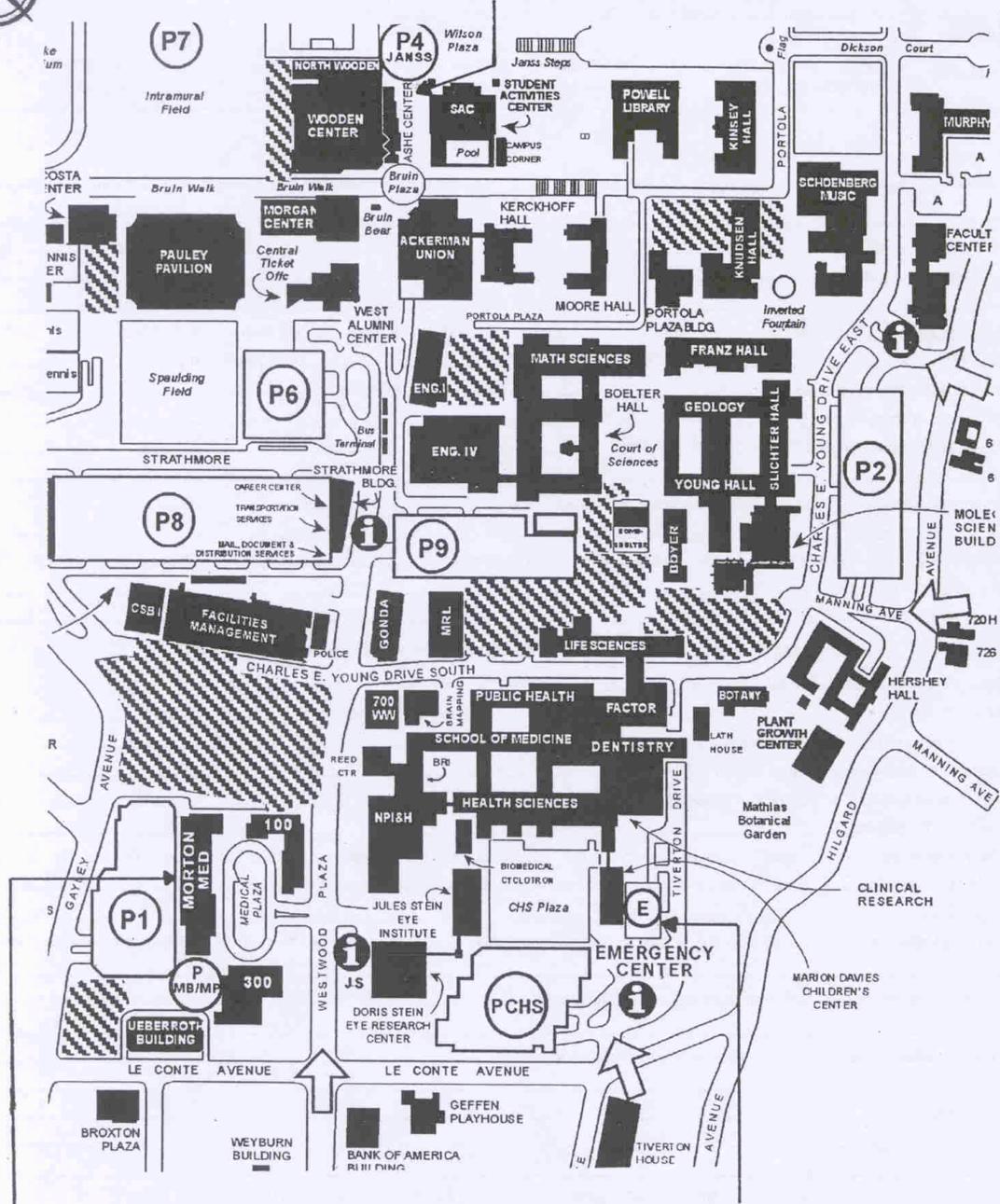
# Locations of UCLA Medical Treatment Services



**Student Health Arthur Ashe Center**

Phone: (310) 794-7918

Hours: M-F 8 AM to 5 PM (except Tuesday, 9 AM to 5 PM)



**Occupational Health**  
 200 Med Plaza Suite 224  
 Phone: (310) 825-6771  
 Hours: M-F 7:30 AM to 4 PM

**Emergency Medicine**  
 CHS BE-133  
 Phone: (310) 825-1052  
 Hours: Mon-Sun 24 Hours

# IN CASE OF SERIOUS INJURY AT WORK!

**1** IMMEDIATELY

CALL  
**911**  
FROM A CAMPUS  
PHONE  
**[310]**  
**825-1491**  
FROM OFF-CAMPUS  
OR YOUR CELL PHONE  
OR GET  
FIRST AID

**2** NOTIFY YOUR  
SUPERVISOR

AND  
YOUR

PERSONNEL  
DEPARTMENT

**3** CALL EH&S  
HOTLINE

**[310]**  
**825-9797**

**WITHIN 8  
HOURS**

**If serious\*  
Injury**

**\*Serious Injury Is:**

- Amputation
- Concussion
- Crushing
- Fracture
- Burn
- Laceration that requires stitches
- Laceration with significant bleeding
- Hospitalization greater than 24 hours

**QUESTIONS?**

**CALL EH&S AT 310-825-5689**

[www.ehs.ucla.edu](http://www.ehs.ucla.edu)

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## CHAPTER 3: MEDICAL TREATMENT

### A. MEDICAL RESPONSE FOR ACCIDENT VICTIMS

The following procedures should be followed in the event of an accident or injury:

**A. Undergraduate student in an instructional laboratory, 8:00 a.m. to 5:00 p.m.:**  
**Student Health Services**, Arthur Ashe Student Health and Wellness Center,  
Monday-Friday, 8:00 a.m. to 5:00 p.m. Extension 54073.

- A *Student Referral Slip for DayTime Lab Injury* is required.

#### **AFTER 5:00 p.m.**

After hours, report to Emergency **Medicine Center** located at the Ronald Reagan medical building, 1st floor, room 1419.

310-267-8407 or x 52111

- A *Student Referral Slip for Nighttime Lab Injury* is required.

**Forms are available at the following locations:** Young Hall Rooms 1072, 3034, 3021, 4204

### **B. Graduate Student, Teaching Assistant, Employees: 7:30 a.m. to 4:30 p.m.**

**Occupational Health Facility**, CHS building on the 6th floor, room 67-120 for work related injuries.

310-825-6771 or x 56771

- An *Employee Referral Slip for Industrial Injury* is required.

#### **AFTER 4:30 p.m.**

Report to Emergency **Medicine Center** located at the Ronald Reagan medical building, 1st floor, room 1419.

310-267-8407 or x 52111

- An *Employee Referral Slip for Industrial Injury* is required.
- A **Department ID** is required without forms.

**Forms are available at the following locations:** Young Hall Rooms 1072, 3034, 3021, 4204

### **C. Guests or Visitors, any time:**

Report to **Emergency Medicine Center** located at the Ronald Reagan medical building, 1st floor, room 1419.

310-267-8407 or x 52111

- There will be a service charge

Supervisors will call 911 Emergency Response if the injury is severe or life threatening. If the injury requires the employee to be hospitalized more than 24 hours or receive an amputation, a supervisor must call the injury hotline at (310) 825-9797 immediately. Environment, Health and Safety (EH&S) will then call Cal/OSHA to report the injury as required by law. If the injury is not reported within 8 hours of supervisor notification, the campus will be fined. In the case of an injury in the department of Chemistry and Biochemistry, the fine will be respectively handed down to the department of Chemistry and Biochemistry.

**Injuries Report Hotline (310) 825-9797 or x 59797**

**D. Considerations Regarding Proper Handling of Injuries:**

- If the injured is unconscious or cannot be moved safely, **immediately call 911.**
- Injured persons should not walk or drive to treatment without being accompanied.
- Injured persons should complete and return a departmental *Accident Report* at their earliest convenience. This form is available in the Chemical Safety Office, Young Hall, room 1217 and in the First Year Courses Office, Room 1037 at Young Hall.

**B. MEDICAL EXAMS FOR SUSPECTED CHEMICAL EXPOSURES**

The Cal/OSHA Safety Order entitled *Occupational Exposure to Hazardous Chemicals in Laboratories* (the Chemical Hygiene Plan) states that all employees who work with hazardous chemical have an opportunity to receive medical attention when:

- The employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed;
- Exposure monitoring reveals an exposure level routinely above the action level for a Cal/OSHA regulated substance or above the exposure limit for a non-Cal/OSHA regulated chemical for which there are exposure monitoring and medical surveillance requirements;
- An event takes place in the work area such as a spill, leak, explosion, or other occurrence resulting in the likelihood of a hazardous exposure.

It is the policy of the Department of Chemistry & Biochemistry to promptly investigate all employee or student-reported incidents in which there is a possibility of employee exposure to a toxic substance. If required, employees shall be examined at the UCLA Employee Medical Facility and students shall be examined at the UCLA Student Health Services under the direct supervision of a licensed physician without cost to the employee and without loss of pay.

**EXPOSURE DETERMINATION:** If there is reason to believe that exposure levels for a regulated substance routinely exceed the action level for a Cal/OSHA regulated substance or exposure limit for a non-Cal/OSHA regulated substance, exposure levels and conditions must be determined by EH&S personnel. Lists of Permissible Exposure

Limits (PELs) for commonly used Cal/OSHA regulated substances are given in the Respiratory Protection Policy. Other lists are available from the Chemical Safety Office.

# I. REFERRAL SLIP

**UCLA Medical Center**

**EMPLOYEE'S REFERRAL SLIP FOR INDUSTRIAL INJURY AND REPORT OF ACCIDENT**

Supervisors are responsible for completing and submitting this form WITHIN 24 HOURS of first notice of an employee's injury. All items must be completed in order to properly process this form. Distribute the copies as noted on the bottom of this form. This information is critical to the injured employee's claim for benefits. DO NOT DELAY. This form must be completed even if the employee did not receive medical attention or if the injury seems minor. If you have questions, please call one of the following numbers:

<b>MEDICAL CENTER EMPLOYEE:</b>	<b>Medical Center Human Resources</b> ..... 794-0500
<b>CAMPUS EMPLOYEE:</b>	<b>Office of Insurance &amp; Risk Management</b> ..... 794-6948

Date: \_\_\_\_\_

Check One:  Medical Center Employee  NPI Employee  Santa Monica Hospital  Volunteer  Campus Employee

1. Name \_\_\_\_\_ Social Security Number \_\_\_\_\_
2. Home Address \_\_\_\_\_ City \_\_\_\_\_ Zip \_\_\_\_\_
3.  Male  Female Date of Birth \_\_\_\_\_ Home Telephone \_\_\_\_\_
4. Department \_\_\_\_\_ Job Title \_\_\_\_\_ Campus Extension \_\_\_\_\_
5. Job Status:  Full Time  Part Time  Temporary  Shift (am/pm)  8 hours  12 hours
6. Date of Injury \_\_\_\_\_ Time of Injury (am/pm) \_\_\_\_\_ Date Reported \_\_\_\_\_
7. Nature of Injury (sprain, contusion, etc.) \_\_\_\_\_ Part of Body Affected \_\_\_\_\_
8. What was employee doing when injured? \_\_\_\_\_
9. How did the injury occur? Please describe in detail. \_\_\_\_\_
10. Employee statement on how accident could be prevented \_\_\_\_\_
11. Name and contact number of the person that this injury was reported to \_\_\_\_\_  
Supervisor's Name (PLEASE PRINT) \_\_\_\_\_ Extension \_\_\_\_\_
12. Supervisor's Signature \_\_\_\_\_ Today's Date \_\_\_\_\_

**INVESTIGATION OF ACCIDENT (TO BE FILLED OUT BY SUPERVISOR OR EMPLOYEE)**

14. Time employee began work (exact hour) \_\_\_\_\_ (am/pm). Did employee lose time off due to injury? \_\_\_\_\_
15. Date last worked \_\_\_\_\_ Date returned to work \_\_\_\_\_
16. Was the employee paid full wages for the day of injury or last day worked? \_\_\_\_\_
17. Location of Accident (Building, Room #, Floor, Corridor, etc.) \_\_\_\_\_
18. Were there materials or equipment associated with the injury? \_\_\_\_\_
19. List ALL witnesses: \_\_\_\_\_
20. Injury treated by:  Self  Emergency Room  Occupational Health  Other (please specify) \_\_\_\_\_
21. Were other employees injured in this event? \_\_\_\_ If yes, write their name and contact number \_\_\_\_\_
22. Was employee exposed to blood/bodily fluid other than his/her own? \_\_\_\_ If yes, write their name, address and contact number \_\_\_\_\_
23. Did others come into contact with the employee's blood/bodily fluid? \_\_\_\_ If yes, write their name, address and contact number \_\_\_\_\_
24. What has been done to prevent a recurrence of this accident? \_\_\_\_\_
25. Comments \_\_\_\_\_

FILING OF THIS FORM IS NOT AN ADMISSION OF LIABILITY

Distribution:

Medical Center:	1. Occupational Health/ER	2. Medical Center Human Resources	3. Applied Risk Management	4. Employee's File
Campus:	1. Occupational Health/ER	2. Insurance & Risk Management	3. Applied Risk Management	4. Employee's File

## CHAPTER 4: PERSONAL PROTECTIVE EQUIPMENT

Most accidents that occur in a chemical laboratory involve individuals being struck in the eyes, face and hands by foreign objects and chemicals. The use of suitable personal protective equipment (PPE) in the research and instructional labs, in combination with permanent safety devices (for example, fume hoods, glove boxes) is required in order to provide a safe working environment and to prevent these potentially serious accidents and injuries from occurring.

Various factors are considered when choosing the proper PPE for laboratory occupants. Some of these factors include:

- The nature of the hazardous material
- The possible routes by which it can penetrate the body
- The presence of permanent safety devices

As stated in the California Code of Regulations (CCR), Title 8, Section 5191, Cal/OSHA requires that all individuals who work with hazardous materials or in potentially hazardous environments (such as labs), must be equipped with the proper PPE. This requirement is specified by Cal/OSHA, which states that *the employer is required to minimize potential employee exposure to hazardous chemicals by making sure that the employees are using the proper PPE*. The Department is, therefore, required to assess the need for PPE and to select the appropriate PPE to best fit the affected individuals for the job. If PPE is needed, then inform the lab manager or PI so that the appropriate equipment can be provided.

It is important to emphasize that exposure should first be controlled at the source. This may be accomplished by using small amounts of chemicals and proper lab techniques, which minimize contact with chemicals, and by using safety control devices such as glove boxes and fume hoods to contain potential exposures. Personal Protective Equipment is used to supplement, not to replace, these permanent controls.

The Chemical Safety Officer is available to consult with regarding PPE. Department personnel are encouraged to consult the Chemical Safety Officer regarding the need for and selection of personal protective equipment. The Chemical Safety Office is located at 1217 Young Hall, and the telephone number is 310-206-3661.

### EYE AND FACE PROTECTION

Eye and face protection is the most important issue to consider when working with hazardous chemicals. A minor splash of a chemical in the eye has the potential for serious and permanent eye damage. Cal/OSHA pays a great deal of attention to this issue, and requires that:

- Each individual who is exposed to eye or face hazards from liquid chemicals, acids or caustic liquids, chemical gases or vapors, or flying particles shall use the appropriate eye or face PPE.
- Each individual shall use eye protection that provides side protection when there is a chemical splash hazard or any flying object hazard. Clip-on or slide-on shields are acceptable. All eye and face protective devices shall comply with the American National Standards Institute (ANSI) "USA Standard for Occupational and

Educational Eye and Face Protection” Z 87.1 1989. All of the devices that the Department stocks meet this standard.

It is the policy of the Department that safety glasses with side shields or goggles must be worn in the laboratory. The glasses used can have permanent or detachable side shields. Regular prescription glasses can be worn under safety glasses provided the safety glasses do not disturb the proper positioning of the prescription glasses. Safety overglasses are available for this purpose. An individual with prescription lenses can wear eye protection that incorporates the prescription in the design, for example, polycarbonate lenses with safety frames and side shields that meet ANSI Z-87.1 1989 standard.

Contact lenses, which were formerly discouraged, can be worn in the laboratory, due to new data which shows that contact lens wearers aren't at any additional risk due to the contact lenses. Protective lenses (safety glasses or safety goggles) must still be worn over the contact lenses.

Safety goggles offer excellent chemical splash protections and can shield the eyes from a variety of hazards. Safety goggles should be worn when working with potentially eye-damaging chemicals such as concentrated acids, concentrated bases, and lachrymators.

One pair of standard safety glasses with either plain or prescription lenses is purchased for Faculty, Postdocs, Graduate students, and staff members, should they request it. The Department does not pay for any upgrades of the glasses, such as style or tint. Undergraduate students are responsible for purchasing either safety glasses or goggles from Alpha Chi Sigma fraternity located at Room 1275 Young Hall or from the Research Storeroom located at Young Hall, Room 3056.

Eye protection must be worn by all persons in areas where chemicals, or other potential eye hazards, such as machinery, or glassware, are being used. This rule applies to visitors as well as workers whether or not there is actually any work currently being performed in the area. This applies to all laboratories, shops, and other potentially harmful areas in the Department of Chemistry and Biochemistry.

Standing shields and face shields which protect the face and neck and also meet the ANSI Z-187 1989 standard can be used for vacuum work or when working with low or high pressure systems, or when explosion hazards are present. Free-standing shields, which are weighted to provide stability, can also be used on bench tops if fume hood ventilation is not required. Standing shields and face shields are secondary protectors and must be used in addition to, and not instead of, safety glasses or goggles.

### **SKIN PROTECTION – GLOVES**

OSHA requires that individuals who work with materials that expose them to hazards such as those from skin absorption of harmful substances, cuts or lacerations, punctures, chemical burns, thermal burns, and harmful temperature extremes shall wear the proper hand protection. Suitable gloves are the most common way to protect hands from these hazards.

Chemical resistant gloves – Skin contact is the most common source of exposure to toxic, corrosive, carcinogenic and other classes of compounds. Proper protective gloves are required whenever the potential for contact with corrosive or toxic materials

and material of unknown toxicity exists. The gloves should be selected on the basis of the material being handled and their suitability for the operation being conducted.

1. **Disposable gloves** – lightweight, flexible disposable gloves are available for use in lab operations. Because of their ease of use, convenience and flexibility, these gloves have become widely used in the Department. It is important to remember that these disposable gloves usually offer intermittent or splash protection only, and are not suitable for operations that require more protection. There are two types of disposable gloves available in the Research storeroom. They are vinyl disposable and nitrile disposable gloves. Vinyl gloves are generally used for aqueous solutions and resist dilute acids and alcohols. Nitrile gloves are suitable for many organic solvents, BUT NOT ALL ORGANIC SOLVENTS. Because of this, it is necessary to consult charts that describe the protection from the individual chemical of concern. There are many charts and guides, which list the protection factors for disposable gloves. Best Manufacturing publishes the “Intermittent Chemical Exposure Guide for Best N-Dex Nitrile Gloves”. This chart can be obtained from the Chemical Safety Office, or from the Research storeroom, where it is posted. Additionally, other manufacturers of disposable gloves publish comparison charts.

