



## **Laboratory Safety Inspection Training – Self-audits**

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Welcome to the University of California, Riverside online Laboratory Safety Inspection Training for self-audits.

# Lab Audit Training Objectives

Use the checklist to:

1. Assess injury and illness prevention measures
2. Determine regulatory compliance
3. Evaluate safe work practice

In addition:

1. Gain valuable safety and inspection tips
2. Learn the lab self-audit process
3. Complete online form (checklist and corrective action)

The image shows a screenshot of the UC Riverside Laboratory Safety Self-Audit Checklist form. The form is titled "UC RIVERSIDE Laboratory Safety Self-Audit Checklist" and includes instructions for use. It contains several input fields for auditor information and a section for inspection items with checkboxes for responses and a comments field.

**UC RIVERSIDE** Laboratory Safety Self-Audit Checklist

**Instructions:** Use this form to enter all responses to the lab safety self-audit checklist.  
Click the "SUBMIT" button below to send form to S&ES.  
CAI - Corrective action completed at time of inspection  
[NEW] - newly added checklist items or changes from previous checklists

Lab or Group Name:  Auditor Name:   
Department:  Auditor Title:   
Building Name:  2nd Auditor Name:   
Lab Room Number:  2nd Auditor Title:   
E-mail (where audit report will be sent):  Audit Date:

**INSPECTION ITEMS**

1. Are hazardous liquid chemicals stored in secondary spill containers?  
 YES  NO  N/A  CAI  
COMMENTS:

2. Are hazardous chemicals stored below eye level (<50")?  
 YES  NO  N/A  CAI  
COMMENTS:

3. Are flammable liquids in excess of 10 gallons being stored in an approved flammable storage cabinet?  
 YES  NO  N/A  CAI  
COMMENTS:

By the end of this training you should be able to perform a self-audit of your laboratory in accordance with the checklist.

In addition you will learn:

Valuable safety and inspection knowledge

How to recognize hazardous conditions

Verify the laboratory is in alignment with federal, state and UCR policies

Lab safety self-audit process

## Program Goals

- ✓ Promote a safe work environment
- ✓ Verify alignment with federal and state regulations
- ✓ Address weaknesses in lab practices



The goals of the self-inspection program includes:

Promoting a safe work environment

Verifying alignment with regulatory agencies

Address weaknesses in work practices

## Before you begin...



Safety Tip: Be sure to wear the appropriate PPE when entering the lab to perform an inspection.

Before you begin conducting your inspection of the lab, care should be taken to wear the appropriate PPE. Check the safety placard for the required PPE used in the lab.



**Storage trays** or **secondary containment** must be used to minimize the distribution of material in the event a container should leak or break.

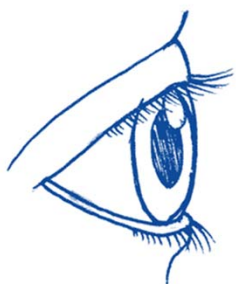
Notice in your lab the secondary containment provided for your hazardous waste bottles. This same principle can be applied to hazardous chemical storage.

Containment systems should have sufficient capacity to contain 110% of the total volume of stored containers.

Containers that do not contain free liquids should not be considered in this determination.

