CSUDH

CALIFORNIA STATE UNIVERSITY, DOMINGUEZ HILLS

CHEMICAL HYGIENE PLAN

Revised: July 13, 2023

Contents

Introduction

Purpose

California State University, Dominguez Hills (CSUDH, "University") is committed to providing a healthy and safe working environment for the campus community, free from recognized hazards. The purpose of the Chemical Hygiene Plan (CHP) is to outline laboratory work practices and procedures which are necessary to ensure that members of the university community are protected from health hazards associated with chemicals with which they work.

Chemical Hygiene Plan Requirements

The general requirements of the CHP include:

- Providing employees with training and direction regarding chemical and physical hazards
- Providing the proper safety equipment
- Identifying those persons, organizations, faculty, or staff who are responsible for implementing the CHP
- Assuring access to medical consultation and examinations
- Maintaining records of employee exposures

Scope

The CHP applies to all university property that handles or stores potentially hazardous chemicals and all personnel who work in these facilities.

The California Code of Regulations (CCR) Title 8 Section 5191 defines a hazardous chemical as any chemical which is classified as a health hazard or simple asphyxiant in accordance with the Hazard Communication Standard (Section 5194).

Each laboratory will develop all procedures necessary to protect laboratory worker health and safety. The following chapters provide a recommended set of minimum procedures and guidelines for protecting persons working in a laboratory environment. Furthermore, the chapters may assist individual laboratories in developing laboratory-specific standard operating procedures.

For the purpose of this plan, a laboratory worker could mean a Principal Investigator, course or laboratory instructor, faculty member, laboratory technician, laboratory assistant, teaching assistant, research assistant or student.

The California Code of Regulations Title 8 Section 5191 defines a laboratory as a facility where "laboratory use of hazardous chemicals" occurs. "Laboratory" refers to a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis, and describes a facility that meets the following conditions:

A. Chemical manipulations are carried out on a "laboratory scale"
B. Multiple chemical procedures or chemicals are used
C. The procedures involved are not part of a production process nor in any way simulate a production process; and
D. The potential for laboratory worker exposure to hazardous chemicals is minimized by using protective laboratory practices and equipment.

The information presented in the CHP provides a broad overview of the information necessary for the safe operation of facilities using potentially hazardous chemicals and is not intended to be all inclusive. Departments, divisions, or other work units that handle hazardous chemicals with unusual characteristics not covered in the CHP must consult with Environmental Health & Safety (EHS) to establish handling procedures and develop relevant documentation.

Each laboratory will institute procedures necessary to protect laboratory worker health and safety. The following chapters provide a recommended set of minimum procedures and guidelines for protecting persons working in a laboratory environment and may assist individual laboratories in developing laboratory-specific standard operating procedures (SOPs).

Regulatory Requirements

Implementation of the necessary work practices, procedures, and policies outlined in this CHP is required by the following:

Title 8, California Code of Regulations, Section 5191, "Occupational Exposures to Hazardous Chemicals in Laboratories	http://www.dir.ca.gov/title8/5191.html
Title 8, California Code of Regulations, Sections 5200-5220, "Regulated Carcinogens"	https://www.dir.ca.gov/title8/sb7g16a110.html
Title 8, California Code of Regulations, Section 5154.1, "Ventilation Requirements for Laboratory-Type Hood Operations	http://www.dir.ca.gov/title8/5154_1.html

Other applicable regulations include those promulgated by the U.S. Department of Labor including 29 CFR 1910.1450 "Occupational Exposure to Hazardous Chemicals in Laboratories" (the "Laboratory Standard"). These regulations require that the CHP be readily available wherever potentially hazardous chemicals are used, handled, or stored. EHS will review and evaluate the effectiveness of the CHP at least annually and update it as necessary.

Rights and Responsibilities

Employees and other personnel who work in laboratories have the right to be informed about the potential health hazards of the chemicals in their work areas and to be properly trained to work safely with these substances. This includes custodial staff and other personnel who work to clean and maintain laboratories. All personnel working with potentially hazardous chemicals are encouraged to report (anonymously, if preferred) any concerns about unsafe work conditions to the EHS Department at 310-243-2895.

Faculty, students, and staff including Principal Investigators (PIs)/Laboratory Supervisors, have a duty to fulfill their obligations with respect to maintaining a safe work environment. All employees and other personnel working with potentially hazardous chemicals have the responsibility to conscientiously participate in training seminars on general laboratory safety and review and be familiar with the contents of the CHP. Those working with chemicals are responsible for staying informed about the chemicals in their work areas, safe work practices and proper personal protective equipment (PPE) required for the safe performance of their job. Failure to comply with these requirements will result in progressive disciplinary action in accordance with university policy and may result in temporary suspension of laboratory activities until corrective action is implemented.

The PI is responsible for the day-to-day management of laboratory safety and adherence to safe laboratory practices.

Deans and Department chairs are responsible for the broad implementation and enforcement of CSUDH's risk management, environmental health, and occupational safety policies by maintaining programs in their respective areas and providing a safe and healthy work environment.

EHS

Within the Department of EHS, the Chemical Hygiene Officer (CHO) has overall responsibility for the chemical hygiene program. The CHO for CSUDH is Ricardo Magallanes. The CHO may be contacted at (310) 243-3171or rmagallanes@csudh.edu. The CHO:

1. Works with faculty and staff to develop and implement appropriate chemical hygiene policies and practices.
2. Monitors procurement, use, and storage of hazardous materials.
3. Performs industrial hygiene monitoring.
4. Conducts inspections of laboratories.
5. Provides technical and regulatory guidance to faculty, staff, & students.
6. Provides laboratory safety training to faculty, staff, students.
7. Performs near-miss incident and/or accident investigations.
8. Reviews and evaluates the effectiveness of Chemical Hygiene Plan annually.

The EHS department supports faculty and researchers in carrying out their safety responsibilities. Staff have general knowledge in the fields of industrial hygiene, fire, chemical and occupational safety. EHS coordinates emergency response services and manages the hazardous waste disposal program.

A copy of this CHP is available at https://www.csudh.edu/ehs/health-safety-programs-policies/

Chemical Hygiene Committee

A CSUDH Chemical Hygiene Committee (CHC) was formed and meets monthly. The CHC's mission is to protect the health and safety of faculty, employees, students, and visitors from chemical hazards on campus. The CHC provides health and safety oversight to chemical related programs on campus and supports implementation of the CHP. The membership consists of:

- EHS Director
- Chemical Hygiene Officer
- Dean or designee from College of Natural and Behavioral Sciences
- Chair of Biology Department
- Chair of Chemistry Department
- Faculty Member(s)
- Laboratory Technician(s)

The purpose of the CHC is to establish and evaluate chemical hygiene policies and procedures for campus work practices including how chemicals are procured, managed, stored, used, disposed of and employee and students training to protect against injuries and illnesses. The CHC provides oversight to the campuses' laboratory health and safety program, continuously evaluates, and improves the effectiveness of chemical use across the campus.

Principal Investigator (PI)/Laboratory Supervisor

The PI/Laboratory Supervisor has responsibility for the health and safety of all personnel working in his/ her laboratory who handle hazardous chemicals. The PI/Laboratory Supervisor may delegate safety duties but remains responsible for ensuring that delegated safety duties are adequately performed**.** The PI/Laboratory Supervisor is responsible for:

1. Knowing all applicable health and safety rules and regulations, training and reporting requirements and standard operating procedures associated with chemical safety for regulated substances.

2. Ensuring that laboratory personnel he/she supervises receive instructions and training in safe work practices including but not limited to the use of personal protective equipment, location of emergency shower/eyewash stations, access to safety data sheets (SDSs), procedures for dealing with accidents, reporting incidents and any laboratory-specific or other specialized training in the CHP or other appropriate safety manual(s). Electronic records of training are encouraged.

3. Performing laboratory hazard assessments and identifying hazardous conditions or operations in the laboratory or other facility containing hazardous chemicals and determining safe procedures and controls and implementing and enforcing standard safety procedures.

4. Preparing and training on SOPs for experiments or chemicals as needed to ensure employees are adequately protected.

5. Providing prior approval for the use of hazardous chemicals in the PI/Laboratory Supervisor's laboratory or other facility with hazardous chemicals.

6. Consulting with EHS on use of higher risk materials, such as use of particularly hazardous substances, or conducting higher risk experimental procedures so that special safety precautions may be taken.

7. Maintaining an updated chemical inventory for the laboratory or facility.

8. Ensuring laboratory or other personnel under his/her supervision are familiar with the appropriate safety procedures.

9. Promptly notifying Physical Plant and/or EHS when engineering controls (e.g., fume hoods, emergency showers/eyewashes)and safety equipment (e.g., fire extinguishers, etc.) become non-operational.

10. Ensuring the availability of all appropriate PPE (e.g., laboratory coats, gloves, eye protection, etc.) and ensuring the PPE is maintained in working order.

11. Conducting periodic monthly self-inspections of research laboratory or facility and maintaining recordsof inspections and corrective actions taken.

Principal Investigator (PI)/Laboratory Supervisor (Cont.)

12. Promptly reporting of accidents and injuries to Human Resources. Serious injuries MUST be reported to the Workers' Compensation Program Manager in Human Resources immediately to allow for compliance with the CAL/OSHA 8-hour reporting requirement. Any doubt as to whether an injury is serious should favor reporting.

13. Informing non-laboratory personnel of potential laboratory-related hazards when they are required to work in the laboratory environment. Additionally, identifying and minimizing potential hazards to provide a safe environment for repairs and renovations.

14. The supervisor's duties, as defined in the Cal/OSHA Laboratory Standard and the CHP are the responsibility of the PI. For laboratories with no PI, the Supervisor's duties are assumed by the person with authority over all laboratory functions, such as course or laboratory instructor.

15. Ensuring that all work is conducted in accordance with the CHP and in compliance with the Cal/OSHA Laboratory Standard.

16. Define the location of "Controlled Work Areas" where toxic substances and potential carcinogens will be used and ensure that the inventory of these substances is properly maintained.

17. Monitoring the performance of laboratory workers to ensure that proper practices and safe techniques are being employed.

18. Enforcing the use of PPE when mandated or necessary.

19. Reporting incidents to EHS. Fill out required accident report forms and include procedures that will minimize the reoccurrence of that type of incident.

20. Ensuring that action is taken to correct workplace practices and conditions that may result in the release of toxic chemicals.

21. Ensuring proper disposal of unwanted and/or hazardous chemicals and materials through EHS.

22. Documenting and maintaining compliance with all applicable local, state, and federal regulatory requirements.

Principal Investigator (PI)/Laboratory Supervisor (Cont.)

23. Ensuring all containers (primary and secondary) within the laboratory are appropriately always labeled. Unattended containers must be appropriately labeled.

24. Identifying and minimizing potential hazards to provide a safe environment for repairs and renovations.

25. Promptly notify EHS upon acquiring or vacating a laboratory if hazardous waste disposal is required.

Personnel Who Handle Potentially Hazardous Chemicals

All personnel in research or teaching laboratories that use, handle or store potentially hazardous chemicals are responsible for:

1. Reviewing and following requirements of the CHP and all appropriate safety manuals and policies.

2. Following all verbal and written laboratory safety rules, regulations, and SOPs required for the tasks assigned.

3. Developing good personal chemical hygiene habits, including but not limited to, keeping the work areas safe and uncluttered.

4. Planning, reviewing and understanding the hazards of materials and processes in their laboratory research or other work procedures prior to conducting work.

5. Utilizing appropriate measures to control identified hazards, including consistent and proper use of engineering controls, PPE, and administrative controls.

6. Understanding the capabilities and limitations of PPE issued to them.

7. Gaining prior approval from the PI/Laboratory Supervisor for the use of restricted chemicals and other materials.

8. Consulting with PI/Laboratory Supervisor before using these particularly hazardous substances (PHS), explosives and other highly hazardous materials or conducting certain higher risk experimental procedures.

9. Immediately reporting all accidents and unsafe conditions to the PI/Laboratory Supervisor.

10. Completing all required health, safety and environmental training and providing written documentation to their supervisor.

11. Informing the PI/Laboratory Supervisor of any work modifications ordered by a physician as a result of medical surveillance, occupational injury or exposure.

12. All personnel share the responsibility of ensuring all chemical containers are properly labeled with the identity of the chemical constituents and hazards.

13. When working autonomously or performing independent research or work:

    - Reviewing the plan or scope of work for their proposed research with the PI/Laboratory Supervisor.

    - Notifying in writing and consulting with the PI/Laboratory Supervisor, in advance, if they intend to significantly deviate from previously reviewed procedures (Note: Significant change may include, but is not limited to, change in the objectives, change in PI, change in the duration, quantity, frequency, temperature or location, change in PPE, andreduction or elimination of engineering controls.)

    - Reviewing SOPs relevant to safety and health that are appropriate for their work.

    - Providing appropriate oversight, training and safety information to laboratory or other personnel they supervise or direct.

Responsibilities of Faculty, Students and Staff

- Understand and comply with the procedures outlined in the CHP.

- Understand and comply with all SOPs.

- Understand and comply with all training received.

- Understand the function and proper use of all PPE. Wear PPE when mandated or necessary.

- Report, in writing, to the PI of any significant problems arising from the implementation of the SOPs.

- Report to the PI all facts pertaining to every incident that results in exposure to toxic chemicals, and any action or condition that may exist that could result in an incident.

- Promote good housekeeping practices in the laboratory or work area.

- Employ the buddy system and avoid working alone in the laboratory. If measures cannot be taken to avoid working alone in the laboratory, it is the responsibility of the principal investigator to:

    - Review Working Alone or Independently Laboratory Policy

    - Fill out a Hazard Review Evaluation Form and submit to CHO

    - Have student(s) review the “Guidance for student(s) Working Alone in a Lab” tab

    - https://www.csudh.edu/ehs/health-safety-programs-policies/working-alone-or-independently-labo

- Contact the PI and/or the CHO if any of the above procedures are not clearly understood.