## 2. **Chemical Resistant Gloves**

Persons handling chemicals such as concentrated acids, bases and solvents, or toxic chemicals and need more protection than afforded by disposable gloves should wear heavy-duty long cuff gloves. There are two types of long cuff gloves available for purchase in the Research storeroom. The neoprene gloves resist a broad range of organic and inorganic acids, caustics, alcohols, solvents, oils, and grease. Nitrile gloves are highly resistant to petroleum and chlorinated solvents, acids, alkalis, grease oils and Freon. Nitrile gloves, however, are not recommended for use with ketones, strong oxidizing acids, and nitrogen containing organic chemicals. It is important to remember that that all gloves are permeable to chemicals to some extent, and that there is not one glove that protects against all chemicals. The rate of permeation depends on a number of factors, including the chemical being used, the material used for the glove, the thickness of the glove, the temperature and other factors. Lab personnel again must decide which glove is best suited for the operation being performed and the chemicals being used. Charts are available which specify the chemical compatibility and the ability to resist permeation for a number of chemicals.

The chart available at the Chemical Safety Office gives some guidance on glove selection from one manufacturer. There are a variety of glove charts that should be consulted before making a selection.

## 3. **Heat and Cold Resistant Gloves**

The handling of hot and cold objects may be a common occurrence in some laboratories. In order to protect hands from these objects, insulated gloves should be worn. Various types of gloves are available for protecting hands from temperature extremes such as leather gloves, cotton gloves, and gloves made from special synthetic materials. The Research storeroom stocks Zetex gloves which deliver reliable resistance to hot and cold temperatures ranging from -70°C to 590°C.

## **FOOT PROTECTION**

Sturdy, closed-toed shoes must be worn in the laboratory at all times to protect against spills, splashes, pieces of broken glass and equipment which may reach the floor. Leather shoes are preferred over canvas shoes since they offer better protection against corrosion. Open toed shoes, sandals, flip-flops, and bare feet are prohibited in laboratories.

## **LAB COATS**

Lab coats are to be worn when handling hazardous chemicals. The main purpose for using a lab coat is to protect skin and clothing against chemical spills and splashes. Most lab coats offer this type of protection. There are a wide variety of lab coats available, which range from the standard cotton type coats to polypropylene fiber to Tyvek coats.

Tyvek coats are unaffected by most acids, alkalis and organic solvents. The polypropylene lab coat, called Kleengard, is fire retardant, water repellent and non-allergenic. Standard lab coats of either 100% cotton or a blend of cotton and polyester are good choices for protection. They are comfortable, durable, heavy-duty lab coats, which can be laundered and kept for many years. These are the recommended lab coats for anyone planning on taking more than one lab course. Lab coats can be purchased from any Lab Equipment catalog. Laboratory aprons are useful compliments to lab coats, but should not take the place of them. The main problem with aprons is the lack of shoulder and arm protection, which are the most frequent areas of chemical spills, splashes, and cuts. The forearms and shoulders should be covered when working safely in a research or instructional laboratory. Aprons can be purchased from the Alpha Chi Sigma fraternity, Room 1275 Young Hall.

## **RESTRAINTS**

Long hair should be tied back to avoid burns, mechanical entanglement and chemical exposure. In addition, avoid wearing loose articles of clothing such as ties or dangling jewelry that may come into contact with laboratory surfaces.

CHEMICAL	Butyl Rubber	Chlorinated Polyethylene	Vitron/ Neoprene	Natural Rubber	Neoprene	Nitrile + Polyvinyl Chloride	Nitrile	Polyethylene	Polyvinyl Alcohol	Polyvinyl Chloride	Vitron	Butyl neoprene	Other Materials*
Acetaldehyde	RR	NN		NN	NN	NN	NN	NN	nn	NN	NN		Yes
Acetic acid, glacial	R	rr		nn	RR	NN	RR	nn	n	NN	rr		Yes
Acetone	RR	NN		NN	NN	nn	NN	NN	NN	NN	NN		Yes
Acetonitrile	RR	rr	nn	NN	NN		NN	NN	rr	NN	rr	rr	Yes
Ammonium hydroxide	R	r		rr	rr	NN	rr	NN	n	NN	r		Yes
Amyl alcohol	rr		r	NN	RR	NN	nn	nn	rr	NN	rr	r	Yes
Aniline	RR	r	rr	NN	NN	NN	nn	NN	RR	NN	NN	rr	Yes
Benzaldehyde	rr	n	n	nn	nn	n	nn	NN	RR	N	n	r	Yes
Benzene	NN	nn	rr	NN	NN	NN	NN	NN	NN	NN	nn	rr	Yes
Butyl acetate	rr	r		NN	NN	nn	NN	NN	rr	NN	nn		Yes
Butyl alcohol	R	r		nn	RR	nn	RR	RR	nn	nn	r		Yes
Butane	n			N	R	r	n			N	r		Yes
Butyraldehyde	nn		n	R	nn	r	r		nn	R	nn	r	Yes
Calcium hypochlorite	r			R	R	r	r			R			Yes
Carbon disulfide	NN	NN		N	N	n	NN	NN	RR	N	RR		Yes
Carbon Tetrachloride	N	nn	r	NN	NN	NN	N	NN	RR	NN	rr	n	Yes
Chloroacetone		r		n	n	R	n			N		r	Yes
Chloroform	N	NN	r	NN	NN	n	NN	NN	RR	NN	rr	n	Yes
Chromic acid	n	r		NN	N	RR	N	rr		RR	r		Yes
Cyclohexane	N	r	r	NN	NN	n	RR	NN	nn	NN	RR	n	Yes
Dibenzyl ether	r		n	N	R	r	r			R		r	Yes
Diethanolamine	rr			n	rr	n	nn			r	rr		Yes
Diethyl ether	NN	r	n	NN	NN	nn	NN	NN	RR	nn	NN	n	Yes
Dimethyl sulfoxide		rr		RR	RR	rr	nn	rr		NN			Yes
Ethyl acetate	n	nn	n	NN	NN	nn	NN	NN	n	nn	n	n	Yes
Ethyl alcohol									rr				Yes
Ethylene glycol	R	r	r	RR	rr	RR	RR	RR	rr	nn	r	r	Yes

Ethylene trichloride	NN	nn		NN	n	Yes							
Formaldehyde, 37%	RR	rr	r	NN	NN	nn	NN	RR	n	NN	RR	r	Yes
Formic acid, 90%	R	r		R	R	R	r	NN		R	n		Yes
Glycerol	r		r	r	R	r	R			r		r	Yes
Hexane	NN	rr		NN	NN	NN	NN	NN	RR	NN	RR		Yes
Hydrobromic acid	r			r	R	r				R			Yes
Hydrochloric acid, conc.	nn	rr	rr	rr	RR	RR	rr			NN	rr	rr	Yes
Hydrofluoric acid			r	RR	rr	NN	nn	rr	n	nn	r	r	Yes
Hydrogen peroxide	nn	rr	r	r	R	r	n			nn	r	r	Yes
Isobutyl alcohol	rr		r	nn	NN	NN	RR	NN	n	NN	rr	r	Yes
Methylamine	r			nn	rr		rr		n	rr			Yes
Methyl alcohol	rr	rr	rr	NN	rr	Yes							
Methyl chloride	n			N	n	n	n	n		N			Yes
Methylene chloride	NN	nn	r	NN	n	Yes							
Methyl ethyl ketone		RR	nn	Yes									
Naphthalene	N	rr	r	N	nn	NN	rr	NN	rr	NN	r	n	Yes
Nitric acid	n	nn		nn	n	NN	nn	nn	n	NN	rr		Yes
Perchloric acid	r		r	N	rr	rr	rr	rr		rr	r	r	Yes
													Yes
Phenol	R	nn		NN	nn	n	NN	rr	nn	NN	n		Yes
Phosphoric acid, conc	r			rr	rr	rr	rr	rr	n	rr			Yes
Potassium hydroxide	r			R	R	r	R			R	n		Yes
Pyridine	r			NN	NN		NN	rr			n		Yes
Sodium Hydroxide	n	rr		R	R	n	R	rr		rr			Yes
													Yes
Sulfuric acid	n	RR	rr	N	rr	nn	n	rr		NN	rr	rr	Yes
Toluene	NN	r	rr	NN		Yes							
Trichloroethylene	NN	nn		NN		Yes							
Triethanolamine	r	r	r	N	R	rr	R	rr		rr	n	r	Yes
Xylene	n	n	r	NN	NN	NN	NN	NN	RR	NN	rr	n	Yes

Source: Guidelines for the selection of Chemical Protective Clothing. 1987. American Conference of Governmental Industrial Hygienists, Inc. Cincinnati, Ohio

#### Legend

RR= recommended based on strong data  
rr=recommended based on data  
R=recommended based on judgement  
NN= not recommended based on strong data  
nn= not recommended based on data  
n= not recommended based on judgement

\*other materials are recommended. Consult the Source or vendor's glove selection charts.



## CHAPTER 5: DEPARTMENTAL SAFETY EQUIPMENT

All members of the Department of Chemistry and Biochemistry should familiarize themselves with the availability, location, and the proper use of the various types of safety equipment, which are available in the Department.

### A. Fire Extinguishers

**It is the responsibility of UCLA Facilities Management to check and certify the fire extinguishers on campus as required by law. Laboratory workers are encouraged to verify that extinguishers are current.**

1. **Carbon dioxide extinguishers** (BC) are located throughout the building; they are suitable for use on burning solvents and electrical fires, but they are of little use on burning paper or wood. Carbon dioxide must never be used on burning metal or metal hydrides for it is likely that an explosive reaction will occur.
2. **Dry chemical extinguishers** (ABC), which can be used on combustibles, flammable solvents and electrical fires are more effective than carbon dioxide extinguishers on fires of all types, and are located in virtually every laboratory and service area.
3. **Class D extinguishers (D) for combustible metals.** Labs that store or use water reactives should have a class D extinguisher.
4. **Fire hoses** are located in corridor wall cabinets, and are for use only on fires that are beyond control by other means. These should never be used by less than two people and only with extreme caution. High-pressure water can cause the heavy nozzle to whip about violently. These are best left for use by the Fire Department. If fire safety equipment is used, report it to the Building Manager or the Chemical Safety Officer so that it may be replaced.

### B. First Aid Kits:

Each Research Lab should have an individual First Aid kit for use by researchers in that lab. Additional first aid supplies for emergencies are available at:

- VWR
- Fisher Scientific
- Lab Support

### C. Emergency Equipment Cage (Young Hall):

Located across from Room 1060. This is accessible to Chemistry personnel who have faculty, storekeeper or graduate (D340) submaster keys. The following equipment is provided:

1. Explosion-proof exhaust fan and flexible exhaust duct.
2. Mercury vacuum cleaner
3. Mercury spill kit (small pump, mercury sponges)
4. "DO NOT ENTER" signs and tape

5. First Aid kits.
6. Sand buckets and shovel
7. Replacement fire extinguishers
8. Wet/Dry ShopVac
9. Organic chemical spill absorbent pads
10. Sodium bicarbonate (for acid spills)
11. Citric acid for base spills
12. Boots, chemical resistant PVC
13. Squeegee, chemical resistant
14. Vermiculite absorbent
15. Tongs, Large metal
16. Face Shields
17. Goggles
18. Class "D" fire extinguisher (combustible metals)
19. Hazardous waste tags
20. Large bags for hazardous waste disposal
21. Medium trash bags
22. Small bags for hazardous waste disposal
23. Chemical resistant shoe covers
24. Bottle carrier
25. Duct tape

**D. Emergency Equipment Room (Mol Sci):** located in room 3120 Mol Sci. Accessible by same key as outside doors. The following equipment is provided:

1. Spill Response Cart
2. Explosion proof exhaust fan and flexible exhaust duct (2)
3. Emergency full-face respirator
4. Half face disposable respirators
5. Organic chemical spill absorbent pads
6. Sodium bicarbonate for acid spills
7. Citric acid for base spills
8. Gloves and splash goggles
9. Boots, PVC, chemical resistant
10. Vermiculite absorbent
11. Cot litters
12. Mercury spill control station
13. Bleach
14. Towels and gloves
15. Detergent
16. Mercury vacuum

Additional heavy-duty equipment such as, picks, axes, shovels, crowbars and lock cutters, is available at the Molecular Science Building Loading Dock, Young Hall 2054 and Shipping and Receiving. Access may be gained through the Chemical Safety Officer.

**E. Exhaust Fans:** High-speed explosion-proof exhaust fans and 25' flexible exhaust ducts for venting fumes are located in the Emergency Equipment Cage (Young Hall) and in the Emergency Equipment Room (Molecular Sciences, Room 3120). **Fumes should not be exhausted into corridors or stairwells but should be exhausted out a window or other opening where others will not be affected.**

**F. Detectors:**

- 1. Mercury Vapor Detector:** A Jerome Mercury Vapor Analyzer is available for detecting Mercury Vapor. This can be useful when evaluating the cleanup of Mercury. Contact the Chemical Safety Officer, x63661 to use the Detector.
- 2. Radiation Monitoring Equipment:** Geiger counters which will detect only high-energy radiation are available on brief loan from the Chemical Safety Officer at Young Hall, Room 1217. Instruments and techniques which detect lower-energy emitters (e.g. certain beta emitters) may be borrowed from research groups which work with these isotopes. Radiation Safety may be contacted for any information concerning radiation at x56995.
- 3. Detectors for Hydrogen gas, and for flammable vapors.** Electronic built in detectors are installed at the High Pressure Hydrogen Reaction Room in Molecular Sciences, Room 4104.
- 4. A portable gas detector** for LEL, Oxygen, carbon monoxide, hydrogen sulfide gases, and PID can be used to detect air composition that relates to immediate danger to life and health. The Chemical Safety Officer has this device available and ready for use. Only the Chemical Safety Officer is qualified to use this device and can survey areas as requested.

**G. Emergency Showers and eyewashes:** Each laboratory should have a functional emergency shower and eye wash. In Young Hall East, Emergency showers and eyewashes are located in the corridors on each floor. There are two showers and eyewash stations on each floor. Green and white signs identify their location. It is the responsibility of UCLA Facilities Management to check and certify the proper function of these as required by law. Laboratory workers are encouraged to check the function of these devices on a regular basis; the standing water in the pipes can become contaminated and should be flushed regularly.

**H. Fume Hoods:** Each laboratory where chemicals are used should have one or more functional fume hoods. Fume hoods are checked and verified on an annual basis by the Chemical Safety Office. UCLA Facilities Management is responsible for repairing or replacing any fume hoods or fume hood motors that do not meet the certified requirements.

## Proper Use of Fume Hoods

By following some simple guidelines, the effectiveness of most fume hoods can be greatly improved. A well functioning fume hood is essential to protect laboratory workers from exposure to hazardous chemicals.

1. The fume hoods at UCLA are certified annually to maintain an average airflow of 100 linear feet per minute (LFM) across the face of the hood. Proper sash opening is indicated by a strip of green tape on the fume hoods in the West and South wings of Young Hall or by two yellow arrows on the sides of the fume hoods in Mol Sci and Young Hall East.
2. FUME HOODS SHOULD NOT BE USED FOR STORAGE. Keep only the minimum amount of equipment and chemicals in the hood. Excess materials, particularly at the bottom rear of the hood, block the air intake ducts. Dust, paper towels and other debris which tend to accumulate against the air intakes and should be removed periodically. Excess flammable material storage can also be dangerous if a reaction conducted in the hood were to catch fire or explode. Excess storage can also cause air turbulence which tends to sweep contaminated air back out of the hood and onto the users face
3. Equipment in the fume hood should be stored 6" from the face of the hood and 1" from the back. Particularly large equipment should be elevated to assure proper airflow.
4. HOODS WILL PERFORM BETTTER WITH THE LAB DOORS AND WINDOWS CLOSED. Ideally, the airflow in the lab is balanced so that the intake air flow matches the exhaust air flow through the hood to the roof. Laboratories should have slightly negative pressure overall.

CONTACT THE CHEMICAL SAFETY OFFICE AT EXT. 63661 WITH ANY QUESTIONS REGARDING FUME HOODS

- I. LABORATORY SPILL KITS:** Commercial spill kits are available for purchase from many of the laboratory supply houses. Generally, they include neutralizing and absorbing materials, bags for disposal, scoops, protective equipment, etc. An alternative method is to obtain small containers of vermiculite (to absorb liquid), citric acid (to neutralize base spills), and sodium bicarbonate (to neutralize acid spills), and label it as spill material and store it in a convenient, visible location. Additional neutralizing materials are kept in Molecular Sciences 3120 in case of emergency spills.
- J. CONTAINER TRANSPORT:** Safety bottle carriers must be used for transporting bottles of dangerous liquids (solvents, acids) in the hallways and elevators. They are available for purchase from the Research Storeroom, Young 3056. When transporting chemicals through department hallways or elevators on carts, the cart must have a railing and bottles must be placed in secondary containers.





## CHAPTER 6: FIRE SAFETY

### B. Fire Extinguishers

**It is the responsibility of UCLA Facilities Management to check and certify the fire extinguishers on campus as required by law. Laboratory workers are encouraged to verify that extinguishers are current.**

1. **Carbon dioxide extinguishers** (BC) are located throughout the building; they are suitable for use on burning solvents and electrical fires, but they are of little use on burning paper or wood. Carbon dioxide must never be used on burning metal or metal hydrides for it is likely that an explosive reaction will occur.
2. **Dry chemical extinguishers** (ABC), which can be used on combustibles, flammable solvents and electrical fires are more effective than carbon dioxide extinguishers on fires of all types, and are located in virtually every laboratory and service area.
3. **Fire hoses** are located in corridor wall cabinets, and are for use only on fires that are beyond control by other means. These should never be used by less than two people and only with extreme caution. High-pressure water can cause the heavy nozzle to whip about violently. These are best left for use by the Fire Department.
4. **Dry powder extinguishers** Labs that store or use water reactives should have a class D extinguisher.

### B. Fire Extinguisher Replacement Procedures

Any extinguisher which has been used or which has a broken seal must be reported immediately to either the Chemical Safety Officer at Young Hall, Room 1217 or the Building Manager at Young Hall, Room 3034.

**Use of departmental fire extinguishers must be promptly reported to the Chemical Safety Officer or to the operations manager. Extinguishers are not to be removed from their designated locations except in an emergency.**

### C. Fire Response

The size of the fire usually determines whether laboratory personnel can extinguish the fire. When a fire occurs in a laboratory, do not attempt to extinguish it if working alone and no back up is available. In that case, follow the procedures for a large fire response given below.

1. Small fire
  - a. Notify people in the immediate area that there is a fire.
  - b. A small fire in a vessel (e.g. beaker) can be easily smothered using a beaker, watch glass, or other similar glassware.
  - c. Fire extinguishers can be used to extinguish a small fire. Work with a back up person when extinguishing a fire.