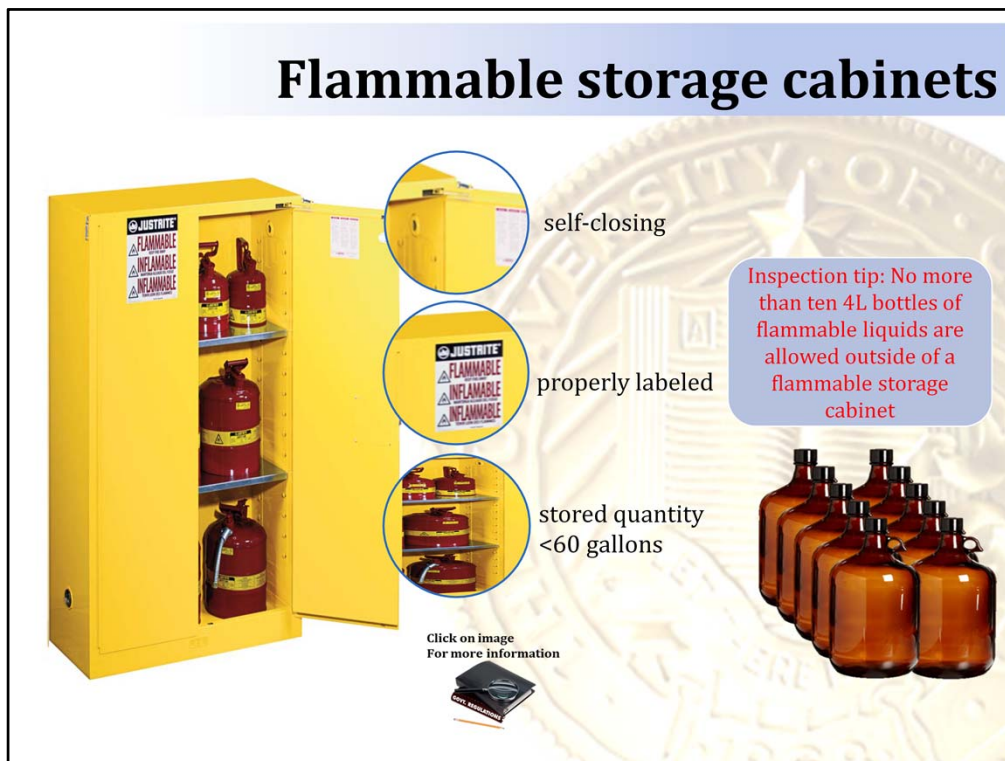
## Chemical storage convention

Chemicals should not be stored above eye level so that storage circumstances can always be easily evaluated (i.e. corroded containers or deteriorating container)



A best practice...store all hazardous laboratory chemicals **below eye level (<56"**). This simple task greatly reduces the likelihood of something falling from above, breaking and contaminating the laboratory or causing injuries. This practice is especially prudent when storing corrosive materials.

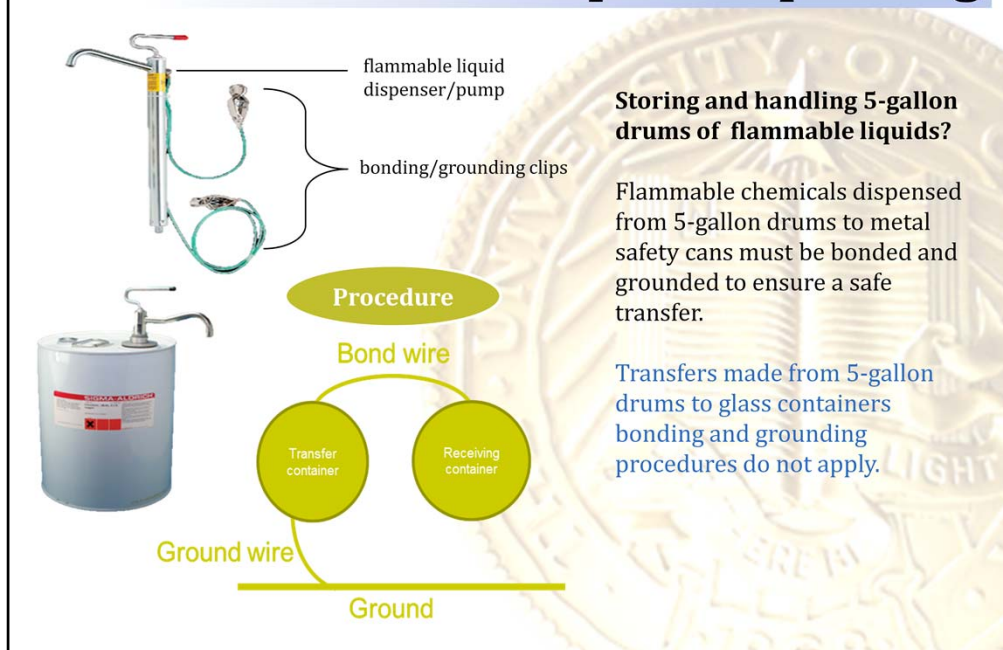
## Flammable storage cabinets



Inspect flammable storage cabinets by opening the doors and releasing them to determine whether the unit is self-closing. Be sure to note that the cabinet is labeled with the appropriate flammable warning message. Look around the lab to see that there are no more than 10 gallons of flammable liquids stored outside of the cabinet. The combined volume of **chemicals exceeding 10 gallons are required** to be stored in an approved flammable storage unit.