Lab Visitors

- Visitors to research labs must be approved and always supervised. Entry of visitors willnot be allowed during operations involving hazardous materials or equipment. Approved visitors shall be provided with all proper PPE.

- Children under the age of 18 are not allowed in any laboratories. Exceptions to this are participants are in special programs that have prior approval from the Department Chair.

- No pets are permitted in laboratories. Note that service animals are not considered pets and may be present in a laboratory. A clean, safe area should be provided.

Section 2: Hazard Communication

Hazard Communication Program

CSUDH has an established Hazard Communication Program that complies with CCR Title 8 Section 5194 the Cal/OSHA Hazard Communication Standard. The purpose of the University's Hazard Communication Program is to improve the detection, treatment, and prevention of occupational illness and disease while also supporting a workers' right to understand the hazards associated with their employment. It is further intended to ensure that departments and workers have the information necessary for them to know when they are working with or may be exposed to hazardous substances. This program is also intended to ensure that departments provide their employees with training in how to avoid exposure to hazardous substances and what to do if they are accidentally exposed to such substances.

The EHS office requires principal investigators to disclose hazardous materials inventory records to EHS if a hazardous chemical is used, handled, or stored in quantities equal to or greater than the following:

- Any amount of a chemical/compound/agent with a hazard characteristic of pyrophoric, water reactive, potentially explosive, acutely toxic, peroxide forming, strong corrosive, strong oxidizing, strong reducing, or irritant
- Any amount of chemical/compound/agent listed as a regulated carcinogen or reproductive hazard
- Any amount of compressed gas

EHS does not track buffers. Laboratory staff may choose to maintain such inventories for their own records.

Identification and Classification of Hazardous Chemicals

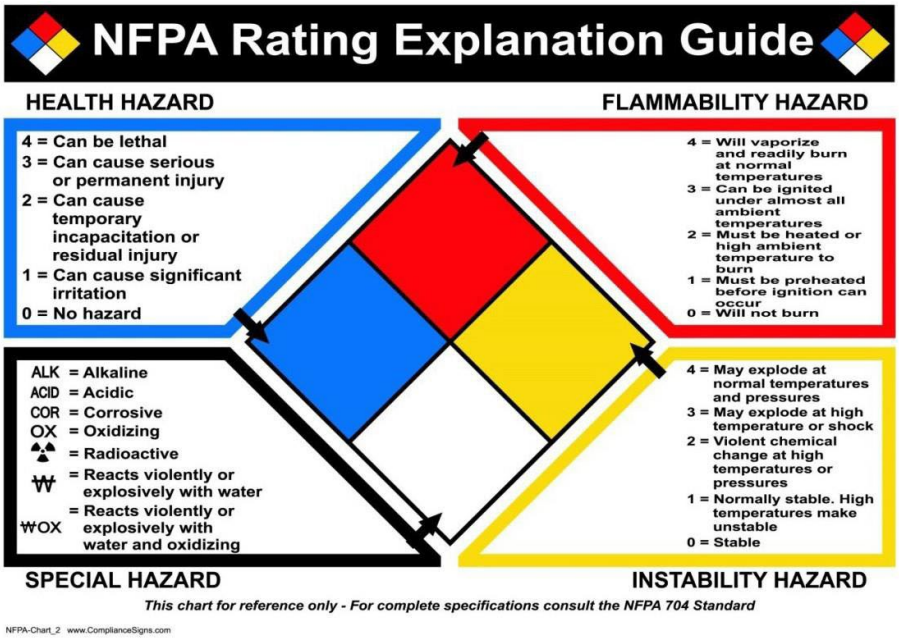
Chemicals can be divided into several different hazard classes. The hazard class determines how these materials should be stored and handled and what special equipment and procedures are needed to use them safely. Whether supplied by a vendor or produced in the laboratory, each chemical container must include labels that clearly identify the hazards associated with that chemical. In addition to specific chemical labels, hazard information for specific chemicals can be found by referencing the SDS for that chemical.

Any area where hazardous substances are used or stored must be labeled with a National Fire Protection Association (NFPA) placard which provide an overview of key chemical hazards contained within that room.

The NFPA 704 color-coded number system uses a color-coded diamond with four quadrants in which numbers are used in the upper three quadrants to signal degree of health hazard (blue), flammability hazard (red), and reactivity hazard (yellow). Furthermore, the diamond exhibits a 0-4 number rating that quickly supplies the hazard information broken down into four hazard classes:

- 0 - Minimal hazard
- 1 - Slight Hazard
- 2 - Moderate Hazard
- 3 - Serious Hazard
- 4 - Severe Hazard

The bottom quadrant is used to indicate special hazards. The NFPA system is good for alerting personnel of the degree of hazard of the chemical and helpful in drawing attention to storage needs and the necessary emergency equipment needed. The system does not indicate chronic health hazards.



Hazard Communication Standard Pictogram

Pictograms will be required as of June 1, 2015, on labels to alert users of the chemical hazards to which they may be exposed. Each pictogram consists of a symbol on a white background framed within a red border and represents a distinct hazard(s). The pictogram on the label is determined by the chemical hazard classification.

Health Hazard  ▪ Carcinogen ▪ Mutagenicity ▪ Reproductive Toxicity ▪ Respiratory Sensitizer ▪ Target Organ Toxicity ▪ Aspiration Toxicity	**Flame**  ▪ Flammables ▪ Pyrophorics ▪ Self-Heating ▪ Emits Flammable Gas ▪ Self-Reactives ▪ Organic Peroxides	**Exclamation Mark**  ▪ Irritant (skin and eye) ▪ Skin Sensitizer ▪ Acute Toxicity ▪ Narcotic Effects ▪ Respiratory Tract Irritant ▪ Hazardous to Ozone Layer (Non-Mandatory)
Gas Cylinder  ▪ Gases Under Pressure	**Corrosion**  ▪ Skin Corrosion/Burns ▪ Eye Damage ▪ Corrosive to Metals	**Exploding Bomb**  ▪ Explosives ▪ Self-Reactives ▪ Organic Peroxides
Flame Over Circle  ▪ Oxidizers	**Environment** (Non-Mandatory)  ▪ Aquatic Toxicity	**Skull and Crossbones**  ▪ Acute Toxicity (fatal or toxic)

The laboratory worker is responsible for understanding the types of hazards, recognizing the routes of exposure, and becoming familiar with the major hazard classes of chemicals. In the instance that the specific hazards associated with new compounds and mixtures are unknown, EHS recommends that all chemicals be treated as if they were potentially harmful and to use appropriate eye, inhalation, and skin protection equipment.

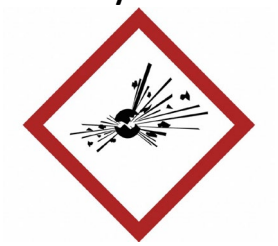
Flammability Hazards

A number of highly flammable substances are in common use in campus laboratories. In general, the flammability of a chemical is determined by its flash point, the lowest temperature at which an ignition source can cause the chemical to ignite momentarily. Flammable liquids include those chemicals that have a flashpoint of less than 140 degrees Fahrenheit. These materials must be stored in flammable storage cabinets if aggregate quantities of 10 gallons/room or more are stored in the lab. Chemicals with a flash point below 200 degrees F (93.3 degrees C) are considered "fire-hazard chemicals" and should be stored in a flammable solvent storage area or storage cabinets designed for flammable materials. Fire-hazard chemicals should be used only invented hoods and away from sources of ignition.

Flame-resistant laboratory coats must be worn when working with flammable materials and/or with procedures where a significant fire risk is present (e.g., when working with open flame, etc.).

These materials can constitute a significant immediate threat and should be treated with particular care, even though the use of these materials is fairly common in the laboratory setting. Particular attention should be given to preventing static electricity and sparks when handling flammable liquids.

Reactivity Hazards



Reactive and explosive substances are materials that decompose under conditions of mechanical shock, elevated temperature, or chemical action, and release of large volumesof gases and heat. Some materials, such as peroxide formers, may not be explosive, but may form explosive substances over time. These substances pose an immediate potential hazard and procedures which use them must be carefully reviewed. These materials must also be stored in a separate flame-resistant storage cabinet or, in many cases, in laboratory grade refrigerator orfreezer that are designed for flammable and reactive chemicals.

Pyrophoric chemicals are a special classification of reactive materials that spontaneously combust when in contact with air and require laboratory specific training. Flame-resistant laboratory coats must alwaysbe worn when working with pyrophoric chemicals.

Health Hazards

The term health hazard refers to any chemical that is classified as posing one or more of the following hazardous effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); aspiration hazard. The criteria for determining whether a chemical is classified as a health hazard are detailed in the Hazard Communication Standard (Section 5194) and Section 5194(c).

Corrosive Substances

As a health hazard, corrosive substances cause destruction of, or alterations in, living tissue by chemical action at the site of contact.

Major Classes of Corrosive Substances

Strong acids	Sulfuric, nitric, hydrochloric and hydrofluoric acids
Strong bases	Sodium hydroxide, potassium hydroxide and ammonium hydroxide
Dehydrating agents	Sulfuric acid, sodium hydroxide, phosphorus pentoxide and calcium oxide
Oxidizing agents	Hydrogen peroxide, chlorine and bromine.

Symptoms of exposure for inhalation include a burning sensation, coughing, wheezing, laryngitis, shortness of breath, nausea, and vomiting. For eyes, symptoms include pain, blood shot eyes, tearing, and blurring of vision. For skin, symptoms may include reddening, pain, inflammation, bleeding, blistering and burns.

As a physical hazard, corrosive substances may corrode materials they come in contact with and may be highly reactive with other substances. It is important to review information regarding the materials they may corrode, and their reactivity with other substances, as well as information on health effects. In most cases, these materials should be segregated from other chemicals and require secondary containment when in storage.

Irritants

Irritants are defined as non-corrosive chemicals that cause reversible inflammatory effects on living tissue by chemical action at the site of contact. A wide variety of organic and inorganic compounds, including many chemicals that are in a powder or crystalline form, are irritants.

The most common example of an irritant may be ordinary smoke which can irritate the nasal passages and respiratory system. Consequently, eye and skin contact with all laboratory chemicals should always be avoided.

Symptoms of exposure can include reddening or discomfort of the skin and irritation to respiratory systems.

Sensitizers

A sensitizer (allergen) is a substance that causes exposed people to develop an allergic reaction in normal tissue after repeated exposure to the substance. Examples of sensitizers include latex, diazomethane, chromium, nickel, formaldehyde, isocyanates, arylhydrazines, benzylic and allylic halides, and many phenol derivatives. Sensitizer exposure can lead to all of the symptoms associated with allergic reactions or can increase an individual's existing allergies.

The hazards of sensitizers typically fall under two categories: skin sensitization and respiratory sensitization. A workplace material is classified as a respiratory sensitizer only if it has caused sensitization reactions in a significant number of exposed workers. Skin sensitizers are classified using animal testing.

Skin sensitization – skin sensitizers can cause an allergic reaction, with redness, rash, itching, swelling or blisters at the point of contact or elsewhere on the body.

Respiratory sensitization – respiratory sensitizers can at first cause symptoms similar to a cold or mild hay fever. However, eventually severe asthmatic symptoms can develop in sensitized workers, including wheezing, chest tightness, shortness of breath, difficulty breathing and/or coughing. A severe attack can cause death.

Hazardous Substances with Toxic Effects on Specific Organs

Substances included in this category include:

- Hepatotoxins
    - i.e., substances that produce liver damage, such as nitrosamines and carbon tetrachloride
- Nephrotoxins
    - i.e., agents causing damage to the kidneys, such as certain halogenated hydrocarbons
- Neurotoxins
    - i.e., substances which produce their primary toxic effects on the nervous system, such as mercury, acrylamide and carbon disulfide
- Agents which act on the hematopoietic system
    - e.g., carbon monoxide and cyanides which decrease hemoglobin function and deprive the body tissues of oxygen
- Agents which damage lung tissue
    - e.g., asbestos and silica.

Symptoms of exposure to these materials vary. Staff working with these materials should review the SDS for the specific material being used and take special note of the associated symptoms of exposure.

Hazard Determination

The term "hazardous substance" refers to any chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed individuals. Hazardous substances include, but are not limited to, those chemicals listed in the following:

1. "The Hazardous Substance List", commonly known as the Directors List of Hazardous Substances, CCR, Title 8 Section 339 (*http://www.dir.ca.gov/title8/339.html*);

2. "Toxic and Hazardous Substances, Air Contaminants", CCR, Title 8 Section 5155 (*http://www.dir.ca.gov/title8/5155.html*);

Laboratory hazards are assessed through a web-based system provided by UC Risk and Safety Solutions (RSS) called ASSESSMENT. PIs/Lab Supervisors and Lab Technicians must complete and certify a laboratory hazard assessment for each laboratory and stockroom for which they are responsible for initially and whenever the hazards change. Lab personal are responsible for acknowledging the certified hazard assessment. The purpose of this assessment to identify hazards and determine the appropriate PPE to protect against the hazards identified.

Safety Data Sheets

A SDS previously referred to as Material Safety Data Sheet (MSDS), is a detailed document summarizing the hazards of a specific chemical. SDSs often include useful information on chemical, physical and toxicological properties, along with suggestions for storing, transporting, and disposing of specific chemicals. Every chemical that is received by the campus from a chemical supplier, donor, or other source must be accompanied by a corresponding SDS.

They vary in style and content, but all contain certain required sections. State and Federal law requires that all manufacturers and distributors of chemical products provide the end user with a manufacturer specific SDS. The primary method of accessing SDSs at CSUDH is through an electronic database called MSDS® Online. Instructions for accessing MSDS® Online are included in the Appendix. The goal of the SDS is to provide the user with a summarized, multi-source resource that informs the user of certain basic but necessary pieces of information regarding the substance they are about to use. The SDS informs the user about the material's physical properties and related health effects, personnel protective equipment necessary to protect the user, first aid treatment necessary in the event of an exposure, how to respond to accidents, and the planning that may be necessary in order to safely handle a spill.