- d. For the proper use of fire extinguishers, remember the acronym P.A.S.S., which stands for pull, aim, squeeze, and sweep. See the illustration below.
  - e. Report the fire immediately, and follow the procedure for fire extinguisher replacement.
2. Large fire
- a. Large fires should not be extinguished until the proper emergency notifications have been made. Do not attempt to extinguish a fire if:
    - You feel it is unsafe to do so
    - You are alone. Always attempt to extinguish fire with another person.
    - You notice odd colored smoke, or experience physical symptoms of exposure such as difficulty breathing, coughing, and nausea. Seek medical attention if experiencing any of these symptoms.
  - b. **DIAL 911**
  - c. Notify people in the immediate area of the fire.
  - d. Make sure all people are evacuated from the fire area.
  - e. Notify your supervisor and others responsible for safety (i.e. Chemical Safety Officer, Operations Manager).
  - f. Confine the fire. Close all doors and windows. Close the fume hood sash if the fire is inside the fume hood.
  - g. Activate the nearest fire alarm.
  - h. Do not enter a room where there is smoke or fire present.
  - i. Evacuate the area **USING THE STAIRWELL**. Never use the elevators, and follow the building evacuation plans.
  - j. Never re-enter the building until told by Fire or Police Officials.
3. Clothing on Fire:
- a. If clothing catches on fire, remember to **STOP, DROP, AND ROLL**. This action will smother the fire.
  - b. Do not use a fire blanket.
  - c. Safety showers and fire extinguishers are only useful if immediately at hand.
  - d. Always obtain medical attention when burned.
  - e. **Dial 911**

## D. BUILDING ALARMS

1. **Young Hall** – fire alarm pull stations are located at every exit from Young Hall and at every stairwell. Also, they are located near the junctions of Young Hall East and Young Hall West, as well as the junctions between Young Hall and Slichter Hall and between Young Hall and Molecular Sciences. Alarms are audible and very loud. All occupants **MUST** evacuate the building when the alarm sounds. **It is against state law to remain in the building when the alarm is sounding.**

## **2. Molecular Sciences Building (MSB)**

Pull alarm stations are located near the south stairwell on each floor, near the elevators on each floor, and on the east balconies on each floor.

Alarms are audible and very loud. All occupants **MUST** evacuate the building when the alarm sounds. If the alarm sounds due to a false alarm or drill, you will be allowed to re-enter the building as soon as the Fire Department determines that it is safe to do so. **DO NOT GO BACK IN THE BUILDING UNTIL THE ALARM STOPS AND YOU ARE CLEARED TO RE-ENTER.**

**3. Other alarms.** There are local fire alarms inside all the elevators. An audible alarm sounds when they are activated. Alarms in Slichter Hall and Geology activate the alarms in Young Hall and the alarms in Young activate the alarms in Geology and Slichter. Even though the fire alarm may cease, it is still necessary to evacuate until the Fire Department arrives and investigates, and gives their approval to re-enter.

## **E. NFPA FIRE DIAMOND SYSTEM**

NFPA (National Fire Protection Association) room directory cards must be posted on all doors where hazardous materials are kept. This includes all laboratories, as well as janitorial closets, etc. The cards are updated annually, by the Chemical Safety Office, and can be updated more frequently, if necessary. It is the responsibility of the Research Director or supervisor to notify the Chemical Safety Office when updates are needed.

**The cards should not be updated manually, since the computer database will not be updated in that case, and will be inaccurate when an emergency occurs.**

The room directory database has information about the building, the room number, the name of the supervisor, the supervisors office number and telephone, the room occupants, the laboratory phone, the contacts in case of emergency, their home phone numbers, and the emergency campus phone number. The fire diamond has four quadrants, colored blue, red, yellow and white. The blue diamond represents health hazards, while the red diamond represents hazards due to flammability, and the yellow, hazards due to reactivity. Each diamond has a rating from 0-4 signifying the danger for each type of hazard, with 4 being the most hazardous. The white diamond contains the designations for radioactive materials, biohazardous materials, water reactive materials, and corrosive materials. The section for Special Hazard Information can be used for miscellaneous information that might be helpful to someone responding to a fire.

# TO OPERATE EXTINGUISHER

## Pull

Pull the pin.



## Aim

Aim the nozzle at the base of the fire.



## Squeeze

Squeeze the operating handle to release the extinguishing agent.



## Sweep

Sweep from side to side at the base of the fire until it goes out.



# FIRE CLASSIFICATION

Letter Symbol	Picture Symbol	Description
<b>A</b>		<b>Type A:</b> Ordinary Combustibles: wood, cloth, paper, rubber, many plastics and other common materials that burn easily.
<b>B</b>		<b>Type B:</b> Flammable Liquids: gasoline and other flammable liquids, oil, grease, tar, oil-based paint, lacquer and flammable gas.
<b>C</b>		<b>Type C:</b> Electrical Equipment: energized electrical equipment, including wiring fuse boxes, circuit breakers, machinery and appliances.
<b>D</b>	No Current Symbol	<b>Type D:</b> Combustible Metals

## **CHAPTER 7: LASER SAFETY**

### **A. LASER SAFETY POLICY**

UCLA has developed a Laser Safety Policy, which is contained in the "UCLA Laser Safety Manual", published by the Environment, Health and Safety (EH&S) Department. The manual can be obtained from the Chemical Safety Officer (x63661), who is also the Laser Safety Officer for the Department. The Laser Safety Policy was developed to meet Cal/OSHA requirements, as contained in the General Duty Clause, and ANSI guidelines.

The purpose of the Laser Safety Policy is to provide guidance in the safe use of lasers for personnel working with lasers and for others coming into contact with laser radiation. It also provides information on the classification of lasers. The Policy will assist departments and researchers with the implementation of the laser safety guidelines recommended in the ANSI Z136.1- 2000 standard for Safe Use of Lasers and in the new standard ANSI Z136.5 - 2000 Safe Use of Lasers in Educational Institutions. It also provides information on safe practices for consideration when setting up laser laboratories and for safe operation of laser systems. This policy also defines the responsibilities of the various groups of responsible users. It will serve as a resource for establishing a general set of procedures to be adhered to when using lasers at UCLA. Specific policies and procedures should be adopted by individual groups or laboratories according to their specific needs. This policy applies to all UCLA researchers and employees who are using lasers and laser systems for the purposes of research, analysis, or demonstration.

The contents of the Laser Safety Manual includes chapters on definitions, responsibilities, recommended practices, laser administrative requirements, and appendices dealing with warning sign, interlocks, suppliers of laser safety equipment, as well as control measures for lasers. It is a short and practical document, which should be helpful to those individuals looking for concise information on general Laser Safety.

### **B. Procedure for Obtaining Laser User Eye Examinations**

The UCLA Laser Safety Policy requires that all users of Class IIIB and Class IV lasers have eye examinations prior to their participation in laser work, and prior to their termination of their use of lasers and following any suspected laser injuries. The medical eye examinations are useful in determining if individuals are pre-disposed to chronic laser injuries and a baseline against which accidental eye damage can be measured. In the event of an accidental exposure, eye examinations may be used to assist with early detection of biological damage.

To receive an eye exam, please follow the instructions below:

1. Call University Ophthalmology Associates (a.k.a. Jules Stein Eye Research Center) at 310-825-3090 or at extension 53090 to schedule an appointment for the eye examination. Inform them of the department you are from (Chemistry and Biochemistry).
2. Obtain the Laser Users Eye Examination Authorization Form from the Chemical Safety Officer (x63661) or the Laser Safety Manual.

3. Bring the completed Authorization Form with you to your scheduled exam. You will be required to give them the form at the exam. Your exam will be on the first floor of the Jules Stein Eye Research Center. Jules Stein is located on the south side of campus adjacent to the UCLA Medical Center.
4. The exam will take approximately 2 hours. Since your eyes will be dilated during the exam, you should not plan to drive a car for 4 to 6 hours after the exam. Sunglasses may be helpful to reduce glare.
5. The results of your exam will be forwarded to the UCLA Occupational Health Facility (OHF), where the results will be reviewed and a permanent record kept. OHF will inform the Laser Safety Officer if an individual is not cleared for continuing work.

### **C. Training**

All Class IIIB and IV laser users must attend the Campus Laser Safety Training. This class is provided biannually through Campus Environment, Health and Safety. Flyers are e-mailed to the department informing lab personnel of time date and location of the training. Specific laser safety training within the labs must be provided and documented. The training must cover the lab specific lasers, systems and standard operating procedures.

## **CHAPTER 8: RESPIRATORY PROTECTION**

Students, faculty and staff in the Department of Chemistry and Biochemistry must have a healthy and safe work environment. This includes protection from any potential respiratory hazards. For respiratory health, engineering controls (heating, ventilation and air conditioning) are the most important. The primary ventilation control for hazardous and volatile chemicals is the fume hood. Most work with known hazardous, volatile and dangerous materials will be conducted in the fume hoods. The fume hoods are checked for proper functioning and certified annually. The respiratory protection policy states that if these engineering controls are insufficient or not feasible, then respirators are required, in accordance with Title 8, Section 5144 of the California Code of Regulations. Other situations where respirator use is indicated are during a chemical spill cleanup or when bench top operation or other experiments would create significant concentrations of airborne chemicals, or when the student, staff or faculty member chooses to use a respirator. All persons planning on using a respirator on a regular basis must receive training in the proper use, maintenance, storage and fit of the respirator. This training requirement includes those who may have purchased their own respirators.

### **A. ROUTINE RESPIRATOR USE**

Permissible Exposure Limits (PELs) are the maximum permitted 8-hour time weighted average concentrations of airborne contaminants. A table of PELs for a variety of chemicals is published and updated the California Occupational Safety and Health Administration (Cal/OSHA) and is a readily accessible reference. An amended version of some representative compounds is presented here as Table 1.

The Chemical Safety Office should be contacted prior to using a respirator when performing experiments, which create significant airborne concentrations. The Chemical Safety Officer will perform a hazard assessment of the experiment. This can include determination of the PEL, the concentration of the contaminant in the environment and the potential hazardous exposure to nearby personnel, or a simple inspection of conditions. Cal/OSHA also instructs employers to conduct studies of the environmental conditions in the work area in order to evaluate changes in exposure levels and introduction of additional toxic substances. The overall purpose of the assessment is to determine if the respirator will provide adequate protection for the user, or if the user must upgrade to a more protective respirator.

### **B. EMERGENCY RESPIRATOR USE**

Because of the nature of the research and teaching functions in the Department, chemical spills may occur outside of normal business hours. For this reason, the Department has instituted a Respiratory Protection Program, which seeks to train a large number of individuals, in the proper use of respiratory equipment. These responsible people would be "fit-tested" for respirators and would subsequently assume responsibility for respirator use.

For guidance and procedures for cleanup of spills, refer to Chapter 10, **Spill Response**.

### **C. Respirator Training**

The department of Environment Health and Safety provides Respirator fit testing and training on the First Tuesday of every month at 2 PM. Anyone in Chemistry and Biochemistry who qualifies to use a respirator must contact Environment Health and Safety at 310-794-5328 or x45328.

The training includes the following topics:

- Appropriate conditions for use of a respirator.
- Conditions where respirators are not approved.
- Individual “fit-testing” of respirators
- Positive and negative pressure “fit-testing”
- Irritant smoke test
- Maintenance and storage of respirators
- Medical Evaluation information- a medical evaluation form will be provided during training and must be completed before a respirator will be issued.

**TABLE 1**

**PERMISSIBLE EXPOSURE LIMITS FOR SOME CHEMICALS**

**PEL'S**

A complete list of chemicals is found at [http://www.dir.ca.gov/title8/5155table\\_ac1.html](http://www.dir.ca.gov/title8/5155table_ac1.html)

<b>COMPOUND</b>	<b>PPM</b>	<b>MG/M<sup>3</sup></b>	<b>HEALTH HAZARD</b>
Acetaldehyde	25	45	Irritant, Toxic
Acetone	500	1200	Irritant, Toxic
Acrolein	0.1	0.25	Irritant, Toxic
Aniline	2	7.6	Toxic
Benzene	1	-	Toxic, Carcinogen
Bromine	0.1	0.7	Irritant, Toxic
2- Butanone (MEK)	200	590	Irritant
Carbon dioxide	5,000	9,000	Asphyxiation
Carbon disulfide	4	12	Toxic
Carbon monoxide	25	29	Asphyxiation
Carbon tetrachloride	2	12.6	Toxic, Carcinogen
Chloroform	2	9.78	Toxic, Carcinogen
Dimethylformamide (DMF)	10	30	Toxic
1,1 Dichloroethylene	1	4	Irritant, Toxic
1,2 Dichloroethylene	200	790	Irritant, Toxic
Ethanol	1000	1900	Irritant
Ethyl Acetate	400	1400	Irritant
Ethyl Ether	400	1200	Irritant
Ethylenediamine	10	25	Irritant
Formaldehyde	0.75	-	Irritant, Toxic, Carcinogen
Gasoline	300	900	Irritant, Toxic
n-Hexane	50	180	Irritant, Toxic
Hydrazine	0.01	0.013	Toxic, Carcinogen
Hydrogen chloride (gas)	5	7	Irritant, Toxic
Methanol	200	260	Irritant
Methylene chloride	25	87	Toxic
Naphthalene	10	50	Irritant
Nitric acid	2	5	Irritant
Phenol	5	19	Irritant, Toxic
n- Propyl alcohol	200	500	Irritant
Pyridine	5	15	Irritant, Toxic
Stoddard solvent	100	525	Toxic
Tetrachloroethylene	25	170	Irritant, Toxic, Carcinogen
Toluene	50	188	Irritant, Toxic
Vinyl chloride (gas)	1	-	Toxic, Carcinogen



## CHAPTER 9: CHEMICAL STORAGE AND SEGREGATION

### A. PERMISSIBLE QUANTITIES OF FLAMMABLE LIQUIDS

These guidelines for storage of flammable liquids are based upon standards of the National Fire Protection Association (NFPA) and the regulations of the California State Fire Marshal, and apply to the laboratories in Molecular Sciences and Young Hall in the Department of Chemistry and Biochemistry at UCLA. This information applies specifically to flammable liquids having flash points of 100°F or less, which are used or stored in either of the buildings.

Examples of some flammable liquids having flash points below 100°F are as follows:

Benzene, carbon disulfide, ethanol, acetone, chlorobenzene, toluene, xylene, gasoline, turpentine, pentane, tetrahydrofuran, ethyl ether

The quantities of flammable liquids that are kept in laboratory buildings shall be limited to amounts that present a minimal fire and explosion hazard while permitting enough to be kept on hand for legitimate requirements. In applying these limits, the governing consideration should be the safety of persons and property under reasonably foreseeable circumstances.

1. Laboratories in Molecular Sciences and Young Hall are allowed storage of up to 60 gallons of flammable liquids. Amounts of flammable solvents exceeding 60 gallons should not be stored in the laboratory. They should be stored in the designated solvent storage areas, which are designated at Molecular Sciences Loading Dock, Rooms CS-05, CS-07 and CS-17.
2. Flammable liquids must be stored in an approved flammable storage cabinet in the laboratory. These can be either freestanding flammable storage cabinets, or storage cabinets provided with fume hoods, designated for flammable storage. The storage cabinets should be vented to the ventilation system wherever possible, or internally vented into the fume hood.
3. A maximum of 10 gallons of flammable liquids from all sources (i.e. solvents, wastes, cleaning liquids) may be kept outside of a flammable storage cabinet. Any amount in excess of 10 gallons must be stored in an approved cabinet. Containers for this type of storage are limited to the types and capacities as follows:
  - a. Underwriters Laboratories approved safety containers not exceeding one gallon or four liter capacity.
  - b. All metal containers with screw caps not exceeding one gallon or four liter capacity.
  - c. Closed glass containers with screw caps not exceeding one gallon or four liter capacity.
4. Dispensing devices for flammable liquids should be made of metal, not plastic. The pump should be tight fitting around the cap.
5. Dispensing of flammable liquids from a drum should be accomplished by means of an approved drum or barrel pump or other approved method.
6. All metal vessels or drums should be grounded when dispensing liquid.
7. Ether storage

- a. Ether should be stored in an approved Flammable Storage Cabinet, away from heat, moisture, or sources of ignition.
- b. Ether should not be stored in a refrigerator or freezer; confined vapors could ignite or explode.
- c. The date of receipt and the date opened should be marked on the ether container. Ether should be disposed of after 12 months to help prevent the build up of organic peroxides. Follow the procedures for Hazardous Waste disposal.

## **B. ACID AND BASE STORAGE**

Acids should be stored in designated cabinets. Cabinets provided with newer style fume hoods are a good storage location for acids, and are often designated "Acid Storage". The cabinets generally have a secondary container (a plastic shelf liner with a lip on all four sides to contain a possible spill), ventilation into the fume hoods, lined walls and doors (to prevent corrosion). Acid bottles must be stored in secondary containers. These can be either the lined shelves mentioned above, or in plastic tubs (metal should be avoided). Mineral acids should be separated from organic acids, and in separate secondary containers. They may be stored in the same cabinets, or even the same shelf as long as they are separated in secondary containers. A minimum amount of acids may be stored on the bench top, but generally should not be more than one small container which will be used frequently. If not used frequently, it should be stored along with the other acids in the designated cabinet.

Bases, particularly inorganic bases such as sodium, potassium or ammonium hydroxide, should be separated from the general chemicals and stored separately. They should be stored in secondary containers, and away from acids.

## **C. CHEMICAL STORAGE REQUIREMENTS**

Chemical storage requirements should be followed. Chemicals should be stored in the laboratory according to hazard classification. It is important to separate incompatible chemicals from one another. Flammables must be stored in a "Flammable Storage Cabinet", acids and bases stored in a designated corrosive cabinet and separated from each other, water reactive chemicals should be stored separately and away from sources of water, and separate from flammables, corrosives, acids, and bases. Carcinogens must be stored separately and Cal/OSHA carcinogen storage must follow the guideline listed in Title 8, California Code of Regulations, Section 5209 (See Appendix).

## **D. REFRIGERATORS**

There are generally three types of refrigerators used in the laboratory:

- General purpose refrigerator for chemical and other materials storage
- Refrigerators which are approved for storage of flammable materials
- Explosion proof refrigerators

In addition some offices adjacent to laboratories have refrigerators which are for food storage. These refrigerators must not be in a laboratory area.

Flammable materials such as solvents, flammable solids, etc., which need refrigeration, must be stored in a refrigerator that is approved for flammable storage. It would be the refrigerator labeled “Approved for flammable storage” or “Explosion proof”. Each refrigerator in the laboratory must have a label designating the classification of the refrigerator. The manufacturer usually provides these labels, but they can become loose or peel off. The Chemical Safety Office has extra refrigerator labels, which can be obtained by calling the Chemical Safety Office at x63661. All refrigerators must have an accurate label.

Personal refrigerators used for food storage, outside the laboratory, also must have a label identifying the type of refrigerator, i.e. “approved for food storage”.

## E. CHEMICAL SEGREGATION

The chemical laboratory must maintain the practice of designating and utilizing separate areas of the laboratory for the safe storage of chemicals, which are compatible with each other. Separation of incompatible chemicals is necessary to avoid the accidental mixing of chemicals (e.g. in an earthquake), which could cause a fire or the release of toxic byproducts. While a separate storage area for each of the following hazard classifications is not necessary, the following general guidelines should be followed.

<u>Hazard Classification</u>	<u>Incompatible With</u>	<u>Storage Tips</u>
Flammables and Combustibles	Oxidizers	Flammable Storage Cabinet
Water Reactives	Water, Acids, Alcohols, other protic sources	A separate area away from protic sources, sinks, water pipes, ect.
Oxidizers	Organic materials (including wood and paper)	A separate area away from organics, liquid oxidizers such as nitric and perchloric acids should have secondary containment
Strong Acids	Strong bases, water reactives, cyanides, sulfides	Corrosives cabinet or other secondary container
Strong bases	Strong Acids	Corrosives cabinet or other secondary container
Inorganic Cyanides and Sulfides	Acids, Oxidizers	Away from same
Organic Peroxides	Heat, shock and organic materials	Away from same

Radioactives	Living things	A separate marked area with appropriate shields
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## F. INCOMPATIBLE CHEMICALS

The term “incompatible chemicals” refers to chemicals that can react with each other violently, with evolution of substantial heat, to produce flammable products, or to produce toxic products.

Incompatible chemicals should always be handled, stored, and packed so that they cannot accidentally come into contact with each other.