Cal OSHA 8CCR §5538, 5416

## Flammable liquid dispensing



Both bonding and grounding of containers of flammable liquids are required by state and federal regulations.

Transferring a liquid from one metal container to another may result in static electrical sparks. To prevent the build up of static electricity and prevent sparks from causing a fire, it is important to bond metal dispensing and receiving containers together before pouring.

You only need to bond those containers that conduct electricity, such as those made from metal or special, conductive plastics.

If a container is made from a material that does not conduct electricity, such as polyethylene plastic or glass, bonding or grounding is not necessary: in fact grounding the container will not have any effect .

Cal OSHA 8CCR §5168





Chemical spill kits must be readily available in the laboratory and lab personnel **trained** on how to use the kit in the event of an accidental release.

All personnel who work in a laboratory are expected to be prepared to clean up spills that are likely to occur in their work areas.

Be sure that each lab member **knows the location** of the spill kit in the lab and is familiar with UCR policy regarding spill control.

Standard kits include acid/base neutralizers, spill pads, collection equipment and personal protective equipment. You can customize a spill kit to meet the potential risks associated with the materials used in your laboratory.

Complete spill kits and accessories are **available at the campus storehouse**.

## Incompatible storage



**Keep** chemical groups **separate** by using:

- Secondary containment
- Cabinets
- Partitions
- Distance

Click on image  
For more information



Keep flammable and combustible liquids away from strong oxidizing agents, such as nitric or chromic acid, permanganates, chlorates, perchlorates and peroxides.

Keep acids separate from bases to avoid exothermic reaction (heat release) and residue formation that results in exterior contamination of chemical bottles.

Chemical groups should be kept separate by using:

Secondary containment

Cabinets

Partition (noncombustible)

Distance (no less than 18" above and to the sides of the stored material)

Cal OSHA 8CCR §5164

## Hydrofluoric Acid (HF)

**Inspection tip:** If your lab uses HF a "Yes" or "No" response should be entered onto the checklist. All others enter "N/A"

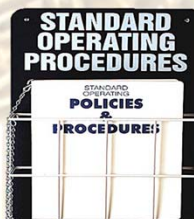
### HF antidote



Hydrofluoric acid requires careful handling and storage. Ensure the lab has an SOP for HF. HF is used for etching glass in industrial applications making it highly incompatible with glass. Be sure to verify that this chemical is being stored in plastic, polyethylene-type containers. In addition, calcium gluconate is used to treat HF exposure on the skin. Maintain an up-to-date tube of calcium gluconate in an easily accessible area preferably inside the first aid kit. Discard tube and any unused gel after use or upon expiration. Cal OSHA 8CCR §5191

## Pyrophoric materials

**Inspection tip:** If your lab uses pyrophoric chemicals a “Yes” or “No” response should be entered onto the checklist. All others enter “N/A”



Pyrophoric chemicals are **INCOMPATIBLE** with:

Air and water



**Pyrophoric materials** are substances that ignite instantly upon exposure to oxygen. They can also be water-reactive, where heat and hydrogen (a flammable gas) are produced. Due to the extremely hazardous nature of pyrophoric materials it is especially important that the lab has written PI-approved standard operating procedures available. Pyrophoric materials are to be stored and handled in accordance with the SOP.

Cal OSHA 8CCR §5191

## Time-sensitive chemicals



The following steps should be taken when storing and handling time-sensitive chemicals:

- Label container with the date of receipt and date first opened
- Do not use or test materials after manufacturer's expiration date

DUAL HAZARD : FIRE AND EXPLOSION



Check the bottle for white crystal formation



Check bottle for date labeling



Storage away from heat and light sources



Time sensitive chemicals are any chemical or chemical product that develops additional hazards upon prolonged storage.