Every laboratory or stockroom that uses chemicals must maintain the SDSs for that area. Laboratory workers must be able to demonstrate knowledge about their use and location. SDSs need to be kept in a location where everyone in the lab can readily access the information. SDSs must be available electronically or as a hard copy. Refer to the CSUDH Hazard Communication Program for more information on SDSs.

Request for Hazardous Waste Collection

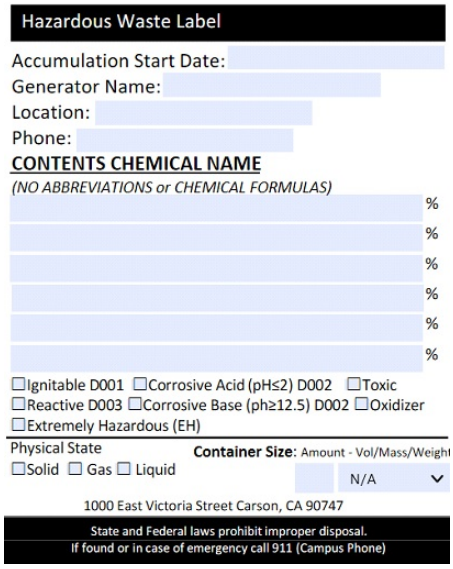
The EHS department is responsible for coordinating the transporting of hazardous waste from the laboratories to the central accumulation area. Arrangements can be made by contacting EHS. A hazardous waste collection form is available on the EHS website, and a copy included in the Appendix.

Once the pick-up form is received, EHS will pick up, transport, and store the hazardous waste properly until it is collected by our hazardous waste vendor. EHS details procedures for transportation as described in a separate document titled “Intra and Inter-Building Laboratory Hazardous Materials and Hazardous Waste Transportation Procedures”.

Requirements for Waste Storage

Chemicals must be stored in appropriate containers designed for chemicals.

- Store liquid waste in screw top containers only. (Do not fill containersmore than 80%.)
- Containers must be compatible with the contents.
- Food containers are not acceptable for storing chemicals.
- Attach a Hazardous Waste Identification Tag to container when waste isfirst generated and fill it out.
- Separate all incompatible wastes from one another using secondarycontainment such as pans, tubs, or cabinets.
- Liquid waste containers must be stored in secondary containment that is capable of holding 110% of the volume of the largest container.


Hazardous Waste Label

Accumulation Start Date:
Generator Name:
Location:
Phone:
CONTENTS CHEMICAL NAME
(NO ABBREVIATIONS or CHEMICAL FORMULAS)
%
%
%
%
%
%
☐Ignitable D001 ☐Corrosive Acid (pH≤2) D002 ☐Toxic
☐Reactive D003 ☐Corrosive Base (ph≥12.5) D002 ☐Oxidizer
☐Extremely Hazardous (EH)
Physical State
☐Solid ☐ Gas ☐ Liquid
Container Size: Amount - Vol/Mass/Weight
N/A
1000 East Victoria Street Carson, CA 90747
State and Federal laws prohibit improper disposal.
If found or in case of emergency call 911 (Campus Phone)

Hazardous Materials

Consideration must be given to providing sufficient engineering controls for the storage and handling of hazardous materials. No more than 10 gallons of flammable chemicals may be stored outside of an approved flammable storage cabinet. For refrigerated or frozen storage, flammable and explosive materials must be kept in refrigeration units specifically designed for storing these materials. Generally, these units do not have internal lights or electronic systems that could spark and trigger an ignition; additionally, the cooling elements are external to the unit. These units should be labeled with a rating from Underwriters Laboratory or other certifying organization

Secondary containment must be provided for corrosive and reactive chemicals and is recommended for all other hazardous chemicals. Secondary containment should be made of chemically resistant materials and should be sufficient to hold the volume of at least the largest single bottle stored in the container.

Laboratories that use hazardous materials must contain a sink, kept clear for hand washing to remove any final residual contamination. Hand washing is recommended whenever a staff member who has been working with hazardous materials plans to exit the laboratory or work on a project that does not involve hazardous materials.

Housekeeping

1. Do not block access to emergency equipment, showers, eyewashes, and exits, even with temporary equipment such as chemical carts.

2. Label appropriately all chemical containers with the identity of the contents and the chemical hazards.

3. Keep all work areas, especially laboratory benches, clean and clear of clutter.

4. Place chemicals in proper storage areas or cabinets at the completion of their use. They must not be stored in aisles, stairwells, or hallways, or on desks, laboratory benches, or floors.

5. Promptly clean up small spills; properly dispose of the spilled chemical and clean-up materials.

6. Use absorbent paper on working surfaces to avoid the spreading of spilled chemicals.

7. When transporting chemicals from one laboratory or area to another, place the chemical in a secondary container to avoid spillage.

Chemical Spills and Incidents

1. Use the CSUDH Emergency Response Guide posted in each laboratory for assistance.

2. Know your primary and alternate evacuation routes, as well as the location of the nearest safety shower and eyewash station.

3. See Section 9 for more information.

Section 3: Categories of Hazardous Chemicals

Particularly Hazardous Substances

OSHA recognizes that some classes of chemical substances pose a greater health and safety risk than others. To differentiate this different risk characteristic, OSHA identifies two categories of hazardous chemicals (29 CFR 1910.1450):

1. Hazardous chemicals; and
2. Particularly hazardous substances.

Substances that pose such significant threats to human health are classified as "particularly hazardous substances" (PHSs). Cal/OSHA regulation requires that special provisions be established to prevent the harmful exposure of researchers to PHSs, including the establishment of designated areas for their use.

Particularly hazardous substances are divided into three primary types:

1. Acute Toxins
2. Reproductive Toxins
3. Carcinogens

Acute Toxins

Acute toxins, or acutely toxic chemicals, are interpreted by OSHA as being substances that "may be fatal or cause damage to target organs as the result of a single exposure or exposures of short duration." Acutely toxic chemicals, associated chemical waste, and storage containers must be handled withcare to prevent cross contamination of work areas and unexpected contact. These chemicals must be labeled as "Toxic." Empty containers of these substances must be packaged and disposed of as hazardous waste without rinsing trace amounts into the sanitary sewer system.

Reproductive Toxins

Reproductive toxins are defined by the OSHA Laboratory Standard as *substances that cause chromosomal damage (mutagens) and substances with lethal or teratogenic (malformation) effects on fetuses*. These substances have adverse effects on various aspects of reproduction, including fertility, gestation, lactation, and general reproductive performance. Reproductive toxins can affect the reproductive health of both men and women if proper procedures and controls are not used. Many reproductive toxins are chronic toxins that cause damage after repeated or long-duration exposures with effects that become evident only after long latency periods. For women, exposure to reproductive toxins during pregnancy can cause adverse effects on the fetus such as embryo lethality (death of the fertilized egg, embryo or fetus), malformations and postnatal functional defects. For men, exposure can lead to sterility.

Examples of embryo toxins include thalidomide and certain antibiotics such as tetracycline. Women ofchildbearing potential should note that embryo toxins have the greatest impact during the first trimester of pregnancy. Because a woman often does not know that she is pregnant during this period of high susceptibility, special caution is advised when working with all chemicals, especially those rapidly absorbed through the skin (e.g., formamide).

Pregnant women and women intending to become pregnant should consult with their medical professional, laboratory supervisor and EHS before working with substances that are suspected to be reproductive toxins.

The reproductive toxicity of a chemical can be determined by consulting the applicable SDS.

Carcinogens

Carcinogens are chemical or physical agents that cause cancer. Generally, they are chronically toxic substances; that is, they cause damage after repeated or long-duration exposure, and their effects may only become evident after a long latency period. Chronic toxins are particularly insidious because they may have no immediately apparent harmful effects. These materials are separated into two classes:

1. Select Carcinogens
2. Regulated Carcinogens

Select carcinogens are materials which have met certain criteria established by the National Toxicology Program (NTP) or the International Agency for Research on Cancer (IARC) regarding the risk of cancer via certain exposure routes. It is important to recognize that some substances involved in research laboratories are new compounds and have not been subjected to testing for carcinogenicity. The following references are used to determine which substances are select carcinogens by Cal/OSHA's classification:

- Annual Report on Carcinogens published by the National Toxicology Program (NTP), including all of the substances listed as "known to be carcinogens" and some substances listed as "reasonably anticipated to be carcinogens"

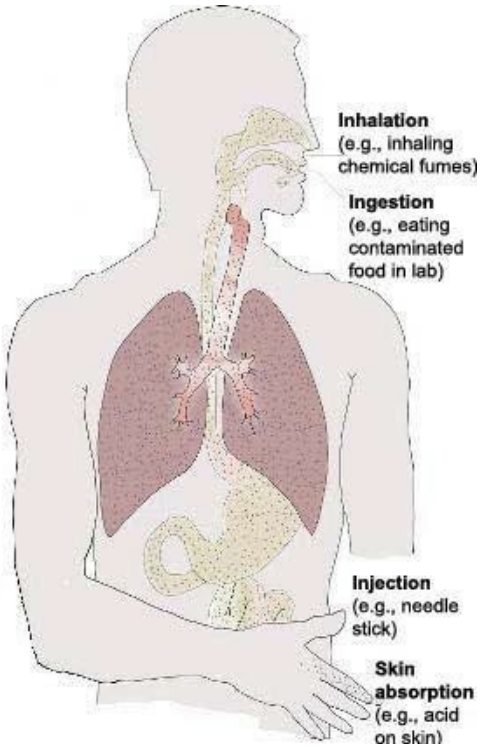
- IARC, including all of Group 1 "carcinogen to humans" by the International Agency for

Research on Cancer Monographs (Volumes 1-48 and Supplements 1-8); and some in Group 2Aor 2B, "reasonably anticipated to be carcinogens" by the NT), and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria: (i) 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 10 mg/m^3; (ii) after repeated skin application of less than 300 mg/kg of body weight per week; or (iii) after oral dosages of less than 50 mg/kg of body weight per day .

Regulated Carcinogens fall into a higher hazard class and have extensive additional requirements associated with them. The use of these agents may require personal exposure sampling based on usage. (For example, CSUDH has performed exposure sampling for methylene chloride use.) When working with Regulated Carcinogens, it is particularly important to review and effectively apply engineering and administrative safety controls as the regulatory requirements for laboratories that may exceed long term (8 hour) or short term (15 minutes) threshold values for these chemicals are very extensive. Because the majority of carcinogens are also mutagens (alter the genetic structure), they are capable of increasing the risk of cancer even in extremely low doses.

Therefore, no dose can be considered acceptable (a zero threshold). While Permissible Exposure Levels (PELs) have been established for toxic materials, for carcinogens, the Lowest Possible Exposure is the standard. CSUDH requires that Regulated Carcinogens be used with a fume hood unless prior approval is granted by EHS. See CSUDH’s SOP on Regulated Carcinogens for more information.

Section 4: How to Reduce Exposures to Hazardous Chemicals



Hazardous chemicals require a carefully considered, multi-tiered approach to ensure safety. There are four primary routes of exposure for chemicals which have associated health hazards:

- Inhalation
- Absorption (through the skin or eyes)
- Ingestion
- Injection (skin being punctured by a contaminated sharp object or uptake through an existing open wound).

Of these, the most likely route of exposure in the laboratory is by inhalation. Many hazardous chemicals may affect people through more than one of these exposure modes, so it is critical that protective measures are in place for each of these uptake mechanisms. Safety Controls are divided into three main classifications:

Safety Controls

Safety controls fall into three mains classes:

1. Engineering Controls
2. Administrative Controls
3. Personal Protective Equipment (PPE)

Elements of the three above classes are used in a layered approach to create a safe working environment.

Engineering Controls

Engineering controls include all “built in” safety systems. These controls offer the first line of protection and are highly effective in that they generally require minimal special procedures or actions on the part of the user except in emergency situations. Additionally, engineering controls often involve the replacement or elimination of hazards for a work environment. A fundamental and very common example is the laboratory fume hood which is very effective at containing chemical hazards and protecting users from inhalation hazards. Other examples of engineering controls include general room ventilation, flammable material storage units, and secondary containment.

Control Measures

Chemical safety is achieved by continual awareness of chemical hazards, by keeping the chemical under control, and by using precautions, including engineering safeguards such as fume hoods. Professors and laboratory supervisors should be alert to the failure of engineering controls and other safeguards. All engineering safeguards and controls must be properly maintained, inspected regularly, and never overloaded beyond their design limits.

General Laboratory Ventilation

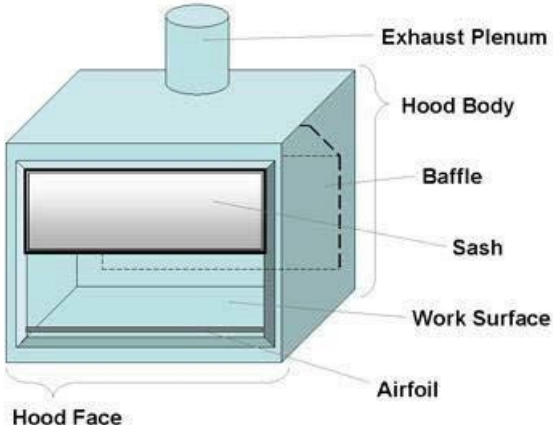
All laboratory rooms in which hazardous materials are used must have fresh air ventilation with 100% of the exhaust venting to the outside; laboratory rooms should not be part of recycled air systems. Laboratory rooms should be kept at negative pressure compared to public areas to prevent the spread of hazardous vapors.

Airborne Chemicals

All practical engineering and procedural controls should be employed to reduce any airborne chemical to its lowest possible concentration. At a minimum, vapor and particulate concentrations should be below the Cal/OSHA Permissible Exposure Limit (PEL), the Threshold Limit Value (TLV), or any similar limit. Tasks with potential airborne hazards that cannot be eliminated by engineering or administrative controls will not be authorized by EHS.