### GENERAL CLASSES OF INCOMPATIBLE CHEMICALS

Chemical	Keep out of contact with:
<u>Acids</u>	<u>Bases</u> <u>Metals</u>
<u>Oxidizing Agents</u> <ul style="list-style-type: none"> <li>• Chlorates</li> <li>• Chromates</li> <li>• Chromium Trioxide</li> <li>• Dichromates</li> <li>• Halogens</li> <li>• Halogenating agents</li> <li>• Hydrogen Peroxide</li> <li>• Nitric Acid</li> <li>• Nitrates</li> <li>• Perchlorates</li> <li>• Peroxides</li> <li>• Permanganates</li> <li>• Persulfates</li> </ul>	<u>Reducing Agents</u> <ul style="list-style-type: none"> <li>• Ammonia</li> <li>• Carbon</li> <li>• Metals</li> <li>• Metal hydrides</li> <li>• Nitrates</li> <li>• Organic compounds</li> <li>• Phosphorous</li> <li>• Silicon</li> <li>• Sulfur</li> </ul>

### SPECIFIC CHEMICAL INCOMPATIBILITIES

Acetylenes	Group IB and IIB metals Group IB and IIB metal salts Halogens, Halogenating agents
Ammonia	Halogens, Halogenating agents Mercury Silver
Alkali and alkaline earth Carbides Hydrides Hydroxides Metals Oxides Peroxides	Water Acids Halogenating Agents Halogenated compounds Oxidizing agents

## G. NOAH'S ARK

Room 3426 Molecular Sciences, is a small chemical storeroom in which unused or partially used inorganic and organic chemicals, some of unknown age or purity are kept. There are no solvents or acids stored there. The Chemical Safety Office, x 63661 maintains the "Ark". These chemicals may be taken, free of charge, by departmental research workers for use in their departmental labs. The Chemical Safety Office will put new chemicals in the Ark, and will keep an inventory of the chemicals in the Ark. Please do not add chemicals to the Ark. Sign out any chemicals taken from the Ark in the book on the counter. Contact the Chemical Safety Office for any surplus chemicals that you might be interested in adding to Noah's Ark.

## H. Waste Minimization

Avoid over purchasing chemicals, especially those with expiration dates. The campus has a chemical recycling program. Chemicals that are not suitable for Noah's Ark, are unopened, unwanted and in good condition may be donated to this program. Contact the Chemical Safety Office for more details at x 63661.



## CHAPTER 10: SPILL RESPONSE

Some of the factors which should be considered when a chemical is spilled:

- The quantity spilled
- The size of the spill area
- The toxicity and other hazardous characteristics of the chemical
- The clean up materials available in the laboratory
- The level of knowledge or training of the persons cleaning up the spill

### **LARGE OR MAJOR CHEMICAL SPILLS**

For chemical spills involving large quantities of hazardous materials or highly toxic chemicals, the UCLA Office of Environment, Health and Safety (EH&S) Hazardous Materials Team should be contacted. The number to reach them is x 55689, or call 911. The Chemical Safety Office should also be notified, at x 63661. The Haz Mat Team will do the cleanup.

In the event of a fire emergency, or if after hours, please call **911**.

#### ***Spill Response Procedure – Large or Major Spill***

- 1. Alert people in the area to evacuate**
- 2. If spilled material is flammable, turn off ignition and heat sources, if it is safe to do so.**
- 3. Either call the Hazardous Materials Team (x 55689) or activate the building fire alarm and call 911.**
- 4. Close doors to affected area and leave the immediate area.**

### **Small or Minor Chemical Spills**

Small or less toxic chemical spills can be handled by trained personnel in the department. For the purposes of this policy, a small spill can be defined as a volume of less than a liter. In many cases the use of a respirator will be appropriate. An air-purifying respirator may only be used during a spill cleanup if the spilled chemical has some type of warning property. Examples are a recognizable odor at low ambient concentrations, or a visual observation such as fine particulates. The warning property will allow the respirator user to identify exposure through inhalation. If the chemical does not have any warning properties, then an air-supplied respirator must be used. If this is the case, then contact the Chemical Safety Officer or dial 911 for assistance. Before attempting to clean up spills, the laboratory personnel should consult the Material Safety Data Sheet (MSDS) to determine the hazards associated with the chemical. Laboratory personnel should pay attention to special handling requirements, spill clean up procedures, and recommended personnel protective equipment indicated on the MSDS. Examples of materials that can be cleaned up safely by lab personnel are the following:

- dilute acids and bases
- most solvents
- materials of low toxicity

- mercury spilled from a broken thermometer.

Laboratory personnel must have the proper protective equipment to clean up a spill. Any questions regarding the ability to safely clean up spills should be addressed to the Chemical Safety Office at x 63661 or to the Office of Environment, Health and Safety at x 55689.

### **Spill Response Procedures - Small or Minor Spills**

Materials for cleanup can be obtained from the Spill Response Cart, located in Molecular Sciences, Room 3120. The spill response cart has a number of supplies on it including brooms, mops, vermiculite, sand, absorbent pads, spill control pillows, sodium bicarbonate, and citric acid. In addition, there are yellow hazardous waste bags for trash and paper generated from the cleanup. There are additional supplies available in the Emergency Cage (Young Hall, first floor, near the Receiving area). Additionally, each laboratory should have a spill kit or spill control materials available.

- 1. Alert people in the immediate area of the spill.**
- 2. Determine chemical nature of the spill. Check the MSDS. If the material is highly hazardous, treat it as a major spill and call the Haz Mat team (x 55689) or 911.**
- 3. If a volatile, toxic or flammable material is spilled, immediately warn everyone nearby to extinguish flames and turn off all electrical and spark producing equipment.**
- 4. Wear the proper protective equipment; at a minimum, gloves and safety goggles.**
- 5. Dike the spill by surrounding the area with absorbents, such as vermiculite, sand, absorbent pads or spill control pillows for organic liquids. Clean up the spill using the same material.**
- 6. Neutralize acids with sodium bicarbonate and bases with citric acid.**
- 7. After cleanup, all materials used in the cleanup, including paper towels, must be disposed of as wastes and placed in the yellow hazardous material disposal bags, or other available bag. Double bag the waste as needed. Label the bag to indicate the wastes contained inside.**
- 8. Wash the surfaces with soap and water and clean up by ordinary means.**

## **Chemical Spill Response Kit**

Each laboratory should have some material available to clean up spills that may occur in the lab. At a minimum, there should be some absorbent material (Vermiculite or equivalent) for liquid spills, some sodium bicarbonate or equivalent to neutralize acid spills and some citric acid to neutralize basic spills.

There are additional supplies of each of these materials on the Spill Response Cart and in bulk storage in Molecular Sciences Building, Room 3120.

Commercial spill kits are available which include protective equipment such as goggles and gloves, neutralizing and absorbing materials, bags, and a scoop.

## **Chemical Spill to Body or Splash in Eye.**

In the case of a chemical spill on the body, remove affected clothing and rinse thoroughly in an emergency shower. There is a shower in the Department, which may be used for a full emergency shower if needed. It is located in Room 1295 at Young Hall. In the event of a spill to the body, rinse and wash with soap and plenty of water for a minimum 15 minutes.

In the event of a splash to the eye or eyes, immediately rinse in an emergency eyewash, for 15 minutes, if possible.

After rinsing and decontaminating, seek medical attention, either at the Occupational Health Facility or the Hospital Emergency Room.

## **Mercury Spill**

One of the most common types of spills of mercury is from a broken glass thermometer. A thermometer contains a few grams of mercury. A spill from a broken thermometer or from other mercury sources can be cleaned up by lab personnel, as follows:

- Clean up the spill immediately after it has occurred.
- Prevent the spread of mercury.
- Wear protective gloves, and other protective clothing for larger spills.
- Push the mercury droplets together using an index card or rubber spatula.
- Aspirate the beaded mercury into a disposable syringe or Pasteur pipette and transfer to a capped vial or jar.
- For a larger amount, use the Mercury Vacuum, which is stored in Room 3120 at Molecular Sciences.
- Clean up residual mercury using a sponge obtained from the Chemical Safety Office, or from some zinc powder that forms an amalgam.
- Clean the surface where spilled with soap and water or with a special solution of Mercon-X, which can be obtained from the Chemical Safety Office.
- Determine if all the mercury is cleaned up by requesting that the Chemical Safety Officer check the area with the Jerome Mercury Vapor Meter.
- Label the waste jar or container with a Hazardous Waste tag, and bring it to the Hazardous Waste collection.

## **Biohazardous Material Spill**

Biohazardous material spills outside a biosafety cabinet generate aerosols containing the hazardous agent. The aerosols are likely to spread throughout the room and may lead to infection of laboratory workers. The proper emergency response for a biohazardous material spill outside a biosafety cabinet will depend on the hazard of the material and the volume.

1. Biosafety Level 1 Spills- Biosafety Level 1 agents are of no known or have minimal potential hazard to laboratory personnel and the environment. To clean up a BSL1 spill:

- Wear disposable gloves
- Soak paper towels in disinfectant and clean up the spill area with the soaked towels.
- Place the towels inside a plastic bag for disposal.
- Sweep any broken glass into a dustpan using a paper towel soaked in disinfectant. Do not use your hands to pick up broken glass.

2. Biosafety Level 2 and Biosafety Level 3 Spills- Biosafety Level 2 agents have a moderate potential hazard to personnel and the environment. Biosafety Level 3 agents may cause serious or potentially lethal disease as a result of exposure by inhalation. To clean up these spills:

- Immediately notify other room occupants of the spill.
- All occupants should hold their breath and immediately leave the room.
- Close the door to the room.
- Do not reenter the room for at least 30 minutes, depending on the room ventilation system.
- Put on protective equipment: lab coat with long sleeves, back fastening gown or jumpsuit, disposable gloves, disposable shoe covers, safety goggles and mask or full face shield.
- Cover the spill with paper towels or other absorbent materials.
- Without splashing, pour a freshly made 1:10 dilution of household bleach around the edges of the spill and then into the spill.
- Allow at least 20 minutes of contact time.
- Use paper towels to wipe up the spill. Work from the edges to the center.
- Clean spill area with fresh towels soaked in disinfectant.
- Place towels into an autoclavable bag and decontaminate by autoclaving.
- Following cleanup, personnel should wash or shower.

3. Biological Material Spill on the Body

Remove clothing and place into a pail or other liquid tight container. Vigorously wash exposed area with soap and water for at least one minute. Obtain medical attention, whether there are symptoms or not.

## **Radioactive Material Spill**

Spreading of radiation beyond the spill can easily occur by the movement of personnel involved in the spill or clean up effort. Prevent spread by confining movement of personnel until they have been monitored and found free of contamination. A minor spill is one that the laboratory staff is capable of handling safely without the assistance of safety and emergency personnel. All other spills are considered major. Contact Radiation Safety at x 56995 or at x 55396 for advice or help cleaning up a spill. After hours, call 911.

1. Minor Spill:

- Notify persons in the area that a spill has occurred
- Prevent the spread. Cover the spill with absorbent paper.
- Clean up. Use disposable gloves and remote handling tongs. Carefully fold the absorbent paper and pad. Insert in a plastic bag and dispose of in the radioactive waste container. Also place in the plastic bag all other contaminated materials such as disposable gloves.
- Survey. With a low range, survey meter appropriate to the radioisotope involved, check the area around the spill, hands and clothing for contamination.
- Report. Record the incident in Laboratory survey records and notify Radiation Safety Division and the Chemical Safety Officer if it occurred outside the authorized use area.

2. Major Spill:

- Clear the area. Notify all persons not involved in the spill to vacate the room or area.
- Prevent the spread. Cover the spill with absorbent pads, but do not attempt to clean it up. Confine the movement of all personnel potentially contaminated to prevent the spread.
- Shield the source. If possible, the spill should be shielded, but only if it can be done without further contamination or without significantly increasing your radiation exposure.
- Close the room. Leave the room area and lock the doors to prevent entry where possible or leave the area.
- Call for help. Notify the Radiation Safety Division immediately at x 56995 or x 55396 and the Chemical Safety Officer at x 63661. After hours call 911.

3. Personnel Decontamination:

Contaminated clothing should be removed and sorted for further evaluation by the Radiation Safety Office. If the spill is on the skin, flush thoroughly and then wash with mild soap and lukewarm water. Inform the Radiation Safety Division and the Chemical Safety Officer Immediately.



## CHAPTER 11: WASTE DISPOSAL

It is a violation of the law to dispose of hazardous waste in the sewer, into the air, or in a landfill. For this reason, there are strict guidelines for disposal of hazardous wastes.

Wastes are considered to be hazardous if they have any of the following characteristics:

- Flammable
- Corrosive
- Reactive
- Toxic

Virtually all the chemical waste generated in the Department of Chemistry and Biochemistry fits in one of these categories, and must be disposed of as hazardous waste.

There are two different types of hazardous waste collection in the Department of Chemistry and Biochemistry. Because of the large amount of organic solvents disposed of, there is a solvent waste collection procedure for organic and halogenated organic solvents. There is also a waste collection procedure for all other kinds of chemical wastes, i.e. non-solvent, aqueous wastes, metal wastes, acid and base wastes, wastes with sulfur or other odorous compounds, amine wastes, powder wastes, gel wastes, contaminated paper wastes, etc.

Anyone who produces or handles chemical waste must complete the Chemistry Hazardous Waste Training through the Office of Environment, Health and Safety. Appointments for training can be made by calling extension x 45328. This class is held every Friday at 2 PM at the Strathmore Building. A certificate of completion will be issued after the training and should be maintained in your lab.

If you handle or produce radioactive or biohazardous waste, then training is also required. Contact Environment, Health and Safety for further information.

### **A. General Procedures for Solvent Waste Collection and Pick-up.**

Solvent wastes should be collected in 5 gallon Safety Cans. The red, wide mouth polyethylene container is the recommended Safety Can. Each research group that generates a large amount of solvent waste should have at least one. They are available for purchase from Fisher Scientific, VWR, Lab Safety Supply and other suppliers. Glass bottles, plastic carboys, or other containers will not be accepted by EH&S for collection. Only the approved solvent containers can be used for the solvent collection program. Each Safety Can must have a flame arrestor in good condition. The flame arrestor must be replaced when evidence of rust or wear is noticed. They can be purchased from the Chemical Storeroom (Young Hall 3056).

Organic solvent wastes are accepted for disposal by the Office of Environment, Health and Safety (EH&S) at the Molecular Sciences Building loading dock on Tuesday and Friday mornings from 9:00 to 9:25 a.m.

**Please note the following procedures:**

1. You must be present to pass your container to the EH&S technicians.

2. Only organic solvents with a pH range of 4-7 will be accepted. The pH of the contents of the container will be checked by EH&S before being accepted for disposal.
3. Halogenated and non-halogenated solvents must be in labeled containers.
4. None of the following can be added to the solvent containers:
  - Oxidizers
  - Corrosives (acids, bases)
  - Inorganic compounds
  - Metals
  - Water reactive compounds
  - Sulfur containing solvents (except a small % of DMSO)
  - Amines
  - Greater than 10% water
5. The 5 gallon container should not be overfilled. Fill only to the 20 liter mark.
6. A completed, up to date Online Hazardous Waste Identification Tag must accompany each container of waste. If envelopes for the tags are needed, they can be obtained in the Chemical Safety Office (Young Hall, Room 1217), or from the EH&S technicians.
7. The EH&S technician will check the Hazardous Waste Identification , and return the emptied container to you.

**B. General Procedures for Hazardous Waste collection, storage, and disposal.**

For any other hazardous waste not disposed of as “solvent waste”, the following procedures should be followed:

1. Hazardous Waste must be collected and stored in the same or adjacent room where it is generated before it is transported to the Chemistry Hazardous Waste facility (loading dock at Molecular Sciences, Rooms CS-09 and CS-11).
2. Separate incompatible chemicals during transport and storage. Store and transport chemicals by their hazardous properties.
3. Waste containers must be controlled by a designated person(s) who must know and control all waste going into the collection container. The person must also sign the Hazardous Waste Tag. Each research group should assign a responsible person or persons for this duty.
4. All containers used for the storage or transport of chemicals must be suitable for that type of chemicals. The containers must be tightly closed and in good condition, without leakage, rusting, or other defects and stored in secondary containment.
5. All waste containers must be labeled using the “Hazardous Waste Identification Tags”. Envelopes for the tags can be obtained at the Chemical Safety Office (Young Hall, Room 1217), or from the EH&S technicians. Tags are printed, using the online system.
6. Environment, Health and Safety (EH&S) has 90 days to ship waste off campus. Since the 90 days begins at the first day of waste collection, it is very important to remove full or partially full waste containers from the laboratories to the hazardous waste storage area within 90 days of first generation (Molecular Sciences loading dock, Room CS-09 and CS-11).

7. A Hazardous Waste Identification Tag must be filled out for each bottle, jar, or container of hazardous waste. The Tags should be secured to the container at the beginning of collection and a running record of contents should be listed.
8. Hazardous Waste Tags should be labeled using the following guidelines:
  - List the first date that the first drop of waste was placed in the container.
  - List the first and last names of the Principal Investigator (PI).
  - List the Department (Chemistry and Biochemistry).
  - The “contact person” is the person responsible for the collection of the waste.
  - Lab/Facility location is the building and room number where the waste was generated.
  - The funding source should be indicated (research, instruction etc.).
  - Substance ID is the **name** of the chemical, not the chemical structure or formula. Ex. Hydrochloric acid, **not** HCl.
  - List all the components of a mixture.
  - Check the Hazard Classification Box, to the best of your knowledge.
  - List the percentage for each component. Estimate the volume of the container.
  - Indicate whether the waste is a solid, liquid, or gas.
9. Unknown wastes  
Unknowns which are properly packaged and accompanied by a completed "Recharge Order Request" form will be accepted at the chemical waste pick-up. Place a tag on the container and write "UNKNOWN" in the substance ID box. A cost of \$65 per container may be charged to identify the waste.
10. Peroxide forming chemicals
  - Once a peroxide forming chemical has been opened, the lab has one year to use it. After one year, it has to be disposed of as hazardous waste.
  - All peroxide forming chemicals (PFCs) that are kept by users beyond the expiration date will result in a \$65 recharge. PFCs normally will not start forming explosive peroxides if they are not expired. *As long as we receive PFCs before their expiration date, there will be no extra charges.*
  - Refer to Appendix for a list of peroxide forming chemicals and the disposal policy for PFCs.

Should you have any questions, please contact the Chemical Safety Office at x 63661. If you need to obtain Hazardous Waste envelopes, call or stop by the Chemical Safety Office at Young Hall, Room 1217.

### Online Tag-Program



## C. SHARPS DISPOSAL

### For chemical, biological and non-regulated waste disposal

The following procedures apply to disposal of sharps from research laboratories at UCLA. A sharp is anything that can cut or puncture skin and includes glass slides, vials, tubes, Pasteur pipettes, capillary tubes; razor blades and scalpels; wires; needles with attached syringes or tubing; and any other item that can cut or puncture skin.

#### **Sharps not contaminated with a regulated waste<sup>1</sup>**

**Needles, wires, razor blades, scalpels, ect.** Dispose in a plastic or other hard sided, puncture-proof sharps container that can be sealed and closed and is not red in color. Cardboard containers are not allowed. The container must not have the words “Biohazard” or “Infections” or the biohazard symbol anywhere on the container. Dispose of a full, closed container in a broken glass or glass disposal container.