Time-sensitive chemicals include:

Peroxide- formers (most common)

The following steps should be taken when storing and handling time-sensitive chemicals:

Label container with the date of receipt and date first opened

Tag time-sensitive materials

Do not use or test materials after manufacturer's expiration date

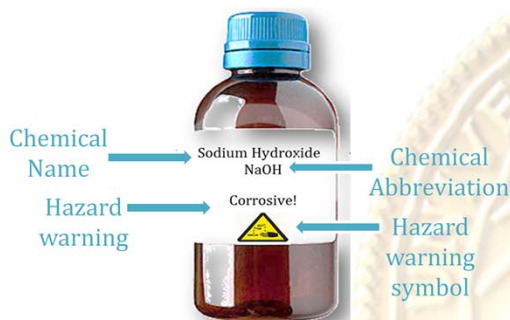
If you discover time-sensitive chemicals that have expired or are outdated:

**DO NOT TOUCH THE BOTTLE**

Visually inspect for water content

If you determine that the container may have crystals – immediately secure the area and notify EH&S (2-5528)

# Transfer storage container labeling



Chemical name	Abbr.	Safety data
acetic acid	CH <sub>3</sub> COOH	POISON DANGEROUS Corrosive. Liquid and mist cause severe burns to all body tissue. May be fatal if swallowed. Inhalation of mist. Irritation may cause long and health damage. Flammable liquid and vapor.
ammonia	NH <sub>3</sub>	POISON DANGEROUS Corrosive alkaline solution. Causes burns to any area of contact. Irritating to respiratory tract if inhaled through skin.
ammonium oxalate	(NH <sub>4</sub> ) <sub>2</sub> C <sub>2</sub> O <sub>4</sub>	POISON DANGEROUS May be fatal if swallowed or absorbed through skin and eyes. May cause blindness.
barium chloride	BaCl <sub>2</sub>	DANGEROUS May be fatal if swallowed. Irritating if inhaled. May cause irritation to skin, eyes, and respiratory tract. Irritant. Irritates the eyes and upper respiratory system.
butylphenol blue		Caution: Irritating to skin, eyes, and respiratory tract.
calcium carbonate	CaCO <sub>3</sub>	CAUTION May cause irritation to skin, eyes, and respiratory tract. Non-toxic dust.
cobalt chloride	CoCl <sub>2</sub>	Moderately toxic by ingestion, skin contact, and inhalation.
copper metal	Cu	Toxic in metallic form.
copper sulfate	CuSO <sub>4</sub>	Moderately toxic by ingestion, skin contact, and inhalation.
diaminodiphenylmethane dihydrochloride		IRITANT Irritating to eyes, respiratory system and skin. In case of contact with skin, wash immediately with plenty of water and seek medical advice. Wear suitable gloves and eye/face protection.
Diocetyl sebacate		No known toxicity. Should be supplied in a fume hood.
disodium phosphate tribasic	EDTA	Non-toxic. The biological properties of this material have not been fully investigated. May be harmful if swallowed. Causes eye and skin irritation. Causes digestive and respiratory tract irritation.

**Safety tip:** Transfer vessels such as squirt bottles, beaker, flasks, and safety cans containing hazardous materials should be labeled



- The contents of all chemical containers, including but not limited to beakers, flasks and reaction vessels are to be properly identified.
- Chemical abbreviations and annotations can be used on secondary containers as long as a list is prominently posted indicating the chemical name and hazard indication attached to each abbreviation.
- To avoid accidents and orphan chemical bottles, all chemical containers must be properly labeled with the following:
  - Chemical name
  - Concentration (if applicable)
  - Hazard warning(s)
  - Date of transfer to the vessel (good practice)
  - Cal OSHA 8CCR §5164, 5191, 5194

## Compressed gas cylinders



**Safety tip:** In the wake of the Northridge earthquake, UC campuses adopted the 1/3 and 2/3 height of the container as a standard for securing compressed gas cylinders to walls using straps or chains.