Fume Hoods

Fume hoods are a local exhaust system used on campus. Other methods include vented enclosures for large pieces of equipment or chemical storage, and portable exhaust systems for capturing contaminants near the point of release. Some systems are equipped with air cleaning devices (HEPA filters or carbon absorbers). Exhaust from fume hoods are designed to terminate at least ten feet above the roof deck or two feet above the top of any parapet wall, whichever is higher. The figure displays the key components of a fume hood.



It is advisable to use a laboratory hood when working with all hazardous substances. In addition, a laboratory hood or other suitable containment device must be used for all work with "particularly hazardous substances." A properly operating and correctly used laboratory hood can reduce or eliminate volatile liquids, dusts and mists. Fume hoods are evaluated for operation and certified on an annual basis. These annual evaluations check the fume hood air flow velocity to ensure that the unit will contain hazardous vapors. Data on annual fume hood monitoring will be maintained by Central Plant. A complete report of fume hood monitoring data must be kept for one year; summary data must be maintained for 5 years. Each fume hood should have a current calibration sticker and a marker indicating the highest sash height to be used when working with hazardous materials. Contact Central Plant for a hood evaluation if these labels are missing. Air flow for fume hood ventilation is measured at nine points. The average of the nine readings must be at least 100 linear feet per minute (lfm) with a minimum of 70 lfm for any measurement. The average face velocity should not exceed 160 lfm. Each fume hood must be equipped with at least one type of continuous quantitative monitoring device designed to provide the user with current information on the operational status of the hood. Many hoods also have motion sensors to determine when they are not in active use. These sensors will reduce the fume hood's air flow and support our energy savings effort. When hazardous materials are in a fume hood, but it is not under active use (e.g., during an unattended reaction or experiment), the sash should be closed. Fume hoods are not designed for storage of hazardous materials. Routine maintenance and repairs of fume hoods are conducted or coordinated by Central Plant. Hood users may route requests for hood repair directly by contacting EHS and/or completing a work order through Physical Plant. Make sure to indicate that the work order has been "generated as a result of a health and safety deficiency" and mark it "urgent – safety priority" in order to expedite processing. Central Plant will coordinate a re-inspection of the fume hood following maintenance or repairs.

Fume Hood Guidelines

The protection afforded by a fume hood is only as good as the work practices of the hood user. The following are general guidelines to be followed when working in the hood.

- Know the toxic properties of the chemicals with which you work. Be able to identify signs and symptoms of overexposure.
- Mark a line with tape six inches behind the sash and keep all chemicals and equipment behind that line during experiments. This will keep vapors from escaping the hood when air currents from people walking past the hood interfere with air flow at the face of the hood.
- Keep the sash completely lowered anytime there is no "hands-on" part of the experiment in progress or whenever the hood is on and unattended.
- **NEVER** use a hood unless there is an indication that it is functioning properly. The fume hood has agreen light indicating standard operation and adequate performance. A red light with a caution flow alarm indicates the valve is not functioning properly. The fume hood should not be used due to inadequate flow. Notify Physical Plant for fume hood repair.
- In an emergency such as a large spill inside the hood push the red button on the fume hood and close the sash. Leave the room and notify the instructional support technicians. If the spill occurs outside the fume hood push the red button and open the sash all the way. Leave the room immediately and also notify the technicians.
- The hood is not a substitute for PPE. Wear a lab coat, gloves, and safety glasses as appropriate.
- Visually inspect the baffles (openings at the top and rear of the hood) to be sure the slots are open and unobstructed.
- **DO NOT** block baffles. If large equipment is in the hood, put it on blocks to raise it approximatelytwo inches so that air may pass beneath it.
- **DO NOT** use an active hood as a storage cabinet. Keep only the materials necessary for the experiment inside the hood. If chemicals need to be stored in the hood for a period of time, install shelves on the side of the hood, away from the baffles.
- Keep the sash clean and clear.
- Clean all chemical residue in the hood after each use.
- All electrical devices should be connected outside the hood to avoid sparks that may ignite a flammable or explosive chemical.
- **DO NOT USE A FUME HOOD AS A WASTE DISPOSAL DEVICE**. Use traps and condensers whenever possible to collect vapors and fumes. Never use a hood to evaporate solvents. Instead, collect thesolvent and dispose of it as hazardous waste.
- **DO NOT USE A FUME HOOD FOR ANY FUNCTION FOR WHICH IT IS NOT INTENDED**. Certainchemicals or reactions require specially constructed hoods.

Glove Boxes and Ventilation Devices

In addition to fume hoods, some laboratories use contained glove box units for working with reactive chemicals under an inert environment, working with very toxic substances in a completely closed system, or for creating a stable, breeze free, system for weighing hazardous or reactive materials. These units can be very effective because they offer complete containment.

Other Engineering Controls

In addition to the elements listed above, consideration must be given to providing sufficient engineering controls for the storage and handling of hazardous materials. For refrigerated or frozen storage, flammable and explosive materials must be kept in refrigeration units specifically designed for storing these materials. Generally, these units do not have internal lights or electronic systems that could spark and trigger an ignition; additionally, the cooling elements are external to the unit. These units should be labeled with a rating from Underwriters Laboratory (UL) or other certifying organization

Storage Cabinets

Chemical storage cabinets must be labeled with the appropriate hazard (e.g., Flammable Liquids Only,Acid Only, Bases only).

Flammable Storage Cabinets

Cabinets designed for the storage of flammable materials should be properly used and maintained. Read and follow the manufacturer's instructions. Cabinets should be vented to fume hoods when necessary. Store only compatible materials inside a flammable storage cabinet. Do not store paper or cardboard or other combustible packaging material in a flammable-liquid storage cabinet. The manufacturer establishes quantity limits for various sizes of flammable-liquid storage cabinets; do not overload a flammable storage cabinet. No more than 10 gallons of flammable chemicals may be stored outside of an NFPA 30 approved flammable storage cabinet.

Corrosive Storage Cabinets

Cabinets designed for the storage of corrosive materials should be properly used and maintained. Read and follow the manufacturer's instructions. Only store compatible materials inside a corrosive storage cabinet. Segregate acids from bases and active metals.
Segregate oxidizing acids from organic acids and flammables from combustibles. Do not store paper, cardboard, or other combustible materials near oxidizing acids in a corrosive material storage cabinet. The manufacturer establishes quantity limits for various sizes of corrosive material storage cabinets; do not overload a corrosive storage cabinet.

Secondary containment must be provided for corrosive and reactive chemicals and is recommended for all other hazardous chemicals. Secondary containment should be made of chemically resistant materials and should be sufficient to hold the volume of at least the largest single bottle stored in the container.

Laboratories that use hazardous materials must contain a sink and kept clear for hand washing to remove any final residual contamination. Hand washing is recommended whenever a staff member who has been working with hazardous materials plans to exit the laboratory or work on a project that does not involve hazardous materials.

Refrigerators and Freezers

All refrigerators and microwaves located in the lab must be labeled with its purpose (e.g., No Food or Drink Allowed in this Refrigerator/Freezer).

Administrative Controls

Administrative controls consist of policies and procedures; they are not generally as reliable as engineering controls in that the user has to carefully follow the appropriate procedures and must be fully trained and aware in order to do so. EHS requires that each laboratory have safety procedures, which include safety practices, for any work that involves hazardous materials. In many cases, a general safe operating procedure can be created in consultation with the department, for a class of chemicals that have similar properties. For example, a laboratory group may have one set of safety guidelines for using acids in their laboratory if the acids used have similar properties and/or if the significant differences are delineated in the general procedure. In addition to safety procedures, laboratory groups must submit proposed changes in procedures to the department for review prior to implementation if these changes could pose an additional or significantly greater hazard then the standard procedure. These reviews are especially important in cases where immediate hazards are present such as large quantities of flammable material, explosives or highly reactive material, or highly toxic substances.

Purchasing Controls

Appropriate administrator/designee and Lead Instructinal Support Technicans are authorized to purchase most hazardous chemicals on their individual Purchase (P-cards). Purchase must be placed through the Campus Market place (CSUBUY) unless the required chemical or agent is not available through pre-approved suppliers.

https://www.csudh.edu/procurement/procurement-contracts/restricted-purchases-hazardous-materials

All chemicals, radioactive materials, controlled substances, select agents, and carcinogens regulated under 8 CCRSection 5209 intended for laboratory use (including research and teaching labs) must be purchased in accordance with the campus Chemical Hygiene Plan (CHP) and will require approval from Environmental Health and Safety (EHS) by emailing ehs@csudh.edu, prior to purchasing and entered into the campus Chemical Inventory. This requirement applies for expenditures using State or Auxiliary funds regardless of purchasing mechanism (P-cards, purchase orders, direct pay, and unauthorized purchases).

Designated Areas

A designated area is a space within a lab to be used for work with select carcinogens, reproductive toxins, and other materials with a high degree of acute toxicity.

A designated area can be a hood, glove box, portion of a laboratory, or an entire laboratory room where specific chemicals are used.

Designated areas shall be posted. Only properly trained lab workers are allowed to handle regulated chemicals in regulated areas.

Within the designated area, remember to follow these guidelines:

- Use the smallest amount of the material that is consistent with the requirements of the work to be done.
- Remove chemicals from storage only as needed and return them to storage as soon as practical.
- Decontaminate the designated area when work is completed. Store all Cal/OSHA-regulated chemicals in locked and enclosed spaces.
- Wear long-sleeved, disposable clothing and gloves known to resist permeation. Do not wear jewelry. Decontamination of jewelry may be difficult or impossible.

Research Laboratories & Stockroom Security Policy

SCOPE: This policy is mandatory for all lab personnel.

- Stockrooms shall be locked outside of normal work hours (7AM to 5 PM, Monday through Friday) and when unoccupied. Laboratory supervisors will determine the policy of locking doors during normal working hours.
- Research Labs shall be locked outside of normal work hours (7AM to 10 PM, Monday through Friday) and when unoccupied. Laboratory supervisors will determine the policy of locking doors during normal working hours.
- Entry to all research (non-teaching) labs and Stockrooms in Science & Innovation is restricted to trained, authorized key holders and other individuals authorized by the faculty in charge. The exception being that escorted guests are allowed into these labs by the laboratory supervisor, appropriate administrator, or staff member in charge.
- Students (graduate and undergraduate) may work alone in the laboratory outside of normal work hours if permission is granted by the laboratory supervisor and EHS. Hazardous work, as determined by the laboratory supervisor and EHS Office, may not be carried out after hours unless approved in writing by the laboratory supervisor and EHS Office.
- Key holders are responsible for the security of their keys. Keys shall remain on their person or otherwise secure when working in lab. Keys are not to be left on tables, desks, benches, or other areas in plain sight.
- Loaning of State keys is strictly regulated by California Penal Code 469.
- Keys to common-use areas shall be stored out of sight in secure locations within labs.
- Room access by custodians, FM workers, police, and other first responders shall be restricted unless it is an official matter or emergency i.e.
    - Active Shooter
    - Chemical Release/Spill
    - Medical Emergency
    - Maintenance/Repairs
    - Fire
- If an unauthorized individual gains access to your lab, inform them of the security policy and politely ask them to leave the lab. If needed, call Campus Police 911. Do not place yourself in danger by aggressively confronting unauthorized people. Let the police handle it.

New Procedures, Equipment, and Particularly Hazardous Materials

Evaluate any new procedure, equipment and or particularly hazardous materials with the laboratory supervisor and CHO.

Standard Operating Procedures

SOPs that are relevant to safety and health considerations must be developed and followed when laboratory work involves the use of hazardous chemicals (CCR, Title 8, Section 5191 (e)(3)(A)), especially for "particularly hazardous substances" (PHS). SOPs are written instructions that detail the steps that will be performed during a given experimental procedure and include information about potential hazards and how these hazards will be mitigated. SOPs should be written by laboratory personnel who are most knowledgeable and involved with the experimental process. The development and implementation of SOPs is a core component of promoting a strong safety culture in the laboratory and helps ensure a safe work environment.

While general guidance regarding laboratory work with chemicals is contained in this plan, PIs/Laboratory Supervisors are required to develop and implement laboratory-specific SOPs for certain hazardous chemicals and PHS that are used in their laboratories. The PI and all personnel responsible for performing the procedures detailed in the SOP shall sign the SOP acknowledging the contents, requirements and responsibilities outlined in the SOP. The SOPs shall be reviewed by qualified personnel and shall be amended and subject to additional review and approval by the PI where changes or variations in conditions, methodologies, equipment, or use of the chemical occurs. For certain hazardous chemicals, PHS, or specialized practices, consideration must be given to whether additional consultation with safety professionals is warranted or required.

Circumstances requiring prior approval from the PI/Laboratory Supervisor must also be addressed in laboratory specific SOPs. These circumstances are based on the inherent hazards of the material being used, the hazards associated with the experimental process, the experience level of the worker and the scale of the experiment. Circumstances that require prior approval include but are not limited to:

- Working alone in a laboratory
- Unattended or overnight operations
- The use of highly toxic gas of any amount
- The use of large quantities of toxic or corrosive gases
- The use of extremely reactive chemicals (e.g., pyrophoric chemicals, water reactive chemicals), or the use of regulated carcinogens outside of the fumehood.

EHS is also available to assist with the development of SOPs. SOPs must be developed prior to initiating any experiments with hazardous chemicals or PHS and are to be filed and maintained in the Laboratory Safety Manual where they are available to all laboratory personnel.

When drafting an SOP, consider the type and quantity of the chemical being used, along with the frequency of use. The SDS for each hazardous chemical or PHS that will be addressed in the SOP should be referenced during SOP development. The SDS lists important information that will need to

be considered, such as exposure limits, type of toxicity, warning properties, and symptoms of exposure. If a new chemical will be produced during the experiment, an SDS will not necessarily be available. In these cases, the toxicity is unknown, thus it must be assumed that the substance is particularly hazardous. As a mixture of chemicals will generally be more toxic than its most toxic component.