#### **Sharps contaminated with hazardous chemicals/drugs<sup>2</sup>**

**Needles, wires, razor blades, scalpels, Pasteur pipettes, capillary tubes, etc. Containing residual trace amounts of chemicals or drugs. Pourable amounts are not allowed in this container.** Dispose in a plastic or other hard sided, puncture-proof sharps container that can be sealed and is not red in color. Cardboard containers are not allowed. The container must not have the words “Biohazard” or “Infections” or the biohazard symbol anywhere on the container. Complete a UCLA Hazardous Waste Disposal Tag and attach to the container. Dispose at the chemical waste pick-up.

#### **Sharps contaminated with biohazardous materials<sup>3</sup>**

Any sharp item contaminated with biohazardous material. Dispose in a sharp container for biohazardous materials. This container must be rigid on all sides including top and can be any color. It must be labeled “BIOHAZARD” and have the biohazard symbol printed on the container. Close and dispose in medical waste vendor’s tub.

#### **Sharps contaminated with animal blood/tissues<sup>3</sup>**

**Any sharp item contaminated with animal blood or tissues.**

1. Dispose as sharps contaminated with biohazardous materials.
2. If option 1 is not possible, you may dispose of sharps with trace contamination of animal blood or tissue as described above under “Sharps not contaminated with a regulated waste”. No pourable liquids or “pieces” of tissue are allowed in this container.

1. Regulated wastes are hazardous chemical waste, radioactive waste, or biohazardous waste.
2. Contact the Hazardous (chemical) Waste Program (Extension 61887, 45569 or [hazwaste@admin.ucla.edu](mailto:hazwaste@admin.ucla.edu)) to determine if the chemical is hazardous or extremely hazardous.
3. Contact Biosafety for more information at extension 63929.

## Source of Sharps Containers

**Sharps Containers** – not red in color, but you will need to remove the biohazard markings from these containers to use for non-biohazard sharps and glass items.

### Fisherbrand Sharps-A-Gator Point of Use Sharps Containers

Volume	Color	Cat. Number	Catalogue
2 ½ Qt.	Almond	14-827-117	Fisher 2009
5 Qt.	Clear	14-827-120	Fisher 2009
3 ½ Gal.	Almond	14-827-128	Fisher 2009
3 ½ Qt.	Almond	14-827-131	Fisher 2009

## D. Broken glass or glass items.

Dispose of broken glass in a waste container that is labeled “Broken Glass” or “Glass Disposal”. This container must be a separate waste container that the one you use for non-regulated trash such as paper. It can be a cardboard box lined with a clear plastic bag sold for this purpose from various scientific supply vendors or any other correctly labeled waste container in you laboratory. Larger glass containers such as solvent bottles should be rinsed, dried, defaced and then placed in one of the 55-gallon drums designated for that purpose. They are located as follows:

**Mol Sci Bldg.:** On each floor, in the auxiliary rooms: 1120, 2120, 3120, 4120 and 5120

Containers that previously contained extremely hazardous chemicals must be rinsed with water three times prior to disposal. Collect the rinse water and bring it to the chemical waste pick-up. Place the empty container in the glass disposal waste container. Alternatively, containers that previously contained extremely hazardous chemicals may be tagged with a hazardous waste tag and brought to the designated hazardous waste pick up.

## Broken Glass Disposal Boxes

1. Fisherbrand Glass Disposal Boxes – cardboard box, lined with clear 2mm thick plastic bag. 2009 Fisher Catalog

Floor	Cat Number 12-009-7A
Intermediate	Cat Number 17-988-448
Benchtop	Cat Number 12-009-7B

2. VWR brand Broken Glass Disposal Carton – Cardboard box lined with 2mm thick plastic bag. VWR Cat. 2009

Floor	Cat. Number 56617-801
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3. Terminal Broken Glass Benchtop Keeper – plastic coated lining of thick paper, 3000mL capacity. VWR Cat, 2009 Cat Number 11214-713

## **E. RADIOACTIVE MATERIAL DISPOSAL**

### Radioactive Waste Storage and Transport

Radioactive waste containers shall be stored as close to the work area as feasible to minimize the possibility of spillage during the transfer of waste to the container. Radioactive waste containers should be kept closed at all times when not in use. Liquid waste must be kept in secondary containment at all times, including transport to the radioactive waste pickup location. Each radioactive waste container in the laboratory shall be labeled with a “Caution Radioactive Materials” sticker on the lid and sides of the container.

Do NOT place any radioactive waste in regular trash receptacles. Provide distinctly different containers for radioactive waste to avoid disposal in the regular trash. Do NOT combine different radioisotopes in the same waste container unless you have prior authorization from the RSD to do so. Use a separate container for each isotope and waste stream. Waste containers shall NOT be stored or left unattended in hallways, stairwells, or other uncontrolled areas. Radioactive waste should not be stored in the lab for extended periods of time. The waste should be delivered to the designated pickup location in a timely manner. This minimizes radiation exposure in the laboratory and reduces the possibility of the radioactive waste being disposed in the regular trash.

When handling or transferring radioactive waste, the individual shall wear appropriate laboratory attire including lab coat, disposable gloves, protective eye wear, and closed toed shoes. All radioactive waste must be transported within secondary containers to prevent leakage and spills. The Authorized User is responsible for verifying that the emergent dose rate from all radioactive waste containers is less than 2.0 mrem/hr at 30 cm. If the dose rate exceeds 2.0 mrem/hr at 30 cm, shielding is required. Please contact the Radiation Safety Division when transporting radioactive waste containers exceeding 2.0 mrem/hr at 30 cm.

Properly packaged waste will contain all contamination. Therefore, the use of gloves during transport is not recommended. However, gloves should be taken along for use in the unlikely event of a spill.

## Dry Radioactive Waste Requirements

All dry radioactive waste must be segregated by isotope and all radiation labels should be removed or defaced. All waste must be accumulated in strong transparent plastic bags (3 mil), within a rigid support container. Double bagging is recommended whenever containment integrity is in question. If accumulating high-energy beta or beta/gamma emitters, the support container should be constructed of a material that will provide shielding. High energy beta and beta/gamma emitters require shielding at all times. Attach a completed radioactive waste tag to each container of waste. If a transportation cart is used, it must have side rails, or some means of securing the waste. Any objects considered "sharps" (needles, scalpels, broken glass) must be packaged in a rigid container. The "sharps" container must be properly sealed and labeled separately.

All animal carcasses and excreta must be securely packaged in opaque plastic bags. All animal carcasses and excreta may be delivered to the CHS Radiation Safety Office during normal working hours. Radioactive waste mixed with biohazardous, infectious or hazardous waste cannot be accepted without prior permission by the RSO.

Mixed waste is a category of radioactive waste that is controlled by both the Nuclear Regulatory Commission and the Environmental Protection Agency because of chemical or otherwise hazardous properties besides radiotoxicity. Title 40, Sections 260-266 of the Code of Federal Regulations (40 CFR) lists several substances which may fall under the category of mixed waste.

The relevance of this to the UCLA radioisotope/radiation community is that contaminated lead shielding is classified as mixed waste material owing to the potential problems of lead poisoning. For this reason, lead dry waste needs to be separated from other dry waste before being delivered to RSO personnel at designated waste pick-up sites and times.

## Liquid Radioactive Waste

Liquids waste must be accumulated in strong leak proof containers (plastic Nalgene carboy containers – unless there are compatibility issues). Container volume is limited to 10 liters fill volume should not exceed 75% of the total volume. Containers will not be accepted with solids or laboratory trash such as pipettes and vials. Containers must be capped when not in use. Secondary containment must be used at all times. Secondary containment volume must exceed liquid waste volume. Attach a completed radioactive waste tag. If a transportation cart is used, it must have side rails, or some means of securing the waste. Shielding must be provided for storage and transportation of high energy beta (P-32, Sr90), and beta/gamma emitters (Fe-59, I-131, Na-22). Radioactive liquid waste mixed with biohazardous, infectious or hazardous waste cannot be accepted without prior permission by the Radiation Safety Office (RSO).

## Liquid Scintillation Vials

Segregate vials by radioisotope and by liquid scintillation fluid used. Vials must be accumulated in stacked cardboard racks within two transparent bags or a cardboard box lined with a plastic bag. The bags should be securely closed with tape or a knot with no more than 5 flats of 100 vials per waste bag. Ensure that the caps of the vials are tightly secured. Vials will not be accepted with solids or laboratory trash. Vials must be capped. Attach a completed radioactive waste tag. If a transportation cart is used, it must have side rails, or some means of securing the waste.

### *Radioactive Waste Pickup Schedule*

9:35 AM to 10:00 AM      Molecular Sciences Loading Dock

## **F. Biohazardous Waste Disposal Procedures**

Use red biohazard bags to contain biohazardous or medical waste. **Do not** use orange or clear bags. The biohazard bags must be labeled with the words “**Biohazardous Waste**” or the word “**BIOHAZARD**” and the international biohazard symbol. Do not use red biohazard bags for regular trash, transporting non-biohazardous items, or covering equipment such as microscopes. Do not remove any biohazardous waste from the bag once it has been placed in the bag. Do not place items in the biohazard bag that can pierce the bag.

Biohazard bags in use must be kept inside rigid, leak-resistant containers. The container must have a lid that fits. The container can be any color, but must be labeled “**Biohazardous Waste**” or with the word “**BIOHAZARD**” and the international biohazard symbol on the lids and sides so that the label is visible from any lateral direction. **Do not** use hampers or wire baskets to hold biohazard bags. **Do not** tape bags to the wall or equipment. The lid must be able to fit tightly on the container and the bags must be able to be tied closed easily. Do not overfill biohazard bags or the biohazard bag container. Lids must be kept on containers unless the container is in use or the container is empty.

The cardboard biohazard “Safe Keeper” may be used to contain plastic pipets, pipet tips and tubes and may not be used for glass pipets and tubes. The “Safe Keeper” must be lined with a small red biohazard bag or placed inside a small red bag which is kept inside a rigid, leak-resistant biohazard bag container. **Do not** tape the “Safe Keeper” to the wall or equipment. Use a stand or hook or keep it inside a rigid, leakproof container.

Biohazard waste containers must be sanitized when soiled with waste. They must be sanitized by exposure to hot water at 180°C for 15 seconds or exposure for 3 minutes to any one of the following disinfectants:

hypochlorite (i.e., bleach) solution (500 ppm available chlorine), phenolic solution (100 ppm active agent), Iodoform solution (100 ppm iodine) or quaternary ammonium solution (400 ppm active agent).

All sharps containers must be rigid, puncture resistant and leak resistant. Cardboard does not meet these requirements. Sharps containers must be labeled with the words, “**Sharps Waste**” or the international biohazard symbol and the word, “**BIOHAZARD**”. Never allow sharps to stick out of the opening of the sharps container. Place them entirely inside the container.

### **Human Tissue and Biohazardous Animals**

Human tissues and biohazardous animals are required to be placed in red biohazard bags. The bags are required to be placed inside a leak resistant container labeled with the words “**Pathology Waste**” or “**PATH**”. When storing human tissues or biohazardous animals that are waste in a freezer, the bags must be tagged with the date and a description of the contents. This is not required until the human or animal tissue becomes a waste. Return human tissues to the department you received them from or from Autopsy (CHS 13-165). Return animals to Department of Laboratory Animal Medicine (DLAM).

### **Transportation and Storage**

Tie-close filled biohazard waste bags before transporting them. All closed and filled biohazard bags must be transported inside a biohazard bag container. The bags may not be transported in an autoclave pan, cardboard box, or on a cart. They may not be carried by hand. Store containers of biohazardous waste in a secure area such as a laboratory or autoclave room. Do not set or store them in the hallway. Do not store bags of biohazardous waste for more than 7 days at a temperature above freezing. Dispose of the bags as soon as possible. **Do not** store full sharps containers for more than 7 days at a temperature above freezing. Dispose of the full sharps containers as soon as possible.

**Do not** store biohazardous waste, full sharps containers or human tissues and animals that are waste for more than 90 days in a freezer. **Do not** compact bags of biohazardous waste when placing them in a storage container.

### **Disposal**

Dispose of all full biohazard bags and sharps containers inside the biohazard containers provided by the treatment company. Keep the lid on the container except when placing bags or sharps containers inside. The lid must fit tightly on the container. Biohazardous waste or sharps waste combined with hazardous chemical waste must be disposed of as hazardous chemical waste. Biohazardous waste or sharps waste combined with radioactive waste must be disposed of as radioactive waste. Biohazardous waste or sharps waste combined with hazardous chemical waste and radioactive waste must be disposed of as radioactive waste.

**UCLA ENVIRONMENT, HEALTH AND SAFETY**

**HAZARDOUS WASTE PICK-UP SCHEDULE**

(Effective July 1, 2007)

<b>Time</b>	<b>Applicable Buildings<sup>1</sup></b>	<b>Location</b>
<b>MONDAY</b>		
<b>10:30 a.m. - 11:00 a.m.</b>	<b>BSRB/OHRC, Boyer Hall, Life Science</b>	<b>BSRB/OHRC Loading Dock</b>
<b>TUESDAY</b>		
<b>9:00 a.m. - 9:25 a.m.</b>	<b>Young Hall (Solvents Only)</b>	<b>MSB Loading Dock</b>
<b>9:35 a.m. - 10:00 a.m.</b>	<b>Young Hall, MSB, Geology, Slichter Hall, Franz Hall</b>	<b>MSB Loading Dock</b>
<b>10:30 a.m. - 11:00 a.m.</b>	<b>MRL, Gonda, NRB</b>	<b>MRL Loading Dock</b>
<b>WEDNESDAY</b>		
<b>10:30 a.m. - 11:00 a.m.</b>	<b>CHS, Factor, NPI, BRI, Reed, Marion Davies, JSEI, JLNRC</b>	<b>CHS 1st Floor Loading Dock</b>
<b>THURSDAY</b>		
<b>1:45 p.m. - 2:15 p.m.</b>	<b>Eng. I, IV,V, Boelter Hall, Math Sciences</b>	<b>Engineering IV Receiving &amp; Loading Area</b>
<b>2:30 p.m. - 3:00 p.m.</b>	<b>CNSI</b>	<b>CNSI Loading Dock</b>
<b>FRIDAY</b>		
<b>9:00 a.m. - 9:25 a.m.</b>	<b>Young Hall (Solvents Only)</b>	<b>MSB Loading Dock</b>
<b>9:35 a.m. - 10:00 a.m.</b>	<b>Young Hall</b>	<b>MSB Loading Dock</b>



## CHAPTER 12: HIGH PRESSURE EQUIPMENT

### A. Location and use

There are two autoclaves located in MSB 4104 used for high-pressure reactions. All users must be familiar with the safety procedures before they can be used.

### B. Procedures for Use

1. Before any work is conducted, first time users must receive training from the Chemical Safety Officer.
2. The procedures, equipment knowledge, and safety requirements must be well understood before the room may be used. The equipment manuals and binder labeled "Detailed Instructions" should be referenced for more thorough information. The plumbing diagram should also be reviewed.
3. Keys to the High Pressure Reaction Facility may be checked out by graduate students and postdoctoral students by completing the "Request for Access to High Pressure Reaction Facilities" form and returning it to the Chemical Safety Officer. The key must be returned once the work is complete. A charge will be made for lost keys.
4. At all times that a reaction is in progress, a completed "Autoclave Facility Work in Progress Information Sheet" must be placed in the fire diamond placard holder in plain view. Remove the sheet once the work is completed.
5. Make sure all connections are leak free.
6. Check to make sure the ventilation system is on.
7. Complete a check to ensure all equipment is functioning properly and is in good repair before use. If there is a problem, discontinue work and notify the Chemical Safety Officer.
8. Conduct a pressure test of the set up using nitrogen before conducting the experiment.
9. The small vessel should be tightened to 30 ft-lbs and the large vessel should be tightened to 90 ft-lbs.
10. If elevated pressure is desired for the experiment, then the booster pump may be used. The booster pumps are actuated pumps that use house air and can be loud. The maximum system pressure should not exceed 2/3 of the vessel's maximum pressure rating.
11. Be aware of the hydrogen and carbon monoxide detectors. The hydrogen detector is set to go off at 20% and 60% of the lower explosive limit (LEL). The LEL is the minimum concentration of a gas required to cause a flammable atmosphere. The carbon monoxide detector will trigger the alarm at concentrations of 50 and 100 ppm. Carbon monoxide is a chemical asphyxiate. Cal/OSHA has promulgated an 8-hour time weighted average of 50 ppm for carbon monoxide.
12. If the alarm is triggered, turn off the reaction, make sure the valves for the gases are shut off, and evacuate the room. The ventilation system will clear the air after some time. In addition, notify the Chemicals Safety Officer.

13. Flush the lines with nitrogen before and after each use if hydrogen or carbon monoxide is used.
14. Place the plastic shield in front of the autoclave while in use.
15. Users of the equipment are responsible to keep the room clean.

### **C. Pressure Vessels**

1. Use a rupture disk that does not exceed the pressure rating for the vessel being used. It is recommended that the rupture disk does not exceed 75% percent of the vessel capacity. The smaller vessel has a maximum pressure of 3370 psi.
2. Ensure the heating jacket fits securely over the vessel and the thermocouple is touching the vessel.
3. There are two types of O-ring seals that may be used (Teflon and silver-plated metal). The Teflon seal is easy to utilize, but is only good for a maximum temperature of 400 degrees F.
4. Constantly monitor the temperature and pressure of the vessel to ensure the ratings are not exceeded.
5. The vessel should be only filled half way to allow expansion of gases.
6. Ensure the gasket is in good condition and seals properly.
7. If the stirrer is used, make sure it can move freely inside the vessel.
8. Never disassemble the vessel until you have allowed it to cool and bled the system so that it is at ambient temperature and pressure.

### **D. Gas Cylinders**

1. All compressed gas cylinders must be stored in the gas cabinets.
2. Ensure the cylinders are chained and secured.
3. Make sure the proper fittings are used.
4. If the heads of the cylinders are damaged or leaking, contact the chemical safety officer immediately.
5. Be aware of the hazards associated with the gases being used. This can be accomplished by reviewing the material safety data sheets (MSDS) for the chemical.

## CHAPTER 13: STUDENT MACHINE SHOP

Young Hall  
Room 1290

### Student Machine Shop Access:

Only authorized personnel will be allowed access to the Student Machine Shop. Access is controlled by a card key system. The Chemistry & Biochemistry machine shop is open everyday from 7:00AM-10:00PM. Authorized personnel (graduate students, faculty and staff) will be granted access via the Bruin Card. Graduate students, Faculty and Staff will be granted access to the machine shop after they have completed orientation and training sessions. A “Buddy System”, requiring two persons present in the workshop at all times (one must be an authorized personnel), is mandatory for all workshop users. Non-certified visitor (Buddy) will be required to sign in using sign-in sheet. Undergraduates will not be allowed access. Video surveillance of the student machine shop will be reviewed weekly.

### Training Requirements:

There is a two part process of becoming a user of the student machine shop. The first is a ‘Machine Shop Introduction / Review & Safety Class that every potential user must take. The second is certification as a ‘qualified’ machine shop user.

User Qualification & Training must be taken by all machine shop users. All users are required to successfully complete a “Machine Shop Introduction/Review & Safety Class” and pass a quiz to demonstrate their understanding and comprehension of the subject material. This 60-90 minute training course will be conducted during each academic quarter by the Chemical Safety Officer and will review the safety procedures for all machines in the student machine shop. The machine shop safety manual requires review of general safety procedures and machines used in the shop. All “Qualified/Experienced” users are required to successfully complete this training course to comply with OSHA safety requirements. Attendance and certification in the course will be maintained by the CSO. Recertification will be required every 2 years unless equipment changes/modifications require retraining and/or OSHA-UCLA rules specify otherwise.