In general, compressed gas cylinders must be:

- Stored upright
- Secured from falling over
- Capped with a valve cover when not in use.
- Segregated and labeled

In general, compressed gas cylinders must be:

stored upright

secured from falling over

Have protective valve cap in place when not in use.

Segregated and labeled with the contents and associated hazard.

In the wake of the Northridge earthquake, UC campuses adopted the 1/3 and 2/3 height of the container as a standard for securing compressed gas cylinders to walls using straps or chains.

Cal OSHA 8CCR §4650, 5191

# Controlled substances



**Use log and inventory records** kept up-to-date, including:  
Amounts purchased  
Amounts used  
Amounts left on hand  
Amounts disposed of

**Schedule I & II** (i.e. morphine, pentobarbital)

Must be stored in a safe or steel cabinet equivalent

**Schedule III, IV & V** (i.e. chloral hydrate, phenobarbital)

Must be stored in a safe locked drawer or cabinet that is inaccessible from above and below

Detailed **use log and inventory records** must be kept up-to-date, including:

Amounts purchased  
Amounts used  
Amounts left on hand  
Amounts disposed of

Controlled substance use authorization (CSUA) must be on file to possess and use controlled substances for the purpose of research, teaching, veterinary care or clinical trial.

**CSUA must be renewed every 3 years.**

UCR Controlled Substances Program



# Chemical inventory



Inspections are to be performed **quarterly**...

**Conduct** a physical inventory – **REMEMBER TO WEAR PPE!**

**Update** the chemical inventory online and include:

- Exact location
- Chemical name
- Container size and contents
- Container type
- Chemical manufacturer

**Complete** the Chemical Inventory Confirmation form.

**Verify** chemical inventory update status by contacting [ehshazmat@ucr.edu](mailto:ehshazmat@ucr.edu)

Each Principal Investigator (PI) is required to maintain a current inventory of all potentially hazardous chemicals stored, used, or produced within each laboratory that is under their responsibility. The laboratory's chemical inventory list should be updated on a quarterly basis, or more often if warranted.

An effective chemical inventory is an essential starting point to you managing your chemical risks.

Conduct a physical inventory – Remember to wear PPE!

Update the chemical inventory online and include:

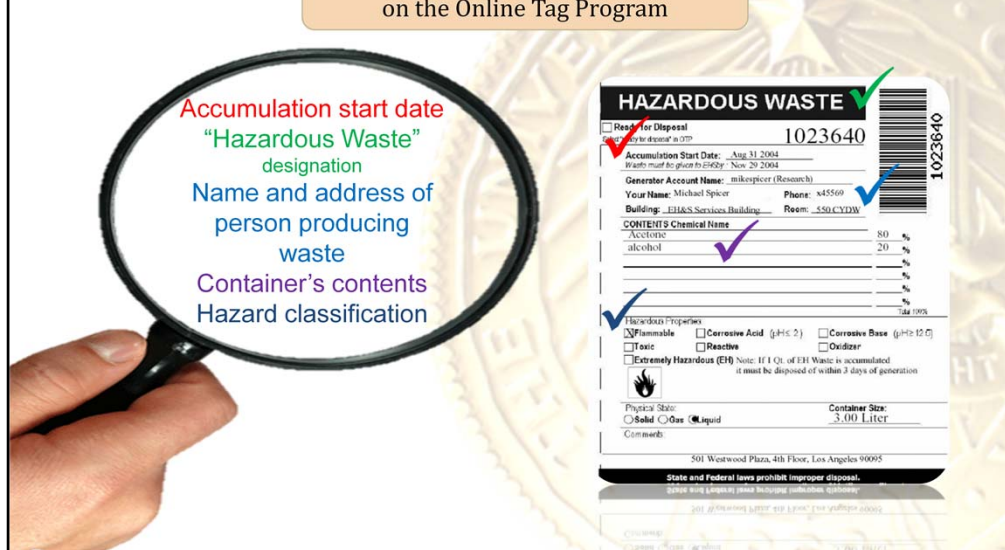
- Exact location
- Chemical name
- Container size and contents
- Container type
- Chemical manufacturer

Complete the Chemical Inventory Confirmation form.