General Rules

- Avoid working alone when working with hazardous materials.
- Wear appropriate laboratory personal protective equipment/apparel (lab coats) at all times. (See Appendix for the PPE Equipment Reference Guide)
- When working with flammable chemicals, be certain that there are no sources of ignition near enough to cause a fire or explosion in the event of a vapor release or liquid spill.
- Use the appropriate shielding for protection whenever an explosion or implosion might occur.
- When using chemicals, all employees should know and constantly be aware of:
    - The specific hazards of each chemical, as determined from the SDS and other appropriate references.
    - The potential for any chemical to be hazardous and when in use to be treated as a hazardous material.
    - Appropriate safeguards for using each chemical, including PPE.
    - The location and proper use of emergency equipment, such as eyewashes and showers.
    - How and where to properly store each chemical when it is not in use. Proper personal hygiene practices.
    - The proper methods of transporting chemicals
    - Appropriate procedures for emergencies, including evacuation routes.
    - Spill clean-up procedures and proper waste disposal.

Laboratory Safety Equipment

New personnel must be instructed in the location of fire extinguishers, safety showers, and other safety equipment *before* they begin work in the laboratory. This training is considered part of the laboratory specific training that all staff members must attend.

Fire Extinguishers

All laboratories working with combustible or flammable chemicals must be outfitted with appropriate fire extinguishers. All extinguishers should be mounted on a wall in an area free of clutter or stored in a fire extinguisher cabinet. Research personnel should be familiar with the location, use and classification of the extinguishers in their laboratory.

Laboratory personnel are not required to extinguish fires that occur in their work areas and should not attempt to do so unless:

- It is a small fire (i.e., small trash can-sized fire)
- Appropriate training has been received
- It is safe to do so

Any time a fire extinguisher is used, no matter for how brief a period, the PI/Laboratory Supervisor, or most senior laboratory personnel present at the time of the incident, must immediately report the incident to the University Police.

Emergency Eyewash/Shower Stations

All laboratories using hazardous chemicals must have immediate access to safety showers with eyewash stations. Access must be available in **10 seconds** or less for a potentially injured individual and access routes must be kept clear. Safety showers must have a minimum clearance of 16 inches from the centerline of the spray pattern in all directions at all times; this means that no objects should be stored or left within this distance of the safety shower. Sink based eyewash stations and drench hoses are not adequate to meet this requirement and can only be used to support an existing compliant system.

In the event of an emergency, individuals using the safety shower should be assisted by an uninjured person to aid in decontamination and should be encouraged to stay in the safety shower for 15 minutes to remove all hazardous material. Safety shower/eyewash stations are tested by Physical Plant on a monthly basis. Any units which do not have a testing date within one month and/or are in need of repair should be reported immediately to Physical Plant 310-243-3804 and/or EHS at 310-243-3000 or 310-243-3012. Be prepared to provide the specific location of the defective equipment.

Emergencies

Refer to the University's Emergency Response Guide posted in each laboratory.

Fire Doors

Many areas of research buildings may contain critical fire doors as part of the building design. These doors are an important element of the fire containment system and should remain closed unless they are on a magnetic self-closing or other automated self-closing system.

Safe Laboratory Habits

As detailed above, a safety program must include layers of policies and protective equipment to allow for a safe working environment, but to achieve effectiveness, a number of fundamental elements must become basic working habits for the research community. Some of these elements are detailed below:

Chemical Handling:

- Properly label and store all chemicals. Use secondary containment at all times
- Deposit chemical waste in appropriately labeled receptacles and follow all other waste disposal procedures of the CHP
- Do not smell or taste chemicals
- Never use mouth suction for pipetting or starting a siphon
- Do not dispose of any hazardous chemicals through the sewer system
- Be prepared for an accident or spill and refer to the emergency response procedures for the specific material. Procedures should be readily available to all personnel.
- For general guidance, the following situations should be addressed:
    - Eye Contact: Promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention
    - Skin Contact: Promptly flush the affected area with water and remove any contaminated clothing. If symptoms persist after washing, seek medical attention

Equipment Storage and Handling:

- Store laboratory glassware with care to avoid damage. Use extra care with Dewar flasks and other evacuated glass apparatus; shield or wrap them to contain chemicals and fragments should implosion occur
- Use certified fume hoods, glove boxes, or other ventilation devices for operations which mightresult in release of toxic chemical vapors or dust. Preventing the escape of these types of materials into the working atmosphere is one of the best ways to prevent exposure
- Keep hood closed when you are not working in the hood
- Do not use damaged glassware or other equipment
- Do not use uncertified fume hoods or glove boxes for hazardous chemical handling
- Avoid storing materials in hoods
- Do not allow the vents or air flow to be blocked

Laboratory Operations:

- Keep the work area clean and uncluttered
- Seek information and advice about hazards, plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation
- If unattended operations are unavoidable, and have been approved by the PI/Laboratory Supervisor, place an appropriate sign on the door, leave lights on, and provide for containment of toxic substances in the event of failure of a utility service (such as cooling water)
- Be alert to unsafe conditions and ensure that they are corrected when detected
- Research staff and students should never work alone on procedures involving hazardous chemicals, biological agents, or other physical hazards
- Do not engage in distracting behavior such as practical jokes in the laboratory. This type of conduct may confuse, startle, or distract another worker

Food/Drink:

- No food or drink may be present or consumed in a laboratory or any other space in which hazardous materials are stored or handled.
- Do not smoke, chew gum, or apply cosmetics in areas where laboratory chemicals are present; wash hands before conducting these activities
- Do not store, handle, or consume food or beverages in storage areas, refrigerators, glassware, or utensils which are also used for laboratory operations
- Wash areas of exposed skin well before leaving the laboratory

Hazardous Waste:

The EHS department is responsible for coordinating the transporting of hazardous waste from the labs to the hazardous waste storage area. Arrangements can be made by contacting EHS. A hazardous waste collection form is available on the EHS website, and a copy included in the Appendix.

Personal Protection

PPE serves as a last line of defense against chemical exposures and is required by everyone entering a laboratory containing hazardous chemicals. The basic PPE requirements include, but are not limited to:

- Wearing closed-toe shoes and full-length pants, or equivalent, at all times when in the laboratory, with no visible skin showing below the pant hem.
- Utilizing appropriate PPE while in the laboratory and while performing procedures that involve the use of hazardous chemicals or materials
- Confining long hair and loose clothing
- Removing laboratory coats or gloves immediately on significant contamination, as well as before leaving the laboratory
- Avoiding use of contact lenses in the laboratory unless necessary. If they are used, inform supervisor so special precautions can be taken
- Using any other protective and emergency apparel and equipment as appropriate. Be aware of the locations of first aid kits and emergency eyewash and shower station

The primary goal of basic PPE is to mitigate, at a minimum, the hazard associated with exposure to hazardous substances. In some cases, additional, or more protective, equipment must be used. If a project involves a chemical splash hazard, chemical goggles are required; face shields may also be required when working with chemicals that may cause immediate skin damage. Safety goggles differ from safety glasses in that they form a seal with the face, which completely isolates the eyes from the hazard. If a significant splash hazard exists, heavy gloves, protective aprons and sleeves may also be needed. Gloves should only be used under the specific condition for which they are designed, as no glove is impervious to all chemicals. It is also important to note that gloves degrade over time, so they should be replaced as necessary to ensure adequate protection. EHS can provide assistance in selecting the appropriate glove type for the type of potential hazard.

How to Use and Maintain PPE

Personal protective equipment should be kept clean and stored in an area where it will not become contaminated. Personal protective equipment should be inspected prior to use to ensure it is in good condition. It should fit properly and be worn properly. If it becomes contaminated or damaged, it should be cleaned or repaired when possible, or discarded and replaced.

Protective Footwear

Protective footwear represents a wide range of foot protection. The need for protective footwear depends on specific job tasks and their potential foot hazards. The area supervisor will determine appropriate protective footwear for specific job tasks and hazards.

It should be noted that such protective footwear does not take the place of safe work practices and proper material handling equipment, which are always primary in safe work practices. Protective footwear is a secondary measure that is intended to prevent injury or reduce injury severity in the event of an accident.

Proper laboratory attire requires the use of closed-toe shoes (no sandals or open toed shoes) which are shoes with a closed heel and toe, preferably out of non-porous materials and non-skid heels.
Students may not compensate for their lack of closed-toe shoes by wearing disposable polypropylene shoe covers (booties).

For any questions or concerns regarding protective footwear, please contact EHS for more information.

Personal Hygiene

1. Promptly rinse with water whenever a chemical has contacted the skin.
2. Avoid inhalation of chemicals; do not sniff to test chemicals.
3. Do not use mouth suction to pipette anything; use suction bulbs or automatic pipettors.
4. Wash well with soap and water before leaving the laboratory.
5. Do not drink, eat, smoke, or apply cosmetics in the laboratory.
6. Do not bring food, beverages, tobacco, or cosmetics into chemical storage or use areas.

Contaminated Clothing/PPE

Laboratory clothing should protect street clothing and must be worn in any work area where hazardous substances are being used. The term “laboratory clothing” refers to a fully fastened laboratory coat, chemical resistant apron, or disposable chemical resistant jumpsuit. Protective clothing used in the laboratory should not be worn outside of the work area.

In cases where spills or splashes of hazardous chemicals on laboratory clothing or PPE occur, the clothing/PPE should immediately be removed and bagged in plastic to prevent the release of the chemical. Heavily contaminated clothing/PPE resulting from an accidental spill should labeled with a hazardous waste tag and be disposed of as hazardous waste. This applies to student and employee clothing/PPE.

Non-heavily contaminated laboratory student lab coats should be cleaned in the same lab where the contamination occurred. Employee lab coats leased by CSUDH should be cleaned and properly laundered by the cleaning vendor. The cleaning vendor must be informed about the contaminated lab coat (e.g., chemical that was spilled onto the coat and its potential health hazards) before they come in contact with the coat. Laboratory personnel should never take contaminated items home for cleaning or laundering.

The Lab Supervisor/PI or Instructor is responsible to make the determination on whether or not contaminated PPE/clothing should be cleaned or disposed of as hazardous waste. Consult with a Laboratory Technician or the CHO for additional support.

Respiratory Protection

Because wearing respiratory equipment places a physical burden on the user, laboratory workers must be medically evaluated and fit tested ***prior*** to wearing respiratory protection equipment. **No employee or student is permitted to wear a respirator without prior approval from EHS.** Laboratory workers who have questions or suspect an inhalation hazard in their work area should contact EHS.

Chemical Spills and Incidents

- Use the CSUDH Emergency Response Guide posted in each laboratory for assistance.

- Know your primary and alternate evacuation routes, as well as the location of the nearest safety shower and eyewash station.

Airborne Chemicals

All practical engineering and procedural controls should be employed to reduce any airborne chemical to its lowest possible concentration. At a minimum, vapor and particulate concentrations should be below the Cal/OSHA Permissible Exposure Limit (PEL), the Threshold Limit Value (TLV), or any similar limit. Tasks with potential airborne hazards that cannot be eliminated by engineering or administrative controls will not be authorized by EHS.

Section 5: Inventory, Labeling, Storage, and Transport

Chemical Inventories

Each laboratory group is required to maintain a current chemical inventory that lists the chemicals and compressed gases used and stored in the labs and the quantity of these chemicals. Specific storage locations must be kept as part of the inventory list to ensure that they can be easily located. Chemical inventories are used to ensure compliance with storage limits and fire regulations and can be used in an emergency to identify potential hazards for emergency response operations.

The chemical inventory list should be reviewed prior to ordering new chemicals and only the minimum quantities of chemicals necessary for the research should be purchased. As new chemicals are added to the inventory, each laboratory group must confirm that they have access to the SDS for that chemical. Where practical, each chemical should be dated so that expired chemicals can be easily identified for disposal. Inventory the materials in your laboratory frequently (at least annually) to avoid overcrowding with materials that are no longer useful and note the items that should be replaced, have deteriorated, or show container deterioration. Unneeded items should be returned to the storeroom/stockroom and compromised items should be discarded as chemical waste. Indications for disposal include:

- Cloudiness in liquids
- Color change Evidence of liquids in solids, or solids in liquids
- "Puddling" of material around outside of containers
- Pressure build-up within containers
- Obvious deterioration of containers
- Expired chemicals
- Chemical containers with unknown contents

Access to hazardous chemicals, including toxic and corrosive substances, should be restricted at all times. These materials must be stored in laboratories or storerooms that are kept locked when laboratory personnel are not present. Locked storage cabinets or other precautions are always recommended, and in some cases may be required in the case of unusually toxic or hazardous chemicals. Unusually toxic chemicals may include those that are associated with very low immediately dangerous to life or health (IDLH) conditions. For guidance on locked storage requirements, please contact the EHS at 310-243-3012. On termination or transfer of laboratory personnel, all related hazardous materials should be properly disposed of, or transferred to the laboratory supervisor or a designee.

Chemical Labeling

Every chemical found in the laboratory must be properly labeled. Most chemicals come with a manufacturer's label that contains the necessary information, so care should be taken to not damage or remove these labels. Each chemical bottle, including diluted chemical solutions, must be labeled with its contents and the hazards associated with this chemical. It is recommended that each bottle also be dated when received and when opened to assist in determining which chemicals are expired and require disposal. When new chemicals and compounds are generated by laboratory operations, these new chemical bottles must be labeled with the name, date, and hazard information; the generator or other party responsible for this chemical should be named on the container so that they may be contacted if questions arise about the container's contents.

Any shipment of chemicals delivered to the campus, including donated chemicals, that are not properly labeled must be rejected and sent back to the supplier.

Peroxide forming chemicals (e.g., ethers) must be labeled with a date on receipt and on first opening the bottle. These chemicals are only allowed a one-year shelf life and should be disposed of as hazardous waste in one year or tested for the presence of peroxides. These chemicals can degrade to form shock sensitive, highly reactive compounds and should be stored and labeled very carefully.