Certification as a “Qualified” Machine Shop user is the second step of the process to become a machine shop user. Previous experience, training, performance:

1. Students and staff: review and certification by Physical Sciences Machine Shop Supervisor.
2. Faculty: review and certification by Chemical Safety Officer.

Completing “Machine Shop Practices & Safety Class” offered by Physical Sciences Machine Shop: 12 week / 1- 2 hr. Classes – No Charge.

Contacts: Supervisor - Harry Lockart 310.206.1448  
Instructor/Machinist – John Morrison 310.825.3929

Physical Science Machine Shop, Room 812  
A12 Humanities Building

### Supervision

The student machine shop will be supervised by the means of perpetual video surveillance and by the Chemical Safety Officer. Chemistry Machinist and Physics machine shop personnel will be available for questions. Users should be responsible for inspecting equipment, maintaining equipment in good working order, performing routine maintenance functions, and keeping the area clean and uncluttered. Janitorial services will not be provided, and users must perform their own service.

The Chemistry Machinist is located in Room 1224 at Young Hall, adjacent to the machine shop. He can be contacted for questions and problems. The Chemical Safety Officer or Machinist should be informed of any safety concerns, maintenance problems, equipment malfunctions, or replacement parts needed. Available for any help or concerns is the Chemical Safety Officer, Michael Wheatley at x 63661. The Principal Investigator should also be consulted as necessary.

### Safety Rules:

The following safety rules must be observed in the student machine shop at all times:

1. Eye protection must be worn at all times in the shop. This consists of safety glasses or goggles, or face shields.
2. Students cannot work alone. Must work in pairs.
3. Long hair should be tied up and out of the way.
4. Loose clothing cannot be worn as it may come in contact with machinery.
5. Closed toe shoes must be worn at all times. Sandals or other open toed shoes cannot be worn.
6. Jewelry cannot not be worn.
7. Do not wear gloves around milling machines and lathes.
8. Respirators can be worn for nuisance dust protection.
9. Machinery should be inspected by user before use.
10. Report ALL injuries to Shipping and Receiving supervisor.
11. Absolutely no running or horseplay in the shop at any time.
12. Safeguards on machinery must not be defeated.
13. The circular saw can only be used during working hours. The circular saw is locked and the key for unlocking it must be obtained from the Shipping and Receiving supervisor.
14. Ample work space around machinery must be maintained.
15. Allow machines to stop completely before inspecting the work piece.
16. Clean up all areas where work was performed (including benches, machines, floor).
17. Put all hand tools and equipment back in their proper place.
18. No tools will be allowed to leave the student machine shop, at any time.
19. Do not leave projects in the shop after the quarter ends.

The safety rules are posted in the student machine shop.

### Disciplinary Actions:

In cases involving violation of Safety Rules, the machine shop user's access will be suspended. This decision can be made and enforced by Chemical Safety Officer, Michael Wheatley or the Chemistry department Administrative Manager, Ron Lau.

### Emergency and First Aid Information

In case of an emergency, dial 911. Paramedic response will be immediate. A telephone is provided in the student machine shop.

For a work related injury, report to Occupational Health Facility located at the CHS building on the 6<sup>th</sup> floor, room 67-120, x 56771. They are open Monday through Friday 7:30 a.m. to 4:30 p.m.

For emergency medical treatment, report to Emergency Medicine Center located at the Ronald Reagan medical building, 1<sup>st</sup> floor, room 1419. 310-267-8407 or x 52111

A First Aid kit is provided in the student machine shop. The first aid kit will be maintained by the Chemical Safety Office.

### Inspection, Maintenance and Repair

The Shipping and Receiving department will be responsible for inspecting the student machine shop on a weekly basis. The inspection will be general and will focus on housekeeping, machine maintenance, and observation of good work practices. They will also respond to maintenance problems when notified. A formal inspection will be done yearly by EH&S personnel and a facilities electrical inspector. The Physics machine shop will respond to maintenance problems and questions and will repair equipment when notified. A "P-39" form must accompany repair work done by the Physics machine shop.

### MSDS :

MSDS sheets will be provided in a loose leaf notebook for the cutting and lube oils used in the machine shop and for any other chemicals used.



## **CHAPTER 14: LABORATORY SAFETY INSPECTION GUIDELINES**

THE PURPOSE OF THE LABORATORY INSPECTION PROGRAM IS TO ASSURE COMPLIANCE WITH REGULATORY STANDARDS AS WELL AS TO PROTECT THE SAFETY AND HEALTH OF FACULTY, STAFF AND STUDENTS. THE INSPECTION TEAM SHOULD INCLUDE A MEMBER OF THE LAB BEING INSPECTED, AND SHOULD EITHER BE THE PRINCIPAL INVESTIGATOR OR THE DESIGNATED SAFETY REPRESENTATIVE FROM YOUR GROUP. IF YOU HAVE NOT APPOINTED ONE OF YOUR SENIOR GRADUATE STUDENTS OR POST DOCS WORKING IN THE LAB, PLEASE DESIGNATE ONE AS THE SAFETY REPRESENTATIVE.

THE APPLICABLE REGULATIONS FOR CONDUCTING LAB INSPECTIONS ARE SPECIFIED IN TITLE 8 OF THE CALIFORNIA CODE OF REGULATIONS, SECTION 5191. IT STATES THAT REGULAR HOUSEKEEPING AND CHEMICAL HYGIENE INSPECTIONS SHOULD OCCUR REGULARLY AND INFORMAL INSPECTIONS SHOULD BE FREQUENT. WE BELIEVE THESE INSPECTIONS WILL BE USEFUL FOR A NUMBER OF REASONS. FIRST, THEY CAN PINPOINT ANY POTENTIAL PROBLEM AREAS OVERLOOKED ON A DAY TO DAY BASIS. IN ADDITION, IT WILL BE USEFUL TO SEE HOW MANY OF THE LABS ARE IN COMPLIANCE WITH THE CAL-OSHA AND CAL/EPA REGULATIONS. THE FIRST STEP IN THE INSPECTION PROGRAM IS ONE OF SELF-INSPECTION. THE FOLLOWING DESCRIBES THE TYPES OF CONCERNS THAT WILL BE LOOKED AT DURING LABORATORY INSPECTIONS WITHIN THE DEPARTMENT.

### **CHEMICAL SAFETY**

Chemical fume hoods must be certified annually. An average face velocity of 100 feet per minute (fpm) must be maintained with no single measurement exceeding 150 fpm (except if the hood is used for carcinogens) or falls below 70 fpm. (California Code of Regulations, (CCR) Title 8, Section 5154.1)

Equipment and chemicals should not be stored in fume hoods. If equipment must be maintained in the hood, it should be moved away from the back wall and elevated above the floor. Airflow will then not be impeded and the efficiency of the hood will be maximized. (CCR Title 8, Section 5154.1, University Policy)

Incompatible chemicals: Chemicals should not be stored alphabetically unless previously categorized by hazard classification and reactivity. The Mallinckrodt Incompatibility List is a good reference for chemical compatibility. (CCR Title 8, Section 5164)

Acids must be properly stored and segregated. Excessive quantities (more than 10 gallons) should be stored in corrosive lockers. All acids should be secondarily

contained. Nitric acid should be stored separately from all other acids. (CCR Title 8, Section 5164, University Policy)

Eye washes are required at all work areas where, during routine operations or foreseeable emergencies, the eyes of an employee may come into contact with a substance which can cause corrosion, severe irritation or permanent tissue damage or which is toxic by absorption.  
(CCR title 8, section 5162)

All procedures in the lab must be performed in compliance with safe handling practices, legal guidelines and University Policy and Procedures. (CCR title 22)

Emergency showers are required in areas where there exists a possibility that someone may come into contact with a hazardous substance. (CCR Title 8, Section 5164)

Chemicals must be properly disposed. All chemicals must be manifested and taken to the waste facility or pre-arranged pick-up. There is no dumping of chemicals into the drain or sanitary sewer system. (CCR Title 26)

All bottles containing hazardous substances must be properly labeled. Labels should include contents and health hazards. (CCR Title 8, Section 5194)

Material Safety Data Sheets (MSDS) must be available to all employees. If MSDS are not in labs, personnel must know where they are located. (CCR Title 8)

Refrigerators should be labeled as APPROVED or UNAPPROVED for the storage of flammable solvents. Food should not be stored with chemicals. (UCLA Policy)

Extension cords should not be used unless UL approved. Outlets and cords must be grounded. The use of octopus or multiple adapters without circuit breakers is forbidden. (CCR Title 8, Section 4070)

All belt drives and machines must be guarded. (CCR Title 8, Section 4070)

Eye protection is required in areas where particulates are generated, chemicals are used and the potential for eye injury is present. (CCR Title 8, Section 3382)

Labs can NOT be safe if the general house keeping is poor.

Gas cylinders must be chained to a cylinder rack. Tanks with regulators must be individually secured. Other tanks must have the safety caps on any may be chained in succession of three. (CCR Title 8, Section 4650)

Food or drink is NOT allowed to be stored or consumed in the lab. (CCR Title 8, Section 5191)

## **SEISMIC SAFETY**

Storage should be limited to eye-level or below, especially for heavy objects and chemicals. (UCLA POLICY)

Earthquake restraints should be installed (2-3" above shelf) to prevent materials from tipping or falling from shelves. The Facilities Department administers the Seismic Anchoring Program. (UCLA POLICY)

ADDITIONAL:

- Emergency numbers should be posted in labs.
- Spill or containment kits are required in areas where chemicals are used.
- Children and animals (pets) are not allowed in laboratories.

## **FIRE SAFETY**

More than 10 gallons of flammable liquids should not be stored in labs. Quantities over 10 gallons must be stored in an approved flammable storage cabinet. No more than 60 gallons are permitted in a single laboratory location. (Uniform Fire Code, Section 79.201e)

Flammable liquids (e.g. ethyl alcohols, ethers) are NEVER to be stored in refrigerators unless they are explosion proof or APPROVED for the storage of flammables. Most refrigerators are unapproved. (National Fire Protection Association (NFPA 70 Article 500, referral to NFPA 1193)

Fire extinguishers are required in each lab. They are to be currently certified and accessible. Extinguishers should be visually inspected on a monthly basis. (NFPA 10)

Corridors, aisles and access ways are to be unobstructed and free of equipment. A 36" aisle is required. Electrical panels must be unobstructed with 36" of clearance. (CCR Title 19, Section 3.11)

NFPA diamonds are required in areas with high concentrations of chemicals, reactives, toxics and flammables. (Uniform Fire Code, Section 79.108 and 80.104e)

Electrical panels must be readily accessible and unobstructed. (NFPA 70, Article 110-116)

Check for worn, frayed, abraded, or corroded electrical wires. Do not use "octopus" adapters. Use grounded plugs for all electrical equipment. Use the three-wire plugs. Powerstrips and extension cords for electrical equipment may not be "daisy chained" to each other. An extension cord may only be plugged directly into a wall outlet. Running several powerstrips and extension cords off one another is a fire hazard.

## UCLA LABORATORY SAFETY SURVEY CHECK LIST

P.I. \_\_\_\_\_ Department Chemistry & Biochemistry  
Date \_\_\_\_\_ Bldg./Rms. \_\_\_\_\_ Inspector \_\_\_\_\_

**0 NOT ACCEPTABLE 2 GOOD LAB PRACTICE**  
**1 ADEQUATE COMPLIANCE N/A NOT APPLICABLE**

### Emergency and Safety Information

0 1 2 NA Emergency assistance information posted  
0 1 2 NA Lab safety manual accessible  
0 1 2 NA Current occupants/responsible person(s) listed  
0 1 2 NA NFPA fire diamond posted

### Safety Equipment and Supplies

0 1 2 NA Fire extinguisher present/charged/ accessible  
0 1 2 NA Approved eyewash present or available in 10 seconds  
0 1 2 NA Emergency shower present  
0 1 2 NA First-aid kit present and stocked  
0 1 2 NA Chemical spill material or kit available  
0 1 2 NA Less than 10 gal. Flammables kept outside flammable storage cabinet  
0 1 2 NA Flammables kept in refig./freezer approved for storage of flammables  
0 1 2 NA Gas cylinders secured  
0 1 2 NA Gas cylinder valve protection cap in place when not in use

### Hazard Communication

0 1 2 NA MSDS available / location known  
0 1 2 NA Containers labeled with name and hazard warning  
0 1 2 NA Current chemical inventory present  
0 1 2 NA Annual training/inspection/accidents documented

### Housekeeping/ Personal Protection

0 1 2 NA Food and drink not in lab areas  
0 1 2 NA Gloves, lab coat worn only in lab areas  
0 1 2 NA Lab coats worn when handling hazardous materials  
0 1 2 NA Gloves worn when handling hazardous materials  
0 1 2 NA Eye protection worn in lab  
0 1 2 NA Glass bottles not stored on floor  
0 1 2 NA Minimal glassware on bench/ in sink/ in fume hood  
0 1 2 NA Proper waste disposal of glass (vial, pipets, etc.) and sharps

### Chemical Waste Disposal and Transport

0 1 2 NA Safety cans available for disposal of non-halogenated/ halogenated solvents  
0 1 2 NA Chemical waste properly stored  
0 1 2 NA Waste cans and containers affixed with completed waste tags

- 0 1 2 NA Waste manifests or tags near safety cans and bottles
- 0 1 2 NA Bottle carrier available for transport of chemicals
- 0 1 2 NA Chemical waste disposal procedures posted

**COMMENTS:**

P.I. \_\_\_\_\_ Department Chemistry & Biochemistry

Date \_\_\_\_\_ Bldg./Rms. \_\_\_\_\_ Inspector \_\_\_\_\_

0 NOT ACCEPTABLE 2 GOOD LAB PRACTICE  
 1 ADEQUATE COMPLIANCE N/A NOT APPLICABLE

**Chemical Storage/ Compatibility**

- 0 1 2 NA Chemical containers free from external contamination
- 0 1 2 NA Maximum of 60 gallons flammable liquids per lab
- 0 1 2 NA Minimal amount of acids stored outside acid/corrosive cabinet
- 0 1 2 NA Acids and bases stored in secondary containers
- 0 1 2 NA Organic acids, mineral acids and bases stored segregated
- 0 1 2 NA Chemicals stored in unsafe manner
- 0 1 2 NA Incompatible chemicals stored segregated
- 0 1 2 NA Ethers and other peroxide formers dated or tested
- 0 1 2 NA Water reactives stored separately
- 0 1 2 NA Carcinogens stored separately
- 0 1 2 NA Corrosives stored separately

**Fume Hoods**

- 0 1 2 NA Current certification date(s)
- 0 1 2 NA Proper sash height indicated
- 0 1 2 NA Sash at or below marked approval level
- 0 1 2 NA Sash stoppers functional
- 0 1 2 NA Safety shields in place
- 0 1 2 NA Hood illumination functional
- 0 1 2 NA Audible/ visual alarm functional
- 0 1 2 NA Minimal clutter in hood (equipment, chemicals)
- 0 1 2 NA Proper equipment placement in fume hood
- 0 1 2 NA Cleanliness
- 0 1 2 NA Room cross drafts and turbulence controlled

**Fire Safety**

- 0 1 2 NA Exits/aisles/corridors are not blocked: 24" min. width

- 0 1 2 NA Laboratory doors kept closed
- 0 1 2 NA Primary and secondary exit from lab maintained

**Seismic Safety**

- 0 1 2 NA Equipment, cabinets, etc., anchored or restrained
- 0 1 2 NA Storage shelves have seismic restraints
- 0 1 2 NA Cabinet doors have seismic restraints
- 0 1 2 NA High overhead storage is secured

**Mechanical and Electrical Safety**

- 0 1 2 NA Moveable parts guarded on equipment
- 0 1 2 NA Electric panel accessible
- 0 1 2 NA Plugs, cords, outlets in good condition
- 0 1 2 NA Extension cords or other cords out of way
- 0 1 2 NA Powerstrips/ extension cords not plugged into one another

**COMMENTS:**

**UCLA LABORATORY SAFETY SURVEY CHECK LIST  
PART 2**

P.I. \_\_\_\_\_  
Department \_\_\_\_\_

Date \_\_\_\_\_ Bldg./Rms. \_\_\_\_\_ Inspector \_\_\_\_\_

<b>0</b>	<b>NOT ACCEPTABLE</b>	<b>2</b>	<b>GOOD LAB PRACTICE</b>
<b>1</b>	<b>ADEQUATE COMPLIANCE</b>	<b>N/A</b>	<b>NOT APPLICABLE</b>

**Radiation Safety**

- |   |   |   |    |   |
|---|---|---|----|---|
| 0 | 1 | 2 | NA | Lab coats being worn                                |
| 0 | 1 | 2 | NA | Gloves being worn                                   |
| 0 | 1 | 2 | NA | Badge and /or ring dosimeter being worn             |
| 0 | 1 | 2 | NA | Waste containers available                          |
| 0 | 1 | 2 | NA | Waste containers tagged and shielded                |
| 0 | 1 | 2 | NA | Radioactive waste pickup schedule available         |
| 0 | 1 | 2 | NA | Radioactive storage cabinets identified and labeled |

**Laser Safety**

- |   |   |   |    |   |
|---|---|---|----|---|
| 0 | 1 | 2 | NA | Signage in place (Danger, Caution, Laser)           |
| 0 | 1 | 2 | NA | Interlock mechanism if applicable                   |
| 0 | 1 | 2 | NA | "Laser in Operation, Do Not Enter" illuminated sign |
| 0 | 1 | 2 | NA | Beam blockers /shutters in place                    |
| 0 | 1 | 2 | NA | Eye protection being worn                           |
| 0 | 1 | 2 | NA | Enclosed beam paths                                 |
| 0 | 1 | 2 | NA | Protective housing                                  |
| 0 | 1 | 2 | NA | Black curtains surrounding laser area               |
| 0 | 1 | 2 | NA | High voltage power supplies stored properly         |
| 0 | 1 | 2 | NA | Restricted access for class IV Laser area           |
| 0 | 1 | 2 | NA | Laser identification by class and type (labels)     |

**COMMENTS:**



## CHAPTER 15: HEALTH AND SAFETY REFERENCES.

The following health and safety reference materials are available in the Campus Libraries, The Chemical Safety Office at Young Hall, Room 1217, Environment, Health & Safety, Strathmore Building, 4<sup>th</sup> floor and the internet. Chemical vendors may also be a useful reference.

### Internet resources:

[www.ucmsds.com](http://www.ucmsds.com) – material safety data sheets (MSDS)

<http://ntp.niehs.nih.gov/index.cfm?objectid=03610FA5-C828-304B-FE31F1182E8F764C>  
– safety and toxicology information

<http://www.ncbi.nlm.nih.gov/pubmed> - Medline

<http://gateway.nlm.nih.gov/gw/Cmd?GMBasicSearch&loc=nccs> – National Library of Medicine

<http://themerckindex.cambridgesoft.com/> - The Merck Index online

[www.cdc.gov](http://www.cdc.gov) – Center for Disease Control (CDC)

<http://www.dir.ca.gov/> - California Occupational Health & Safety Administration (Cal/OSHA)

<http://www.calepa.ca.gov/> - California Environmental Protection Agency (Cal/EPA)

<http://www.cdc.gov/od/ohs/biosfty/biosfty.htm> - CDC biosafety information

[www.who.org](http://www.who.org) – World Health Organization

[http://www.mrw.interscience.wiley.com/sax/sax\\_articles\\_fs.html](http://www.mrw.interscience.wiley.com/sax/sax_articles_fs.html) - Dangerous Properties of Industrial Materials, 11<sup>th</sup> Edition. Sax, Irving N. and Lewis, Richard J. Sr. New York, Wiley, © 2005

<http://www.ehs.ucla.edu/Manuals.html> - resource for UCLA campus manuals (laser safety, radiation safety, campus emergency response et.)