Verify chemical inventory update status by contacting [ehshazmat@ucr.edu](mailto:ehshazmat@ucr.edu)  
Cal OSHA Title 8 CCR §5191

# Hazardous waste labels

Contact EH&S to establish an account on the Online Tag Program



Chemical, radioactive and biological waste containers are to be labeled the **moment waste is generated**.

Create labels using the campus **On-line Tag Program (OTP)**

OTP-generated labels include the required information which includes:

accumulation start date

hazardous waste designation

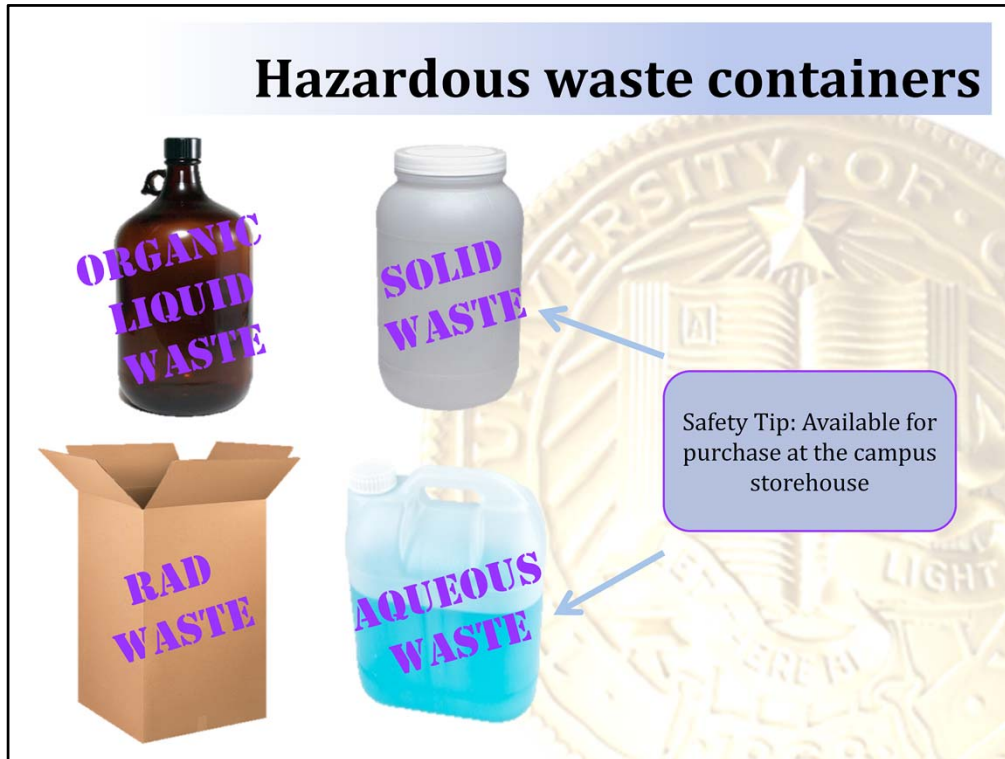
name and address of person producing waste

container contents

hazard classification

Cal OSHA Title 8 CCR §5191 • Title 22 CCR §66262

## Hazardous waste containers



Waste containers should be of seamless construction and made with or lined with materials that will not react with and are otherwise compatible with the waste in the container.

A container holding hazardous waste should be closed during accumulation and storage, except when necessary to add waste.

Incompatible waste cannot be stored in the same secondary spill containment so that in the event of commingling there will be no reactivity.