Particularly Hazardous Substances require additional labeling. Printable safety labels identify the specific hazard associated with each of these chemicals (carcinogen, reproductive toxin, acute toxin). In addition, the storage area where they are kept must be labeled with the type of hazard. These chemicals should be segregated from less hazardous chemicals to help with proper access control and hazard identification.

Primary Containers

- Identity of the hazardous substance(s)
- Appropriate hazard warnings
- Name and address of the manufacturer, importer or other responsible party.
- Hazardous substances may be transferred from its original container into another container (such as a spray bottle, pan, etc.). This other container is known as a secondary container.

Secondary Containers

- Identity of the hazardous substance(s)
- Appropriate hazard warnings

It is the responsibility of each employee to ensure that any secondary container they are using is properly labeled with either a copy of the original manufacturer's label or with a generic label. If the container is not properly labeled a label should be made with the required information.

Exception: Portable containers for immediate use during a single shift by a single employee who performs the transfer himself/herself are exempt from the labeling requirement under California's Hazard Communication Regulation.

Chemical Storage and Segregation

Establish and follow safe chemical storage and segregation procedures for your laboratory. Storage guidelines are included for materials that are flammable, oxidizers, corrosive, water reactive, explosive and highly toxic. The specific SDS should always be consulted when doubts arise concerning chemical properties and associated hazards. All procedures employed must comply with Cal/OSHA, Fire Code and building code regulations. Always wear appropriate PPE (e.g., laboratory coat, safety glasses, gloves, safety goggles, apron) when handling hazardous chemicals. Be aware of the locations of the safety showers and emergency eyewash stations. Each laboratory is required to provide appropriate laboratory-specific training on how to use this equipment prior to working with hazardous chemicals.

Chemical storage safety priorities:

Keep in mind that most chemicals have multiple hazards and a decision must be made as to which storage area would be most appropriate for each specific chemical. First you have to determine your priorities:

1. **Flammability.** When establishing a storage scheme, the number one consideration should be the flammability characteristics of the material. If the material is flammable, it should be stored in a flammable cabinet.
2. **Isolate.** If the material will contribute significantly to a fire (e.g., oxidizers), it should be isolated from the flammables. If there were a fire in the laboratory and response to the fire with water would exaggerate the situation, isolate the water reactive material away from contact with water.
3. **Corrosivity.** Next look at the corrosivity of the material, and store accordingly.
4. **Toxicity.** Finally, consider the toxicity of the material, with particular attention paid to regulated materials. In some cases, this may mean that certain chemicals will be isolated within a storage area. For example, a material that is an extreme poison but is also flammable, should be locked away in the flammable storage cabinet to protect it against accidental release.

There will always be some chemicals that will not fit neatly in one category or another, but with careful consideration of the hazards involved, most of these cases can be handled in a reasonable fashion.

General Recommendations for Safe Storage of Chemicals

Each chemical in the laboratory must be stored in a specific location and returned there after each use. Acceptable chemical storage locations may include corrosive cabinets, flammable cabinets, laboratory shelves, or appropriate refrigerators or freezers. Fume hoods should not be used as general storage areas for chemicals, as this may seriously impair the ventilating capacity of the hood. The illustration to the right depicts improper fume hood storage. Chemicals should not be routinely stored on bench tops or stored on the floor. Additionally, bulk quantities of chemicals (i.e., larger than one- gallon) should be stored in a separate storage area, such as a stockroom or supply room.

Laboratory shelves should have a raised lip along the outer edge to prevent containers from falling. Hazardous liquids or corrosive chemicals should not be stored on shelves above eyelevel and chemicals which are highly toxic or corrosive should be in unbreakable secondary containers.

Chemicals must be stored at an appropriate temperature and humidity level and should **never** be stored in direct sunlight or near heat sources, such as laboratory ovens. Incompatible materials should be stored in separate cabinets, whenever possible. If these chemicals must be stored in one cabinet, due to space limitations, adequate segregation and secondary containment must be ensured to prevent adverse reactions. All stored containers and research samples must be appropriately labeled and tightly capped to prevent vapor interactions and to alleviate nuisance odors. Flasks with cork, rubber or glass stoppers should be avoided because of the potential for leaking.

Laboratory refrigerators and freezers must be labeled appropriately with "**No Food/Drink**" and must never be used for the storage of consumables. Freezers should be defrosted periodically so that chemicals do not become trapped in ice formations. **Never** store peroxide formers (e.g., ether) in a refrigerator!

Storage of Flammable and Combustible Liquids

Large quantities of flammable or combustible materials should not be stored in the laboratory. The maximum total quantity of flammable and combustible liquids must not exceed **60 gallons** within a flammable storage cabinet. The maximum quantity allowed to be kept outside a flammable storage cabinet, safety can, or approved refrigerator/freezer is **10 gallons**.

Only the amounts needed for the current procedure should be kept on bench tops and the remainder should be kept in flammable storage cabinets, explosion proof refrigerators/freezers that are approved for the storage of flammable substances, or approved safety cans or drums that are grounded.

Always segregate flammable or combustible liquids from oxidizing acids and oxidizers. Flammable materials must **never** be stored in domestic-type refrigerators/freezers and should not be stored in a refrigerator/freezer if the chemical has a flash point below the temperature of the equipment. Flammable or combustible liquids must not be stored on the floor or in any exit access.

Handle flammable and combustible substances only in areas free of ignition sources and use the chemical in a fume hood whenever practical. Only the amount of material required for the experiment or procedure should be stored in the work area. Always transfer flammable and combustible chemicals from glass containers to glassware or from glass container/glassware to plastic. Transferring these types of chemicals between plastic containers may lead to a fire hazard due to static electricity. The transfer of flammable liquid from 5 gallon or larger metal containers should **not** be done in the laboratory.

Pyrophoric and Water Reactive Substances

Because pyrophoric substances can spontaneously ignite on contact with air and/or water, they must be handled under an inert atmosphere and in such a way that rigorously excludes air and moisture. Some pyrophoric materials are also toxic and many are dissolved or immersed in a flammable solvent. Other common hazards include corrosivity, teratogenicity, or peroxide formation. Only minimal amounts of reactive chemicals should be used in experiments or stored in the laboratory. These chemicals must be stored as recommended in the SDS. Reactive materials containers must be clearly labeled with the correct chemical name, in English, along with a hazard warning.

Suitable storage locations may include inert gas-filled desiccators or glove boxes; however, some pyrophoric materials must be stored in a flammable substance approved freezer. If pyrophoric or water reactive reagents are received in a specially designed shipping, storage or dispensing container (such as the Aldrich Sure/Seal packaging system), ensure that the integrity of that container is maintained. Ensure that sufficient protective solvent, oil, kerosene, or inert gas remains in the container while pyrophoric materials are stored. Never store reactive chemicals with flammable materials or in a flammable liquids storage cabinet.

Gas cabinets, with remote sensors and fire suppression equipment, are required. Gas flow, purge and exhaust systems should have redundant controls to prevent pyrophoric gas from igniting or exploding. Emergency back-up power should be provided for all electrical controls, alarms and safeguards associated with the pyrophoric gas storage and process systems. **Never** return excess reactive chemical to the original container. Small amounts of impurities introduced into the container may cause a fire or explosion.

For storage of excess chemical, prepare a storage vessel in the following manner:

- Dry any new empty containers thoroughly
- Insert the septum into the neck in a way that prevents atmosphere from entering the clean dry (or reagent filled) flask
- Insert a needle to vent the flask and quickly inject inert gas through a second needle to maintain a blanket of dry inert gas above the reagent
- Once the vessel is fully purged with inert gas, remove the vent needle then the gas line. To introduce the excess chemical, use the procedure described in the handling section below for long-term storage, the septum should be secured with a copper wire
- For extra protection a second same-sized septa (sans holes) can be placed over the first
- Use parafilm around the outer septa and remove the parafilm and outer septum before accessing the reagent through the primary septum.

Oxidizers

Oxidizers (e.g., hydrogen peroxide, ferric chloride, potassium dichromate, sodium nitrate) should be stored in a cool, dry place and kept away from flammable and combustible materials, such as wood, paper, Styrofoam, plastics, flammable organic chemicals, and away from reducing agents, such as zinc, alkaline metals, and formic acid.

Peroxide Forming Chemicals

Peroxide forming chemicals (e.g., ethyl ether, diethyl ether, cyclohexene) should be stored in airtight containers in a dark, cool, and dry place and must be segregated from other classes of chemicals that could create a serious hazard to life or property should an accident occur (e.g., acids, bases, oxidizers). The containers should be labeled with the date received and the date opened. This information, along with the chemical identity should face forward to minimize container handling during inspection. These chemicals must also be tested and documented for the presence of peroxides periodically. Minimize the quantity of peroxide forming chemicals stored in the laboratory and dispose of peroxide forming chemicals before peroxide formation.

Carefully review all cautionary material supplied by the manufacturer prior to use. Avoid evaporation or distillation, as distillation defeats the stabilizer added to the solvents. Ensure that containers are tightly sealed to avoid evaporation and that they are free of exterior contamination or crystallization.

Never return unused quantities back to the original container and clean all spills immediately. If old containers of peroxide forming chemicals are discovered in the laboratory, (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 the **EHS at 310-243-3000** for pick-up and disposal.

Corrosives

Store corrosive chemicals (i.e., acids, bases) below eye level and in secondary containers that are large enough to contain at least 10% of the total volume of liquid stored or the volume of the largest container, whichever is greater. Acids must always be segregated from bases and from active metals (e.g., sodium, potassium, magnesium) at all times and must also be segregated from chemicals which could generate toxic gases upon contact (e.g., sodium cyanide, iron sulfide).

Specific types of acids require additional segregation. Mineral acids must be kept away from organic acids and oxidizing acids must be segregated from flammable and combustible substances. Perchloric acid should be stored by itself, away from other chemicals. Picric Acid is reactive with metals or metal salts and explosive when dry and must contain at least 10% water to inhibit explosion.

Special Storage Requirements

Compressed Gas Cylinders

Compressed gas cylinders must be stored with the valve cap in place when not in use. Cylinders must be stored either chained or strapped to the wall or within a cylinder storage rack. The cylinders must be restrained by two chains (see Figure 6.3) or single strap to keep it secured. For wall storage, no more than three cylinders may be chained together in the laboratory. Bolted “clam shells” may be used in instances where gas cylinders must be stored or used away from the wall. Store liquefied fuel-gas cylinders securely in the upright position. **Cylinders containing certain gases are prohibited from being stored in a horizontal position, including those which contain a water volume of more than 5 liters.** Do not expose cylinders to excessive dampness, corrosive chemicals or fumes.

Certain gas cylinders require additional precautions. Flammable gas cylinders must use only flame-resistant gas lines and hoses which carry flammable or toxic gases from cylinders and must have all connections wired. Compressed oxygen gas cylinders must be stored at least 20 feet away from combustible materials and flammable gases. Cylinders must be stored away from hot and/or electrical equipment. Gas cylinder connections must be inspected frequently for deterioration and must never be used without a regulator. Never use a leaking, corroded or damaged cylinder and never refill compressed gas cylinders. When stopping a leak between cylinder and regulator, always close the valve before tightening the union nut. The regulator should be replaced with a safety cap when the cylinder is not in use. Move gas cylinders with the safety cap in place using carts designed for this purpose.

Liquid Nitrogen

Because liquid nitrogen containers are at low pressure and have protective rings mounted around the regulator, they are not required to be affixed to a permanent fixture such as a wall. However, additional protection considerations should be addressed when storing liquid nitrogen in a laboratory.

The primary risk to laboratory personnel from liquid nitrogen is skin or eye thermal damage caused by contact with the material. In addition, 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 possibility. Always use appropriate thermally insulated gloves when handling liquid nitrogen. Face shields may be needed in cases where splashing can occur.

Transporting Hazardous Chemicals

Precautions must be taken when transporting hazardous substances between the stockroom and laboratories. Chemicals must be transported between stockrooms and laboratories in break-resistant, secondary containers such as commercially available bottle carriers made of rubber, metal, or plastic, that include carrying handle(s) and which are large enough to hold the contents of the chemical container. If several items are needed, use a cart. Side rails on the cart and/or the use of the original shipping containers for the chemical bottles reduce the chances of an accidental chemical spill.

When transporting cylinders of compressed gases, always secure the cylinder with straps or chains onto a suitable hand truck and protect the valve with a cover cap. Avoid dragging, sliding, or rolling cylinders and use an elevator when possible.

Additionally, all containers should be capped with their screw on lid or cap. If transporting a container that does not have a screw on lid, such as glass beakers or test tubes, a rubber stopper or cork may be used to prevent spillage.

CSUDH Shipping & Receiving, Facility Trade Shops, Authorized Individuals, Contractors/Vendors, and EHS are the only entities able to deliver hazardous substances around campus.

For further information, on transporting hazardous chemicals on campus, you may refer to our Intra and Inter-Building Laboratory Hazardous Substances Transportation Procedure located:

https://www.csudh.edu/ehs/health-safety-programs-policies/

Section 6: Training

Employee Information and Training

EHS provides information and general laboratory safety training including the contents of this plan to all laboratory employees. Each department provides general laboratory-safety training and EHS can assist in providing annual hazard communication training. It is the responsibility of the PIs/Laboratory Supervisors, faculty members, or a person designated by them, to provide employees under their direction with information and training on the following:

- The hazards of chemicals and toxic materials that they will be using in the laboratory
- Potential hazards, safe work practices, engineering safeguards, and other personal protective measures available.
- How to use and care for PPE, and the emergency procedures to follow in the event of spills or accidental exposure to toxic or dangerous materials.
- The availability and location of SDSs and other reference material.
- Laboratory procedures, applicable SOPs, and associated safety practices. Employees should understand these practices before starting the procedure.

Effective training is critical to facilitate a safe and healthy work environment and prevent laboratory accidents. All PIs/Laboratory Supervisors must participate in formal safety training and ensure that all their employees have appropriate safety training before working in a laboratory.