[www.ehs.ucla.edu](http://www.ehs.ucla.edu) – Campus Environment, health and Safety website

### Books:

A comprehensive Guide to the Hazardous Properties of Chemical Substances, 2<sup>nd</sup> Edition. Patnaik, Pradyot, Wiley, © 1999

Chemical Carcinogens: Some Guidelines for Handling and Disposal in the Laboratory. Castegnaro, Marcel and Sansone, Eric B., Berlin, Springer-Verlag, © 1986

Chemistry of Hazardous Materials. Meyer, Eugene, Inglewood Cliffs, NJ, Prentice Hall, © 1977

CRC Handbook of Laboratory Safety, 4<sup>th</sup> Edition. Furr, A. Keith, editor, Cleveland, Chemical Rubber Company, © 1995

Dangerous Properties of Industrial Materials, 11<sup>th</sup> Edition. Sax, Irving N. and Lewis, Richard J. Sr. Hoboken : Wiley-Interscience © 2004

Flash Point Index of Trade Name Liquids, 8<sup>th</sup> Edition. National Fire Protection Association, (NFPA no. 325-A 1972), Boston, National Fire Protection Association, © 1972

Guide to safe Handling of Compressed Gases. Matheson, East Rutherford, NJ, Matheson, © 1983

Handbook of Reactive Chemical Hazards, 6th Edition. Bretherick, L., London, Butterworth, © 1999

Handling Chemical Carcinogens: a Safety Guide for the Laboratory Researcher. Lenexa, K.A., Chemsyn Science Laboratories, © 1986

Practical Laser Safety. Winburn, D.C, New York, M. Dekker, © 1990

Laser and Eye Safety in the Laboratory. Mathews, Larryl, Garcia, Gabe, Bellingham © 1995

Guide for the selection of Laser Eye Protection, 3<sup>rd</sup> Edition. Laser Institute of America, Orlando, © 1995

LIA Guide to Non-beam Hazards Associated with Laser Use, 9<sup>th</sup> Edition. Laser Institute of America, Orlando, © 1999

Laser Safety Guide, 9<sup>th</sup> Edition. Laser Institute of America, Orlando, © 1993

Prudent Practices in the laboratory Handling and Disposal of Chemicals. National Research Council, Washington D.C, National Academy Press, © 1995

Safe Storage of Laboratory Chemicals 2<sup>nd</sup> Edition. Pipitone, David A., New York, Wiley, © 1991

[The Occupational Environment - Its Evaluation and Control.](#) DiNardi, S., AIHA Press, Fairfax, VA, ©1998

Patty's Toxicology, 5<sup>th</sup> Edition. Bingham, Eula, Cochrane, Barbara and Powell, Charles, New York, Wiley © 2001

Safety in Academic Chemistry Laboratories, 7<sup>th</sup> Edition, volumes 1 and 2. ACS Committee on Chemical Safety, Washington DC, American Chemical Society, © 2003

## **APPENDIX A: CAL/OSHA REGULATED CARCINOGEN POLICY**

### **Purpose:**

The purpose of this document is to comply with Title 8 of the California Code of Regulations, Section 5209 to help ensure the safety of UCLA students, staff and personnel and to protect the environment.

### **Scope:**

This policy shall apply to anyone that uses, stores or disposes of any Select Carcinogen.

### **Definitions:**

- *Action Level*- A concentration designated in Title 8, California Code of Regulations for a specific substance, calculated as an eight (8)-hour time weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.
- *Cal/OSHA regulated carcinogen*- A substance that is regulated by Cal/OSHA as a carcinogen

- *Designated Area*- An area which may be used for work with “select carcinogens”. A designated area may be the entire laboratory, an area of the laboratory or device such as a laboratory hood.
- *IARC*- International Agency for Research on Cancer
- *Laboratory*- A facility where the “laboratory use of hazardous chemicals” occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.
- *Laboratory scale*- Work with substances in which the containers used for reactions, transfers and other handling of substances are designated to be easily and safely manipulated by one person.
- *Laboratory Use of Hazardous Chemicals*- Handling or use of such chemicals in which all of the following are met:
  - Chemical manipulations are carried out on a “laboratory scale”.
  - Multiple chemical procedures or chemicals are used.
  - “Protective laboratory practices and equipment” are available and in common use industry-wide to minimize the potential for employee exposure to hazardous chemicals.
- *MSDS*- material safety data sheet
- *NTP*- National Toxicological Program
- *PEL*- Permissible Exposure Limit
- *PPE*- personal protective equipment (i.e., gloves, lab coat, safety eyewear)
- *Select Carcinogen*- Any substance which meets one of the following criteria:
  - A Cal/OSHA carcinogen
  - It is listed under the category, “known to be carcinogens” in the Annual Report on Carcinogens published by the NTP.
- It is listed as group 1 “carcinogenic to humans” by IARC
- It is listed in either group 2A or 2B by IARC or under the category “reasonably anticipated to be carcinogens” by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:
  1. After inhalation exposure of 6-7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10mg/m<sup>3</sup>;
  2. After repeated skin applications of less than 300mg/kg of body weight per week; or
  3. After oral dosages of less than 50mg/kg of body weight per day
- *SOPs*- Standard Operating Procedures

**Responsibilities:**

Department:

1. Provide and document training for select carcinogens.
2. Ensure labs have adequate safety controls.

Supervisor:

1. Ensure employees are trained on select carcinogens.
2. Provide SOPs, MSDS and other required information.
3. Ensure employees follow SOPs and safety precautions.
4. Provide approval for carcinogen use.

Employee:

1. Receive training on select carcinogen use.
2. Review SOPs and MSDS before working with carcinogen.
3. Follow all safety guidelines.

**List of Cal/OSHA Regulated Carcinogens:**

2-Acetylaminoflourene\*  
4-Aminodiphenyl\*  
Benzidine (and its salts) \*  
3,3'-Dichlorobenzidine (and its salts) \*  
4-Dimethylaminoazobenzene\*  
alpha-Naphthylamine\*  
beta-Naphthylamine\*  
4-Nitrobiphenyl\*  
Lead  
N- Nitrosodimethylamine\*  
Beta-Propiolactone\*  
Bis-Chloromethyl ether\*  
Methyl chloromethyl ether\*  
Ethyleneimine\*  
1,2- Dibromo-3-Chloropropane\*  
Asbestos  
Vinyl Chloride  
Coke Oven Emissions  
Acrylonitrile  
Inorganic Arsenic  
Ethylene Dibromide  
Ethylene Oxide  
Methylenedianiline  
1,3-Butadiene  
Methylene Chloride  
Cadmium  
4,4-Methylenebio (2-Chloroaniline)  
Formaldehyde  
Benzene

*\* Indicates the following additional requirements listed below:*

1. Mechanical pipetting aids shall be used for all pipetting procedures.
2. Contaminated wastes and animal carcasses shall be collected in impervious containers which are closed and decontaminated prior to removal from the work area.
3. Laboratory vacuum systems shall be protected with high efficiency scrubbers when using beta-propiolactone, bis-chloromethyl ether, methyl chloromethyl ether or ethyleneimine. Disposable filters may be used in place of scrubbers for all other chemicals.
4. Personnel engaged in animal support activities must wear the additional PPE:
  - Foot covers
  - Head covers
  - Respirators
5. If PPE or clothing become contaminated or is suspected of being contaminated, it must be placed in labeled impervious containers for the purpose of decontamination or disposal.
6. Personnel must wash hands, forearms, face and neck upon each exit from the regulated area, close to the point of exit and before engaging in other activity.
7. Employees engaged in animal support activities shall be required to shower, including washing of the hair, after the last exit of the day.
8. The ventilation system for the regulated area must be filtered with the appropriate filter.
9. The ventilation system for the regulated area must not be connected to any other areas.

### **Other Select Carcinogens**

There are several lists of select carcinogens other than the Cal/ OSHA regulated carcinogens mentioned above. You may contact EH&S to see if any of your chemicals appear on one of the select carcinogens list.

### **Procedure for Use, Storage and Disposal of Cal/OSHA Carcinogens in the Laboratory:**

Before a Cal/ OSHA carcinogen may be used or stored in the lab, the following procedures must be met:

1. Written SOPs must be submitted to EH&S for review and approval. An SOP template will be provided by EH&S upon request. Once approved, a copy of the SOP will be retained by EH&S and a second copy kept at the lab. New SOPs must also be submitted if the procedure for chemical use is changed. The SOP must include:
  - Prior approval
  - PPE
  - Engineering Controls
  - Special Handling and Storage

- Spills, Accidents and Exposures
  - Decontamination
  - Waste Disposal
  - Designated Area
  - MSDS location
  - Protocol or procedure followed
2. Designated area(s) for use and storage must be established.
  3. All laboratory personnel who work with or may be exposed to the chemical must be adequately trained. Training records must be kept on file in the lab. Training should include at a minimum:
    - The hazards/ toxicological effects associated with the carcinogen.
    - Exposure limits.
    - Measures that lab personnel can take to protect themselves from the hazards.
    - What to do in an emergency.
    - A review of the SOPs and material safety data sheets.

Once use has been approved by EH&S, the following is required:

1. Exposure monitoring is required for lab personnel when the chemical is first used. If initial monitoring indicates that exposure levels are below both the action level and PEL, then no further monitoring is required. If exposure levels are above the action level and/or PEL, then all work with the chemical will cease and further investigation by EH&S will be required. If procedures for chemical use changes, then additional monitoring is also required.
2. Signage is required for the container, designated work area and storage location. Sign wording must state the following:  
“DANGER, contains (Chemical Name), CANCER HAZARD”
3. An inventory of the chemical must be maintained and shall include:
  - date and amount received
  - date opened
  - amount and date used
  - date emptied
  - date disposed
4. The chemical must be stored in manner that will minimize the risk of accidental release, capped tightly and be maintained in chemical resistant secondary containment.
5. Waste disposal requires separate waste containers that are properly identified and labeled. Any trash that is contaminated with carcinogen should also be disposed of as hazardous waste.
6. Bench top work with Cal/OSHA carcinogens is NEVER PERMITTED! Always work in an appropriate containment area, such as a glove box or fumehood.
7. All lab surfaces that come in contact with the chemical must be maintained in a manner to keep them free from contamination. Any items that need to be cleaned and decontaminated must be carried out in a glove box or fumehood.
8. When transporting the chemical, the container should be protected from breakage, such as using a bottle carrier.

9. Always wear the appropriate PPE specified in the SOPs when working with the chemical. Contaminated PPE must not be removed from the designated area until properly decontaminated.
10. Immediately wash hands after working with the chemical.
11. Eating, drinking or storing food in designated areas is prohibited.
12. A copy of the specific regulation and MSDS for the chemical used must be kept in the lab. The specific regulation for the chemical can be accessed through EH&S.
13. All employees who may be exposed to the Cal/OSHA carcinogen have the right to a medical evaluation. A medical evaluation is required if an exposure exceeds the action level or PEL and can be obtained through occupational health for employees or Arthur Ashe for students. A copy of the MSDS and regulation should be brought to the medical evaluation.
14. Additional requirements may apply, depending on the specific chemical. Contact EH&S to see if the carcinogen you plan to use requires further controls.

## **NON-LABORATORY USE OF CAL/OSHA REGULATED CARCINOGENS**

The regulations regarding the non-laboratory use of select carcinogens are numerous, complex and specific to each chemical. For procedures on storing, use and disposal of asbestos, contact the Asbestos and Lead Program Manager at EH&S. All other select carcinogen use is strongly discouraged and should be substituted with another chemical whenever possible. Before any non-asbestos select carcinogens may be purchased or used, EH&S must be contacted for an evaluation.

## APPENDIX B: STANDARD OPERATING PROCEDURES

### Instructions for Completing Standard Operating Procedures

To be in compliance with the Cal/OSHA Laboratory Standard, laboratory-specific Standard Operating Procedures (SOPs) are required to be included in your Chemical Hygiene Plan. This manual does not provide specific SOPs for the hazardous chemical or hazardous substance use operations or procedures in your particular laboratory. If your laboratory research involves use of hazardous substances, chemicals or equipment, you will need to develop laboratory-specific SOPs to supplement the information found in the EH&S publication—“Laboratory Safety Manual and Chemical Hygiene Plan”. Below are instructions for completing the laboratory-specific SOPs using the template provided. Please contact the Chemical Safety Office (extension 63661) with any questions or comments you may have while completing your SOPs.

#### 1. Type of SOP—check one box

**Process:** the SOP will be for a process such as distillation, synthesis, etc.

**Hazardous chemical:** the SOP will be for an individual chemical such as arsenic, formaldehyde, nitric acid, etc.

**Hazard class:** the SOP will be for a hazard class of chemicals such as oxidizer, flammable, corrosive, etc.

**Equipment or system:** the SOP will be for individual equipment or systems that pose a hazard such as lasers, machines with moving parts, UV lamps, etc.

#### 2. Describe the Process, Hazardous Chemical or Hazard Class, Equipment or System

**Process:** Briefly describe the process and name all the hazardous chemicals or substances used in the process.

**Hazardous chemical:** Provide the name of the chemical. Include the full name, common name, and any abbreviations used for the chemical.

**Hazard class:** Name the hazard class and list the name of the chemicals in this hazard class used or stored in your laboratory.

**Equipment or system:** Name the type, make and model or components of the equipment or system.

#### 3. Potential Hazards

Describe all the potential hazards for each process, hazardous chemical, hazard class, equipment or system. Describe potential for both physical and health hazards. Health hazards include carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which

damage the lungs, skin, eyes, or mucous membranes. State the potential for chronic and/or acute health hazard effects of the chemical(s).

Physical hazards include radioactivity, cryogen, high temperature, electrical, compressed gas or other pressure systems, UV light, laser, flammable or combustible, corrosive, water-reactive, unstable, oxidizer, pyrophoric, explosive, or peroxide formers.

#### **4. Circumstances Requiring Prior Approval**

Discuss the circumstances under which this particular process, hazardous chemical or hazard class, equipment or system will require prior approval (if any) from the principal investigator, laboratory supervisor or chemical hygiene officer. The circumstances may be based on such criteria as: the inherent hazards of the material(s) used, the hazards of the experimental process, the experience level of the worker, the scale of the reaction, etc. Some examples of circumstances that may require prior approval include unattended or overnight operations, use of highly toxic gas in any amount, use of large quantities of toxic or corrosive gases or use of carcinogens.

#### **5. Personal Protective Equipment (PPE)**

Identify the required PPE for the process, hazardous chemical, or hazard class. PPE includes but is not limited to: gloves, aprons, lab coats, safety glasses, goggles, masks, respirators, or faceshields.

#### **6. Engineering Controls**

Describe or list engineering controls that will be used to prevent or reduce employee exposure to hazards. Examples of engineering controls are fumehoods, glove boxes, interlocks on equipment, shielding of various kinds, etc.

#### **7. Special Handling, Storage Requirements and Maintenance**

Describe storage requirements for hazardous substances including special containment devices, special temperature requirements, special storage areas or cabinets, chemical compatibility storage requirements, etc. State the policy regarding access to substance(s). Provide exact storage location in laboratory. Describe special procedures such as dating peroxide forming chemicals on receipt and opening and disposal or testing after an appropriate amount of time has passed. Describe safe methods of transport such as in a secondary container or/and on a low, stable cart, or using two hands to carry the chemical container.

Describe any pre-inspection or maintenance schedule of any equipment

#### **8. SPILL AND ACCIDENT PROCEDURES**

Describe special procedures for spills, releases, exposures or emergency shut down (e.g., neutralizing agents, use of fluorescence to detect materials, etc.). Indicate how spills, accidental releases and exposures will be handled. List location of the following emergency equipment: chemical spill clean-up kit, first-aid kit, emergency shower, eyewash, and fire extinguisher.

#### **9. DECONTAMINATION PROCEDURES**

Describe specific decontamination procedures for equipment, glassware or work areas.

#### **10. WASTE DISPOSAL PROCEDURES**

Describe how waste will be collected and disposed.

#### **11. DESIGNATED AREA**

Indicate the designated area established for experiments using “particularly hazardous substances”. A portion of a laboratory bench, a piece of equipment, the fumehood or the entire laboratory may be considered as a designated area for experiments using “particularly hazardous substances”.

#### **12. SAFETY INFORMATION**

State where the MSDSs are kept for the chemicals or hazardous substances used. Indicate the location of other pertinent safety information (e.g., references, equipment manuals, maintenance records, etc.).

#### **13. Protocols**

Insert a copy of your step-by-step specific laboratory procedures for the process, hazardous chemical or hazard class.

---

Please fill out the form completely. Print a copy and insert into your  
*Laboratory Safety Manual and Chemical Hygiene Plan.*  
Refer to instructions for assistance.

---

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

Principal Investigator: \_\_\_\_\_

Chemical Hygiene Officer: \_\_\_\_\_

Laboratory Phone: \_\_\_\_\_ Office Phone: \_\_\_\_\_

Emergency Contact: \_\_\_\_\_  
(Name and Phone Number)

Location(s) covered by this SOP: \_\_\_\_\_  
(Building/Room Number)

---

1. Type of SOP (check one)

Process  Hazardous Chemical  Hazard Class

2. Describe Process, Hazardous Chemical or Class, Equipment or System:

3. Potential Hazards:

4. Circumstances Requiring Prior Approval:

5. Personal Protective Equipment (PPE):

6. Engineering Controls:

7. Special Handling, Storage Requirements and Maintenance:

8. Spill & Accident Procedures:

9. Decontamination Procedures:

10. Waste Disposal Procedures:

11. Designated Area:

12. Safety Information Location:

13. Protocol(s):



## **APPENDIX C: BROKEN GLASSWARE**

Broken laboratory glassware is repaired by an outside contractor. Jeffery Tait from Scientific Glass Fabrication Inc. comes to the department once a month to pick up and repair broken glassware. If you need to make an appointment, e-mail him at [jtait@tgsciglass.com](mailto:jtait@tgsciglass.com) or call (949) 837-8785. He will place you on a list and e-mail you with the date and time of pick-up and delivery. Repaired glassware will be returned the following visit. A purchase order number will be required.



## APPENDIX D: TRAINING

Under federal and state law and university policy all laboratory personnel are required to complete specified safety and environmental training. Training is required upon initial employment, before working with new equipment, chemicals and procedures, after incidences and accidents, and after specified time intervals (refresher training and lab meetings).

It is the PI's responsibility to ensure that all personnel are adequately trained and that training is properly documented. Graduate students receive training from the Chemical Safety Officer initially before they begin their first year at UCLA. Post doctoral students, undergraduate researchers and other lab employees must receive training from Chemical Safety Officer and must be notified for general safety training.

Below is a list of training topics. However, by no means is the list all inclusive, and is meant to be used as a guide to cover most safety topics. Also provided are forms that may be used to help ensure that the training received is properly documented.