Utilizing both classroom and online training will help meet this requirement.

Types of Training

All faculty, students and staff laboratory personnel must complete general safety training:

1. Prior to working in the laboratory
2. Prior to new exposure situations
3. As work conditions or work assignments change

Refresher training, for some courses, is also required for all laboratory personnel. EHS can assist by providing general classroom and online training, plus resource materials to assist laboratories inimplementing laboratory-specific training.

General Laboratory Safety Training

Faculty and staff working in a laboratory are required to complete general laboratory safety training, which includes:

- Review of laboratory rules and regulations, including the CHP
- Recognition of laboratory hazards
- Use of engineering controls, administrative controls, and PPE to mitigate hazards
- Exposure limits for hazardous chemicals
- Signs and symptoms associated with exposures to hazardous chemicals
- Chemical exposure monitoring
- Review of reference materials (e.g., SDS) on hazards, handling, storage, and disposal ofhazardous chemicals
- Procedures for disposing of hazardous chemical waste
- Fire safety and emergency procedures
- Information required by Section 3204 regarding access to employee exposure and medical records (annually required)

Laboratory-Specific Training

PIs/Laboratory Supervisors must also provide laboratory-specific training to faculty, students and staff. Topics that require specific training include:

- Location and use of the CHP, IIPP, SDS(s) and other regulatory information
- Review of IIPP and Emergency Management Plan, including location of emergency equipment and exit routes
- Specialized equipment SOPs
- Specialized procedures and protocols
- PHSs including physical and health hazards, potential exposure, medical surveillance, and emergency procedures

Documentation of Training

Accurate recordkeeping is a critical component of health and safety training. Per Cal/OSHA regulations, departments or laboratories are responsible for documenting health and safety training, including safety meetings, one-on-one training, and classroom and online training. EHS maintains General Laboratory Safety training records. Individual departments must maintain all other training records.

Section 7: Safety Inspections

EHS will assist laboratories and other facilities that use, handle or store hazardous chemicals to maintain a safe work environment and ensure compliance with regulations to fulfill CSUDH's commitment to protecting the health and safety of the campus community.

As part of this chemical safety program, EHS conducts annual inspections of laboratories and other facilities with hazardous chemicals to ensure the laboratory is operating in a safe manner and to ensure compliance with all federal, state and University safety requirements. The primary goal of inspection is to identify both existing and potential accident-causing hazards, actions, faulty operations and procedures that can be corrected **before** an accident occurs.

EHS uses a web-based inspection tool provided by UC RSS to conduct laboratory inspections. PIs/Lab supervisors will receive email notification of any required corrective actions from the inspection process.

EHS may require the cessation of any activity that is "Immediately Dangerous to Life and Health" (IDLH) until that hazardous condition or activity is abated.

The chemical safety inspection is comprehensive in nature and looks into all key aspects of working with hazardous chemicals. While inspections are a snapshot in time and cannot identify every accident-causing mistake, they do provide important information on the overall operation of a particular laboratory. They can also help to identify weaknesses that may require more systematic action across a broader spectrum of laboratories, and strengths that should be fostered in other laboratories. The complete inspection checklist can be found in the Appendix.
Specific inspection compliance categories include:

- Hazard Communication
- Emergency Preparedness and Safety Information
- General Safety
- Fume Hoods
- Fire Safety
- Hazardous Waste
- Electrical Safety
- Personal Protective Equipment (PPE)
- Housekeeping
- Chemical Storage and Compatibility

Notification and Accountability

The compliance program requires that PIs/Laboratory Supervisors and other responsible parties take appropriate and effective corrective action upon receipt of written notification of inspection findings. Serious deficiencies are required to be corrected within 48-hours; non-serious deficiencies must be corrected within 30-days. Failure to take corrective actions within the required timeframe will result in a repeat deficiency finding and an escalation of the notification to the Department Chair and Dean. Depending on the severity of the deficiency, it may be necessary to temporarily suspend research activities until the finding is corrected. In some cases, the PI may be required to provide a corrective action plan prior to resumption of research activities.

Recordkeeping Requirements

Accurate recordkeeping demonstrates a commitment to the safety and health of the CSUDH community, integrity of research, and protection of the environment. EHS is responsible for maintaining records of inspections, incident investigations, and training conducted by the EHS department. Per Cal/OSHA regulations, departments or laboratories must document health and safety training, including safety meetings, one-on-one training, and classroom and online training.

Additionally, the following records must be retained in accordance with the requirements of state and federal regulations:

- Incident records
- Measurements taken to monitor employee exposures
- Inventory and usage records for high-risk substances should be kept
- Any medical consultation and examinations, including tests or written opinions required by CCR, Title 8, Section 5191
- Medical records must be retained in accordance with the requirements of state and federal regulations

Section 8: Hazardous Chemical Waste Management

Regulation of Hazardous Waste

In California, hazardous waste is regulated by the Department of Toxic Substance Control (DTSC), a division within the California Environmental Protection Agency (Cal/EPA). Federal EPA regulations also govern certain aspects of hazardous waste management, since most of our waste is treated and disposed out of state. These hazardous waste regulations are part of the Resource Conservation and Recovery Act, or RCRA. Local enforcement authority is administered by the Los Angeles County Health Hazardous Materials Division.

Hazardous Waste Program

EHS coordinates the shipment and disposal of all hazardous waste generated on campus. Each laboratory employee must comply with university policy related to hazardous waste requirementsand all applicable regulations.

Laboratory personnel are responsible for identifying waste, labeling it, storing it properly in the laboratory, and transporting waste to the hazardous waste storage area or arranging for pick up through EHS.

The PI/Laboratory Supervisor is responsible for coordinating the disposal of all chemicals from his/her laboratories prior to closing down laboratory operations.

Definition of Hazardous Waste

EPA regulations define hazardous waste as substances having one of the following hazardous characteristics:

- **Corrosive:** pH < 2 or >12.5*
- **Ignitable**: Liquids with flash point below 60º C or 140º F [e.g. Methanol, Acetone]
- **Reactive**: Unstable, explosive or reacts violently with air or water, or produces a toxic gaswhen combined with water [e.g. Sodium metal]
- **Toxic**: Determined by toxicity testing [e.g. Mercury]

The EPA definition of hazardous waste also extends to the following items:

- Abandoned chemicals
- Unused or unwanted chemicals
- Chemicals in deteriorating containers
- Empty containers that have visible residues
- Containers with conflicting labels
- Unlabeled or unknown chemicals

Chemicals not in frequent use must be carefully managed to prevent them from being considered a hazardous waste.

Extremely Hazardous Waste

Certain compounds meet an additional definition known as “extremely hazardous waste”. This list of compounds includes carcinogens, pesticides, and reactive compounds, among others (e.g., cyanides, sodium azide, and hydrofluoric acid). The Federal EPA refers to this waste as “acutely hazardous waste”, but Cal/EPA has published a more detailed list of extremely hazardous waste. In California, we are required to follow both sets of regulations. If a waste generator has an extremely or acutely hazardous waste, there is a limit to the amount that they can store in the lab at one time. **One quart** of extremely or acutely hazardous waste can be stored before disposal is required. When one quart or more of extremely or acutely hazardous waste accumulates, the waste must be disposed of within three (3) days of reaching that point. If you have less than one quart, you have 90 days to accumulate the waste (same as hazardous chemical waste). It is suggested that if you are accumulating a waste that falls into this category, you should dispose of it before it reaches the one-quart limit. This way you will not have to be restricted by the three-day maximum time limit.

Proper Hazardous Waste Management

Training

All personnel who are responsible for handling, managing, or disposing of hazardous waste must attend training **prior** to working with these materials. Contact EHS for information regarding required training.

Waste Identification

All the chemical constituents in each hazardous waste stream must be accurately identified by knowledgeable laboratory personnel. This is a critical safety issue for both laboratory employees and the waste technicians that handle the waste once it is turned over to EHS. Mixing of incompatible waste streams has the potential to create violent reactions and is a common cause of laboratory accidents. If there is uncertainty about the composition of a waste stream resulting from an experimental process, laboratory workers must consult the PI/Laboratory Supervisor, the Chemical Hygiene Officer or the Environmental Compliance Specialist. In most cases, careful documentation and review of all chemical products used in the experimental protocol will result in accurate waste stream characterization.
The manufacturer’s SDSs provide detailed information on each hazardous ingredient in laboratory reagents and other chemical products, and also the chemical, physical, and toxicological properties of that ingredient.

Segregation and Storage

All hazardous waste must be managed in a manner that prevents spills and uncontrolled reactions. Stored chemicals and waste should be segregated by hazard class. Examples of proper segregation are:

- Segregate acids from bases
- Segregate oxidizers from organics
- Segregate cyanides from acids

Segregation of waste streams should be conducted in a similar manner to segregation of chemical products.

Chemicals must be stored in appropriate containers designed for chemicals.

- Store liquid waste in screw top containers only. (Do not fill containers more than 80%.)
- Containers must be compatible with the contents.
- Food containers are not acceptable for storing chemicals.
- Attach a Hazardous Waste Identification Tag to container when waste is first generated and fill it out.
- Separate all incompatible wastes from one another using secondary containment such as pans, tubs, or cabinets.
- Liquid waste containers must be stored in secondary containment that is capable of holding 110% of the volume of the largest container.

Incompatible Waste Streams

Mixing incompatible waste streams or selecting a container that is not compatible with its contents, is a common cause of accidents in laboratories and waste storage facilities. Reactive mixtures can rupture containers and explode, resulting in serious injury and property damage. All chemical constituents and their waste byproducts must be compatible for each waste container generated.

Unknowns

Unlabeled chemical containers and unknown/unlabeled wastes are considered unknowns. These containers must be labeled with the word “unknown”. Please do not mix unknowns.

Managing Empty Containers

Empty containers that held extremely hazardous waste must be managed as hazardous waste and brought to hazardous waste storage. Do not rinse or reuse these containers.
All other hazardous waste containers, if they are less than 5 gallons in size, should either be reused for hazardous waste collection, or should be cleaned and discarded or recycled. Proper cleaning involves triple rinsing the container, with the first rinse collected as hazardous waste. The labels should be completely defaced (remove it or mark it out completely). Dispose or recycle rinsed plastic or glass containers as regular trash or in a campus recycling bin.

Transportation

It is a violation of DOT regulations to transport hazardous waste in personal vehicles, or to carry hazardous waste across campus streets that are open to the public.

As a result, EHS provides pick-up services for all hazardous waste generators. These routine waste pick-ups are for routinely generated waste by the trade shops, instructional laboratories, and research laboratories.

Special pick-ups and laboratory clean-outs are available upon request for large volumes (more than 30 containers or 50 gallons). Contact EHS at 310- 243-3000 for pick up information and refer to the CSUDH procedure for hazardous waste transportation.

The transport of hazardous materials and or waste to the campus from elsewhere is prohibited.

Refer to the Hazardous Substances Transportation Program

https://www.csudh.edu/ehs/health-safety-programs-policies/

Disposal

Frequent disposal will ensure that waste accumulation areas in labs are managed properly, and that maximum storage volumes are not exceeded. CSUDH policy states that hazardous chemical waste can be stored in a laboratory for up to 90 days. Once a waste container is 90% full or it is near the 90-day time limit, it should be brought to the hazardous waste storage area.

Drain Disposal

CSUDH does not permit drain disposal of chemical wastes, unless a specific dilution and/or neutralization method for a consistent waste stream has been reviewed and approved by EHS. This applies to weak acid and base solutions. As indicated in previous sections, EPA hazardous waste definitions specify that materials with a pH between 2.5 and 12.5 are not hazardous wastes.

However, drain disposal of these materials is still not permitted, because local industrial wastewater discharge requirements have more restrictive pH thresholds.

Waste Not Accepted For Pick Up

Wastes that will **not** be accepted at Central Accumulation Area include:

- Biohazardous waste (medical waste, infectious materials, or biohazardous agents)
- Controlled Substances
- Reactive waste streams without a properly vented cap, or containers that are bulging, fuming or bubbling
- Leaking, overflowing, or contaminated containers, or containers that are compromised
- Bags that have protruding glass or other sharps, or bags that are ripped or punctured
- Wastes that require special handling procedures or have shipping restrictions
- Waste streams in incompatible containers

Hazardous Waste Controls

Administrative Controls

In order to reduce the amount of chemicals that become waste, administrative and operational waste minimization controls can be implemented. Usage of chemicals in the laboratory areas should be reviewed to identify practices which can be modified to reduce the amount of hazardous waste generated.

Inventory Control

Rotate chemical stock to keep chemicals from becoming outdated. Locate surplus/unused chemicals and attempt to redistribute these to other users or investigate returning unused chemicals to the vendor.

Operational Controls

Review your experimental protocol to ensure that chemical usage is minimized. Reduce total volumes used in experiments; employ small scale procedures when possible. Instead of wet chemical techniques, use instrumental methods, as these generally require smaller quantities of chemicals. Evaluate the costs and benefits of off-site analytical services. Avoid mixing hazardous and non-hazardous waste streams. Distill and reuse solvents if possible. Spent solvents can also be used for initial cleaning, using fresh solvent only for final rinse. Use less hazardous or non-hazardous substitutes when feasible.

Section 9: Chemical Spills and Fire Emergencies

Laboratory emergencies may result from a variety of factors, including serious injuries, fires and explosions, spills and exposures, and natural disasters. **Before beginning any laboratory task**, know what to do in the event of an emergency situation. Identify the location of safety equipment, including first aid kits, eye washes, safety showers, fire extinguishers, fire alarm pull stations, and spill kits. Plan ahead and know the location of the closest fire alarms, exits, and telephones in your laboratory. The University's Emergency Response Guide, posted in each laboratory, provides an overview of emergency response procedures.

For all incidents requiring emergency response, call University Police at 911 from a campus phone or (310) 243-3333 from a cell phone.

To obtain support from Facilities services from 8:00 AM – 7:00 PM Monday through Friday, employees should call the work control desk directly at Ext. 3804.

After hours, employees should call campus police at Ext. 3639.

Chemical Spills

Chemical spills must be cleaned up immediately only by trained personnel. Clean up the spill only if the following conditions are met:

- You know what the chemical (s) are, and the hazards associate with it/them
- You understand the clean-up protocols and you have adequate clean up materials in the laboratory
- You have the proper PPE to do the clean-up
- You feel comfortable and feel that no personal injuries will result from cleaning the spill

DO NOT clean up the spill if:

- The chemical is highly flammable
- A secondary situation exists that makes the area unsafe (such as a fire)
- The chemical hazard is "toxic". For example, do not attempt to clean up the following toxic chemicals:
    - Aromatic amines
    - Hydrazine
    - Bromines
    - Hydrofluoric acid
    - Carbon disulfide
    - Nitriles
    - Cyanides
    - Nitro-compounds
    - Ethers
    - Organic halides

Chemical spills become emergencies when:

- The spill results in a release to the environment (e.g., sink or floor drain)
- The material or its hazards are unknown
- Laboratory staff cannot safety manage the hazard because the material is too hazardous, or the quantity is too large

Small Chemical Spill:

A small spill is generally defined as less than 1 liter or 1 kilogram of chemical that is not highly toxic, does not present a significant fire or environmental hazard, and is not in a public area such as a common hallway. A small chemical spill should take less than 15 minutes to clean up. Small chemical spills can be cleaned up by laboratory personnel who have been trained in spill clean-up and with the appropriate materials. Some factors to consider when doing the cleaning are:

- The size area and quantity of the spill
- The availability of clean up equipment in the laboratory
- The toxicity and hazardous properties of the chemical
- Personal exposure to the chemical

Small Chemical Spill Procedures:

- Alert people in the surrounding immediately of the spill and evacuate all non-essential persons from the spill area
- Help anyone who has been contaminated. Use the emergency shower/eyewash and flush skin or eye for at least 15 minutes
- Work with another person to clean-up the spill. Do not clean-up a spill alone
- Check the chemical's SDS and/or container label to understand the recommended procedures for cleaning up the spill and the PPE to wear. Contact the CSUDH CHO with questions or to request additional support at 310-243-3000
- Wear the appropriate PPE as recommended by the chemical's SDS. At a minimum, eye protection and lab coat must be work during spill clean-up
- Turn off all ignition sources (flames, electrical devices) near the spill area
- Confine the spill to small area using spill kit contents and prevent others from entering the spill area
- Use the appropriate kit to neutralize and absorb inorganic acids and bases. Collect the residue in a clear plastic bag, place in the container, label the container with contents, and dispose it as hazardous chemical waste. Do not dispose of the chemical in the sink or in the trash can
- For other chemicals, absorb spill with vermiculite, dry sand, or diatomaceous earth
- Clean the spill area with soap and a small amount of water (if compatible with thechemical that was spilled). Handle the wastewater as chemical waste
- Collect the residue and place it in a clear plastic bag. Double bag the waste and label the bag as hazardous waste. Contact EHS at 310-243-3000 to schedule a hazardous waste

pick-up

Large Chemical Spill:

Large chemical spills include spills of 1 liter or 1 kilogram or more, spills of any quantity of highly toxic chemicals, or chemicals in public areas or adjacent to drains. Large chemical spills require emergency response. If the spill presents a situation that is immediately dangerous to life or health (IDLH) or presents a significant fire risk, activate a fire alarm, evacuate the area and wait for emergency response to arrive.

DO NOT attempt to clean up a large chemical spill.

Large Chemical Spill Procedures:

- Notify people in the area immediately of a chemical spill
- Attend to any injured or contaminated person(s) in the area. Use the emergency shower/eyewash and flush skin or eye for at least 15 minutes if it is safe to do so
- Turn off all ignition sources (flames, electrical devices) if it is safe to do so
- Evacuate the area and close the door. Avoid walking through contaminated areas or breathing vapors of the spilled material. Warn others not to enter
- Call University Police by dialing 911 from a campus phone or (310) 243-3333 from a cell phone
- Notify the EHS by dialing 310-243-3000
- Any employee with known contact with a particularly hazardous chemical must shower, including washing of the hair as soon as possible unless contraindicated by physical injuries
- Complete a CSUDH Incident Report and Investigation Form and following incident reporting procedures

Chemical Spill during Transportation, Outside the Laboratory

Chemical transportation is performed in accordance with the CSUDH Hazardous Materials and Hazardous Waste Transportation Procedures. Small spills that occur within laboratory buildings where there is access to a spill kit, SDSs, and proper PPE may be cleaned as described above. For chemicals spill during transportation, outside of laboratory spaces, perform the following:

- Secure the area and notify bystanders of the spill. Do not let anyone get near the spill
- Contact University Police by dialing 911 from a campus phone or (310) 243-3333 from a cell phone and follow the large spill procedures above as appropriate

Fire-Related Emergencies

If you encounter a fire, or a fire-related emergency (e.g., abnormal heating, smoke, burning odor), immediately follow these instructions:

- Pull the fire alarm and call 911 from a campus or (310) 243-3333 from a cell phone to notify the University Police
- Evacuate and isolate the area If properly trained, use portable fire extinguishers to facilitate evacuation and/or control a small fire (i.e., size of a small trash can), if safe to do so
- If possible, shut off equipment before leaving
- Close doors
- Remain safely outside the affected area to provide details to emergency responders
- Evacuate the building when the alarm sounds.
    - It is against state law to remain in the building when the alarm is sounding. If the alarm sounds due to a false alarm or drill, you will be allowed to re-enter the building as soon as the University Police and/or Fire Department determines that itis safe to do so
    - **DO NOT** go back in the building until the alarm stops and you are cleared to reenter.
- If your clothing catches on fire, go to the nearest emergency shower immediately. If a shower is not immediately available, then stop, drop, and roll. A fire extinguisher may be used to extinguish a person's clothing on fire
- Report any burn injuries to the supervisor immediately and seek medical treatment. Notify the University Police every time a fire extinguisher is discharged

Section 10: Injuries and Obtaining Medical Care

PIs/Laboratory Supervisors are responsible for ensuring that their employees receive appropriate medical attention in the event of an occupational injury or illness. Instructors are responsible for ensuring that students receive appropriate medical attention.

Major Injuries

For major or life-threatening injuries, immediately **call 911 from a campus phone or call University Police at 310-243-3333** to determine appropriate action. Paramedics may arrange for transport to Harbor UCLA Medical Center. For chemical exposures, print a copy of the Safety Data Sheet (SDS) and provide it to the paramedics.

Minor Injuries

For minor injuries, such as small cuts, minor burns, etc., use the first aid kit available in the lab or stockroom to stabilize the injury. Refer students with minor injuries to Student Health Center at (310) 243-3629.

Employees with minor, non-emergency, injuries should be treated using the first aid kit and sent to the following off-site occupational health facility for further evaluation and treatment.

Western Medical Center
21081 Western Avenue, Suite 150
Torrance, California 90501
Telephone: 310-782-3333

Injury Notifications

For employee injuries, notify the PI/Laboratory Supervisor. For student injuries, notify the Instructor. After medical care been initiated, notify EHS of injuries at 310-243-2895 and complete a CSUDH Incident Report and Investigation Form as described in Section 11.
The PI, Supervisor, or Instructor must notify the CSUDH Department Chair and the Associate Dean at 310-243-2547.

For all injuries/illnesses, including exposure or suspected exposure to toxic substances during normal working hours, contact the Workers' Compensation Program Manager at 310-243-3771 for information and instructions.

Serious occupational injuries, illnesses, and exposures to hazardous substances, including but not limited to amputations, lacerations with severe bleeding, burns, concussions, fractures and crush injuries must also be reported immediately to Human Resources.

Section 11: Reporting and Recordkeeping

For laboratory incidents and near-misses such as chemical spills, fires, chemical exposures, and major or minor injuries, the PI/Lab Supervisor or Instructor must complete an Incident Report and Investigation Form and submit it to ehs@csudh.edu. EHS will review each incident and may conduct an investigation. Incidents will be reviewed with an intent to improve health and safety performance and reduce risk.

EHS will ensure records are maintained for the results of:

- Environmental monitoring done to determine the presence and concentration of hazardous substances in laboratories and other campus facilities
- Fume-hood performance in laboratories
- Incident report and investigation forms
- Records required by regulatory agencies

Appendix

Personal Protection Equipment (PPE) Reference Guide

	If your activity or task involves:	Recommended PPE:
Chemicals	Solids of low or moderate toxicity	• Disposable gloves
	Minimal amount of liquids (less than 0.1 liters with acute or chronic toxicity)	• Safety glasses or googles • Appropriate chemical-resistant gloves • Clothing covering to knees
	More than minimal amounts of liquids with acute or chronic toxicity (pure chemicals, mixtures or solutions)	• Safety glasses or googles Appropriate chemical-resistant gloves • Lab coat • Acid-resistant apron if more than 4 liters of highly corrosive chemicals used • Consider flame-resistant lab coat if more than 4 liters of flammable liquids used
	Cryogenic liquids	• Safety glasses or goggles • Face shield required if handling cryovials stored in liquid phase • Insulated cryogenic gloves • Lab coat recommended
	Potentially-explosive compounds	• Safety goggles • Face shield • Heavyweight gloves • Fire-resistant lab coat
	Pyrophoric (air-reactive) solids or liquids	• Safety glasses or goggles • Face shield recommended • Fire-resistant gloves • Appropriate chemical resistant gloves • Fire-resistant lab coat
	Particularly hazardous substances including carcinogens, reproductive toxins, and reagents of high acute toxicity	• Safety glasses or goggles • Appropriate chemical resistant gloves • Lab coat • Respirators as needed
Biological Materials	BL1 microorganisms or viruses	• Disposable gloves
	BL2 microorganisms, viruses, viral vectors, human materials or Old World primate materials	• Disposable gloves • Lab coat
	Procedures without splatter guard when splashes or sprays are anticipated	• Safety glasses or goggles • Disposable gloves • Lab coat
Other Hazards	Handling hot surfaces and objects such as autoclaved materials and heated glassware	• Heat-resistant gloves • Lab coat
	Glassware under pressure or vacuum	• Safety glasses or goggles • Face shield recommended • Lab coat
	Cutting and connecting glass tubing	• Safety glasses or goggles • Cut-resistant gloves
	Loud equipment	• Ear plugs or earmuffs

One Glove Rule – Lab Glove Policy

Gloves should never touch door handles, elevator buttons, telephones or any surfaces outside of the laboratory.

ONE GLOVE RULE

If you transport materials from labs through common areas, use an ungloved hand to touch common surfaces and a gloved hand to carry the items.

Best lab safety practice is to package the material to allow handling the outer package without gloves and to contain the material if it were dropped.

Safety Data Sheets

OSHA® QUICK CARD™

Hazard Communication Safety Data Sheets

The Hazard Communication Standard (HCS) requires chemical manufacturers, distributors, or importers to provide Safety Data Sheets (SDSs) (formerly known as Material Safety Data Sheets or MSDSs) to communicate the hazards of hazardous chemical products. As of June 1, 2015, the HCS will require new SDSs to be in a uniform format, and include the section numbers, the headings, and associated information under the headings below:

Section 1, Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.

Section 2, Hazard(s) identification includes all hazards regarding the chemical; required label elements.

Section 3, Composition/information on ingredients includes information on chemical ingredients; trade secret claims.

Section 4, First-aid measures includes important symptoms/effects, acute, delayed; required treatment.

Section 5, Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.

Section 6, Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.

Section 7, Handling and storage lists precautions for safe handling and storage, including incompatibilities.

(Continued on other side)

For more information:

OSHA® Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov (800) 321-OSHA (6742)

OSHA 3493-02 2012

OSHA® QUICK CARD™

Hazard Communication Safety Data Sheets

Section 8, Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).

Section 9, Physical and chemical properties lists the chemical's characteristics.

Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.

Section 11, Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.

Section 12, Ecological information*
Section 13, Disposal considerations*
Section 14, Transport information*
Section 15, Regulatory information*

Section 16, Other information, includes the date of preparation or last revision.

*Note: Since other Agencies regulate this information, OSHA will not be enforcing Sections 12 through 15 (29 CFR 1910.1200(g)(2)).

Employers must ensure that SDSs are readily accessible to employees.
See Appendix D of 29 CFR 1910.1200 for a detailed description of SDS contents.

For more information:

OSHA® Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov (800) 321-OSHA (6742)

OSHA 3493-02-2012

Sample Standard Operating Procedure
The following items should be contained in a Standard Operating Procedure.

Department:
Date SOP Written:
Date SOP Approved by PI/Lab Supervisor:
Principal Investigator:
Lab Safety Coordinator/Lab Manager:
Lab Phone:
Office Phone:
Emergency Contact:
Locations covered by the SOP:
Type of SOP:

- ⎦ Process
- ⎦ Hazardous Chemical
- ⎦ Hazardous Class

Purpose:

Physical & Chemical Properties/Definitions of Chemical Group:

CAS #

Class:

Molecular Formula:

Form (physical state):

Color:

Personal Protective Equipment:

Engineering Controls:

First Aid Precautions:

Special Handling and Storage Requirements:

Medical Emergency:

Waste Disposal Procedures:

Safety Data Sheet Locations:

Protocol/Procedures:

Documentation of Training:

Source: UCLA

Permissible Exposure Levels

Permissible exposure limits (PELs) protect workers against the health effects of exposure to hazardous substances. PELs are regulatory limits on the amount or concentration of a substance in the air. They may also contain a skin designation.

PELs are based on an 8-hour time weighted average (TWA) exposure.

Federal OSHA Standards

https://www.osha.gov/dsg/topics/pel/

Cal/OSHA Standard

Permissible Exposure Limits for Chemical Contaminants

http://www.dir.ca.gov/Title8/5155table_ac1.html

Table AC-1

http://www.dir.ca.gov/Title8/ac1.pdf