### Cal/OSHA Required Training for Everyone:

- Hazardous Communication- CCR Title 8, section 5194
  - Employees must be informed of the hazards from the chemicals they work with
  - How to access chemical safety information (proper chemical labeling, MSDS, inventory, other safety references).
  - Understand, basic toxicology, routes of exposure, signs and symptoms of exposure, warning properties, exposure limits (Cal/OSHA, NIOSH, et.), other chemical hazards (flammability, reactivity, oxidizers, et.)
  - Understand how to protect themselves from chemical hazards
  - Proper storage, use and handling
  - Emergency procedures (spills, exposures, medical treatment)
  - Be informed of the chemical and physical properties
  - Availability of hazard assessment by the Chemical Safety Officer or the PI, exposure monitoring by the Chemical Safety Officer, and medical consultation.
- Chemical Hygiene Plan- CCR Title 8, section 5191
  - Each department on campus that has labs must develop a chemical hygiene plan; this is the lab safety manual that the Chemical Safety Office updates every year and distributes to the labs
  - The policies, procedures and safety equipment are specific to the Department of Chemistry and Biochemistry
  - All laboratory personnel must be familiar with the contents and availability of the manual
  - This law also requires the development of specific written standard operating procedures for hazardous substances and processes. Since research varies from lab to lab, each PI is responsible for his/her own procedures.

- Injury Illness and Prevention Program (IIPP)- CCR Title 8, section 3203
  - How to report an injury or accident
  - How to recognize and report or correct an unsafe condition in the work environment without fear of reprisal
  - Be aware that they must conduct regular internal audits of their work environment to ensure it is safe and meets departmental policies (typically someone in the lab is assigned the duty of lab safety officer; this is separate from my inspections)
  - When working as a TA, be familiar with safety and health hazards undergraduates may be exposed to and what to do
  - Be aware of disciplinary action when procedures are not followed
  - How to follow standard operating procedures and develop if necessary
  - Fire prevention- should be conducted by UCFD
  - Earthquake safety
  - Proper housekeeping
  - Emergency preparedness (evacuation routes, medical emergencies, emergency numbers, how to report an emergency, alarms, roles and responsibilities in an emergency)
  - Personal Protective Equipment (proper selection, limitations, maintenance and how to use)

#### **Cal/EPA Required Training for Everyone:**

- Hazardous waste

#### **Recommended but not Required Training for Everyone:**

- Ergonomics (lab, computer and back safety)
- Fire extinguisher
- General first aide
- Electrical safety

#### **Common Training Topics by Division**

##### **Biochem:**

- Chemicals:  
Ethidium Bromide, SDS, Acrylamide, Phenol/Chloroform, DMSO, DMF, Strong acids, Organic solvents, Carcinogens, Mutagens
- Radiation
- Biohazard
  - Cells
  - Animal use
  - BSL
  - Biowaste
  - Biosafety cabinets
  - Proteins
- Equipment
  - Centrifuges
  - Autoclaves

- Heating baths
- Cryogenics
- Compressed gas cylinders

### **Physical Chem:**

- Electrical
- Shop Safety
- Lasers
- Soldering
- Compressed gas cylinders
- Chemicals:  
Heavy metals, Water reactives, HF, Piranha solution, Formamide, Organic solvents
- Compressed gas cylinders
- Radiation
- High Vacuum

### **Inorganic:**

- Chemicals:  
Air sensitive/ pyrophoric, Water reactives, HF, Heavy metals, Boron, Acids, bases and flammables
- Cryogenics
- Shlenk lines
- High Vacuum
- Lasers
- Radiation

### **Organic:**

- Chemicals:  
Carcinogens, Mutagens, Potentially explosive (azides, nitro chemicals and organic peroxides), Peroxide forming chemicals, Flammable solvents, DMSO, Strong acids bases and oxidizers, Water reactives
- High pressure
- High Vacuum
- Cold traps
- High temperature
- Distillation
- UV
- Compressed gas cylinders







## APPENDIX E: HANDOUTS

### Department of Chemistry and Biochemistry, UCLA EMERGENCY INFORMATION YOUNG HALL AND MOLECULAR SCIENCES

<p><b>EMERGENCIES DIAL 911</b></p>	<p>For Emergencies which require <b>POLICE, FIRE or MEDICAL</b> assistance, dial 911 from any departmental phone. Notify the Operations Manager, X53024, Room 1224, Young Hall</p>
<p><b>EARTHQUAKE</b></p>	<p><b>IF IN THE BUILDING</b>, take cover under a table, desk, or on the floor between the seats in the auditorium. Move away from windows and apparatus that can fall on you. If in a corridor, sit on the floor next to a wall. Cover your head. Do not use the elevators. Do not attempt to leave the building while there is shaking. If in a laboratory when an evacuation is called, try to turn off any equipment or reactions which may present a hazard if left unattended or may not tolerate changes in water or electrical current, e.g. flammable solvent stills, gas lines, electrical appliances, heat or water sensitive reactions, etc.</p> <p><b>IF OUTSIDE THE BUILDING</b>, stay outside. Move away from tall buildings, trees or power lines. Do not go into a parking structure. Report to the nearest Disaster Evacuation Area for directions and assistance. This area for Young Hall and Molecular Sciences is in the Court of Sciences between Young and Boelter Halls.</p>
<p><b>FIRE DIAL 911</b></p>	<p><b>ALARM PULL STATIONS</b> - located on east balcony and near elevator and adjacent to south stairwell on each floor in Molecular Sciences. In corridors in Young Hall.</p> <p><b>EXTINGUISHERS: DRY CHEMICAL (ABC)</b> -located in almost every classroom and laboratory, generally near the front of the room. More effective than carbon dioxide. <b>CARBON DIOXIDE</b> - located throughout the building, generally near the front door.</p> <p><b>REPLACEMENT EXTINGUISHERS</b> - Located at north end of service corridor in Molecular Sciences; also, Room 3056 Young Hall. Leave used extinguisher on the floor. Report all uses of fire extinguishers to the Chemical Safety Officer immediately (X63661).</p>
<p><b>MEDICAL and/or AMBULANCE  DIAL 911</b></p>	<p><b>DIALING 911 WILL RESULT IN PARAMEDIC RESPONSE IN 5 - 10 MINUTES</b></p> <p><b>EMERGENCY MEDICAL TREATMENT</b></p> <p><b>EMPLOYEES:</b> Emergency Medicine Center located at the Ronald Reagan medical building, 1st floor, room 1419. Call 310-267-8407 or x 52111</p> <p><b>STUDENTS:</b> Emergency Medicine Center located at the Ronald Reagan medical building, 1st floor, room 1419. Call 310-267-8407 or x 52111</p> <p><b>ALL OTHERS:</b> Emergency Medicine Center located at the Ronald Reagan medical building, 1st floor, room 1419. Call 310-267-8407 or x 52111</p>

	<p><b>NON - EMERGENCY MEDICAL TREATMENT:</b>  <b>EMPLOYEES:</b> Occupational Health Facility, CHS building on the 6th floor, room 67-120 for work related injuries. 310-825-6771 or x 56771  <b>STUDENTS: Student Health Services,</b> Arthur Ashe Student Health and Wellness Center, Monday-Friday, 8:00 a.m. to 5:00 p.m. Extension 54073.</p>
<b>POLICE - DIAL 911</b>	Use any departmental phone to dial 911, then notify the Operations Manager at X53024
<b>EMERGENCY AND SAFETY EQUIPMENT</b>	<p><b>CHEMICAL CLEANUP EQUIPMENT:</b> Exhaust fan, water pump, spill absorbents, personal protective equipment etc. are located in the Emergency Equipment Room, Molecular Sciences, Room 3120. Additional supplies, including a mercury vacuum are located in Young Hall emergency cage, outside Room 1072.</p> <p><b>RESPIRATORS</b> (gas masks): filter type for organic vapors and acid gases, but not where there is a lack of oxygen, i.e. fire, can be obtained from the Chemical Safety Officer. Anyone who uses a respirator must be fit tested and trained through Environment Health and Safety.</p> <p><b>GAS DETECTOR</b> (O2, LEL, CO and H2S): Contact Chemical Safety Office at X45647.</p> <p><b>MERCURY VAPOR DETECTOR:</b> Contact Chemical Safety Office at X45647.</p> <p><b>RADIOACTIVITY DETECTORS:</b> Contact Chemical Safety Office at X45647.</p>
<b>EMERGENCY REPAIR</b>	<p><b>DURING WORKING HOURS:</b> Notify Mail and Information, <b>X54219</b>, Room 3034 Young</p> <p><b>ALL OTHER TIMES:</b> Call Facilities Division 24 hour emergency number, <b>X59236</b></p>

### Fire Diamond Information

Building: \_\_\_\_\_

Room Number: \_\_\_\_\_

Room Type: \_\_\_\_\_

Numbers of signs requested: \_\_\_\_\_

Supervisor: \_\_\_\_\_

Office \_\_\_\_\_ Campus Phone: \_\_\_\_\_

Supervisor: \_\_\_\_\_ Campus Phone: \_\_\_\_\_

Office \_\_\_\_\_ Campus Phone: \_\_\_\_\_

Regular room occupants (List up to 4 names):

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

Lab phone number: \_\_\_\_\_

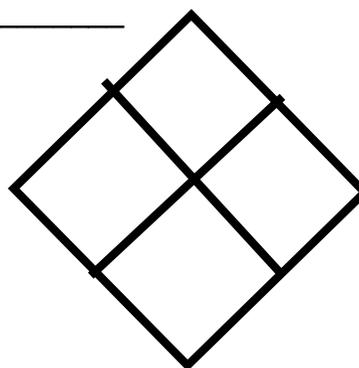
In case of an emergency, please notify:

Name: \_\_\_\_\_

Phone: \_\_\_\_\_

Special Hazards:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



All information on this sheet will be posted on the door. Please designate an emergency contact that is willing to have this information included on the door.

Please provide a chemical inventory sheet along with this form to the Chemical Safety Office once it has been completed.

## Peroxide-Forming Chemicals (PFCs)

Due to rising costs of chemical waste disposal, all peroxide forming chemicals (PFCs) that are kept by users beyond the expiration date will result in a \$65 recharge. This new policy will become effective June 1, 2003. This will provide an amnesty period in which researchers may dispose of their expired PFCs free of charge.

PFCs normally will not start forming these explosive peroxides if they are not expired. *As long as we receive PFCs before their expiration date, there will be no extra charges.* It is important for the user to keep a record of when these PFCs will expire so you will not have to pay any additional disposal costs.

Materials that are susceptible to peroxide formation (i.e., autooxidation) are ones that typically react with air, moisture, or impurities and produce a change in their chemical composition in normal storage. Peroxides are highly reactive and can explode upon shock or spark. The peroxides that form are less volatile than the solvent itself and thus tend to concentrate. This is particularly dangerous if peroxides are present during a distillation, where the applied heat to the concentrated solution may trigger a violent explosion. Equally dangerous is to allow a container of this material to evaporate to dryness, leaving the crystals of peroxide at the bottom of the container. Each container of peroxide forming chemicals should be dated with the date received and the date first opened. There are three classes of peroxide forming chemicals. The examples listed below each class do not compose a complete list of peroxide forming chemicals.

### Disposal Requirements

#### CLASS 1

These chemicals form peroxides after prolonged storage. These chemicals should be tested for the formation of peroxides on a periodic basis. Several methods are available to check for peroxides. The two most common are the use of peroxide test strips or the potassium iodide test.

Isopropyl ether  
Divinyl acetylene  
Sodium amide

Potassium amide  
Vinylidene chloride  
Potassium metal

Divinyl ether

#### CLASS 2

This group of chemicals will readily form peroxides when they become concentrated (i.e. evaporation or distillation). The concentration process will defeat the action of most auto-oxidation inhibitors. These chemicals should be disposed of within 12 months of receiving.

**Diethylether**

Tetrahydrofuran  
Dioxane

**Methyl isobutyl ketone**

Ethylene glycol dimethyl ether  
Dicyclopentadiene

**Furan**

Vinyl ethers  
Cyclohexene

**Acetal****Diacetylene****Cumene****Methylacetylene**

Cyclopentene

**Tetrahydronaphthalene**

Methylcyclopentane

**CLASS 3**

***This group of chemicals form peroxides due to initiation of polymerization. When stored in a liquid state, the peroxide forming potential dramatically increases. These chemicals should be disposed of if they become degraded or are no longer needed.***

**Butadiene****Vinyl pyridine****Acrylic acid****Styrene****Vinyl chloride****Methyl methacrylate****Tetrafluoroethylene**

Vinyl acetylene  
Vinyl acetate

**Chlorobutadiene**

Chlorotrifluoroethylene  
Acrylonitrile

**Vinylidene chloride**

### Procedures for handling and storage of Peroxide Forming Materials

1. Minimize the quantity of peroxide forming chemicals stored in the lab.
2. Try to avoid over ordering (bulk purchases) of PFCs (peroxide forming chemicals) that will not be used within the allotted time.
3. Carefully review all cautionary material supplied by the manufacturer prior to use.
4. Segregate these compounds from other classes of chemicals that could create a serious hazard to life or property should an accident occur (i.e. acids, bases, oxidizers and etc.).
5. Date all containers of peroxide forming chemicals when they first arrive to the lab.
6. Never return unused quantities back to the container (contamination).
7. Clean up all spills immediately.
8. Avoid evaporation or distillation, since distillation defeats the stabilizer added to the solvents.
9. Ensure containers are tightly sealed to avoid evaporation.
10. Ensure containers are free of exterior contamination or crystallization.
11. Routinely test for the formation of peroxides using one of the approved methods.
12. Dispose of ethyl ether, and other volatile peroxide forming compounds, within 12 months.
13. If old containers of peroxide forming chemicals are discovered in the lab, (greater than two years past the expiration date or if the date of the container is unknown) **do**

**not handle the container.** If crystallization is present in or on the exterior of a container, **do not handle the container**, secure it and contact EH&S.

14. Complete hazardous waste tags for expired, degraded, or unwanted peroxide forming chemicals and take them to the next designated hazardous waste pick-up.

## Safe Lifting/Back Injury Prevention

Forklifts, hoists, dollies and other types of lifting equipment should be used to lift heavy objects. However, sometimes it is necessary to load or unload moderate to heavy objects by hand. Therefore knowing the proper ways to lift can save you a great deal of pain and misery from a sprained back.

**Assess the situation:** Before lifting or carrying a heavy object, ask yourself:

Is the path clear of clutter, cords, slippery areas, overhangs, stairs, curbs or uneven surfaces? Will you encounter closed doors that need to be opened? Can the load be broken down into smaller parts? Should you wear gloves to get a better grip and protect your hands?

**Size up the load:**

Test the weight by lifting one corner. If it is too heavy or awkward, try to break up the load down to smaller parts. If unable to reduce load stop and ask for help, or use a lift or hand truck.

**Use good lifting techniques:**

Center yourself close over the load and stand with your feet shoulder width apart.

Tighten your stomach muscles. Tight abdominal muscles increase intra-abdominal pressure and help to support the back.

Get a good handhold and pull the load close to you. The farther the load is from your body, the heavier it will feel.

Bending your knees is the single most important thing you can do when you lift moderate to heavy objects. Squat down like a weightlifter, bend your knees, keep your back in its natural arch, & let your legs do the lifting. Leg muscles are much more powerful than the smaller muscles in your back.

Do not jerk. Use a smooth motion and lift straight up. Hold the load close and keep it steady.

Do not twist or turn your body while lifting. Keep your head up, and look straight ahead.

**Carrying the load:**

Change direction by turning your feet, not your back. Your nose and your toes should always be pointing in the same direction. Any sudden twisting can result in taking out your back.

Rest if you fatigue. Set the load down and rest for a few minutes.

**Setting the load down:**

Bend your knees. Squat down and let your legs do the work.

Keep your back curves. Remember not to twist your body while setting down a load, keep your head up and keep the load close.

Plan your release. Once the load is where you want it and secured, release your grip.

### **Using hand trucks and pushcarts:**

Push rather than pull with both arms. It's easier & safer to use your body weight to assist when pushing.

Keep close and lock your arms. Try not to lean over and keep your back in its natural arches.

Use tie-downs, if necessary, to secure the load.

## **SAFETY ISSUES USING AND STORING LIQUID NITROGEN**

The primary risk to laboratory personnel is skin or eye contact with liquid nitrogen or the material stored in the vials. Nitrogen expands 696:1 when changing from a cryogenic liquid to a room temperature gas. The gases usually are not toxic but if too much oxygen is displaced, asphyxiation is a definite possibility. Nitrogen is prone to splashing during expansion. Storage vials containing nitrogen may leak or explode contents when thawing. Follow these necessary precautions:

**Know the first aid procedures for frostbite before using, handling or storing a cryogenic liquid.**

**Avoid storing cryogenic storage vials submerged in the liquid nitrogen.** Plastic cryogenic storage vials are designed for vapor phase storage in liquid nitrogen freezers. This means that they are designed to sit in the cloud of extremely cold nitrogen gas that sits just above a small reservoir of liquid nitrogen in the bottom of the freezer. Do not overfill the freezer with liquid nitrogen. Do not store samples in the bottom spaces of the metal racks or aluminum canes.

**Wear gloves, a lab coat and face shield that covers the face and neck when removing sample vials from the freezer. Wear closed-toed shoes, pants without cuffs or a long skirt.** Do not wear jewelry. Wear gloves with adequate insulation when direct handling is required. Gloves must be loose enough to be tossed off easily in case of a spill. Cover all skin areas that may contact uninsulated vessels. Handle objects that are stored in a liquid nitrogen freezer with tongs, pot-holders or gloves to avoid skin contact. Use both Type G, H or K safety goggles and a Type N face shield.

**Thaw the vials inside a biological safety cabinet or other enclosure in case they leak or explode.** Vials infrequently explode. If they do explode, they will explode early in the warm-up process. During warming of plastic vials, liquid can spray from the cap/vial interface with potential dissemination of the vial contents.

**Visually check each cryovial prior to filling it to ensure there are no defects around the rim. Never re-use cryovials.**

**Glass dewars should be wrapped with strong tape or enclosed in strong mesh material.** Avoid pouring a cryogenic liquid on or over the edge of a glass Dewar flask when filling or emptying the flask; the flask may break and implode. If broken, the implosion of the vacuum space can cause broken glass to fly off. If a crack occurs (especially on the inside) of a dewar, liquid can accumulate in the confined space that was previously evacuated. Metal dewars should have a pressure relief valve built into the vacuum shut off valve. Check any metal dewar that you use to determine whether such a safety feature is in fact present. In a glass dewar, which will not have a pressure relief valve, this kind of crack can lead to a violent explosion.

The boiling point of O<sub>2</sub> is -183°C and that of N<sub>2</sub> is -196°C. Therefore liquid O<sub>2</sub> will condense out of the air into a liquid N<sub>2</sub> bath<sup>M</sup>-This is of particular concern when liquid N<sub>2</sub> is used as a trap on a vacuum system. If the system is opened while the trap is still

on, liquid O<sub>2</sub> could condense from the air and could then combine with any organic material in the trap to create an explosive mixture. Therefore, a system with a liquid N<sub>2</sub> trap must not be opened to the atmosphere (even briefly) until the trap has been removed.

**If liquid nitrogen can seep into a vial, materials from inside the vial can seep into the liquid nitrogen.** Assume that your liquid nitrogen tank is contaminated with whatever you are storing inside. Take appropriate precautions to prevent exposure to stored materials.

**The work area where you store liquid nitrogen must be well ventilated.** Avoid inhaling air that has been cooled to near-cryogenic temperatures. Do not store liquid nitrogen containers in walk-in cold rooms or other areas where the air from the room is not ventilated. Rooms that contain appreciable amounts of liquid nitrogen should be fitted with oxygen meters and alarms. Do not put a cryogenic liquid into a household Thermos bottle or other insulated container ordinarily used to keep food or drinks cold.

Appropriate signage should always be used for unattended operation.