Cal OSHA Title 22 CCR §66265

# Hazardous waste accumulation

Safety tip: Use the Online Tag Program to request waste pickup

Accumulation

180 days or less

Disposal

**HAZARDOUS WASTE**  
1023640

Ready for Disposal  
Date must be greater than: Aug 20 2004

Accumulation Start Date: Aug 31 2004

Generator Account Name: m.boynton@ucsb.edu

Your Name: Michael Speyer Phone: 485569

Building: 3126 Science Building Room: 250 CND02

CONTENTS Chemical Name

Acidic %  
Alkaline %  
Infectious %  
Oxidizing %  
Flammable %  
Corrosive (pH < 2) %  
Corrosive Base (pH > 12) %  
Toxic %  
Reactive %  
Oxidizer %  
Extremely Hazardous (EH) Note: If 1 Qt. of EH Waste is accumulated it must be disposed of within 2 days of generation

Physical State:  
Solid  Gas  Liquid  Other

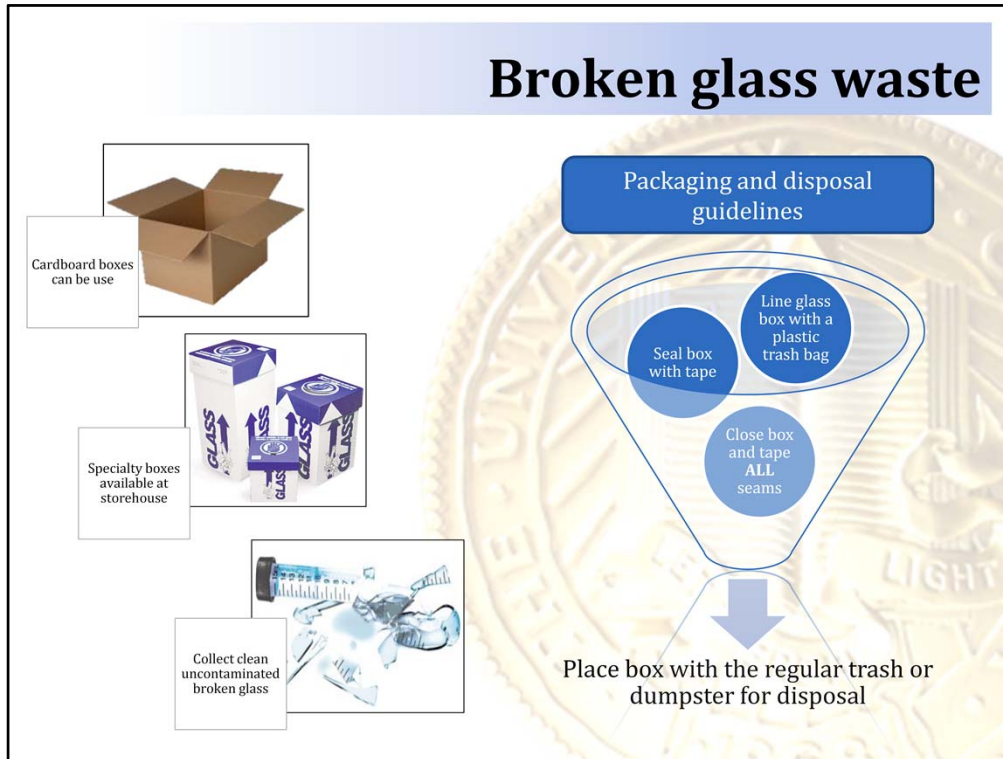
Container Size: 3.00 Liter

400 Westwood Plaza, 6th Floor, Los Angeles 90095  
State and Federal laws prohibit improper disposal.

Hazardous wastes **shall not be accumulated** longer than six (6) months at satellite sites such as laboratories. The Online Hazardous Waste Tag Program assists with tracking and notifies EH&S when the accumulation of waste exceeds 180 days.

Check the waste label to confirm that the waste is not being collected beyond the 6 month deadline.

Title 22 CCR §66262.34



All **glass waste must be placed in covered bins** and glass is not allowed to be thrown into general waste bins unprotected.

### Packaging and disposal guidelines

Use a plastic trash bag to line the box  
Close and seal bag with tape

Close the box and tape ALL seams

Place the box in the regular trash or dumpster for disposal

**Collect clean, uncontaminated broken glass** as carefully and completely as possible. Cardboard boxes can be used to collect broken glass waste specialty glass disposal boxes are available for purchase at the **campus storehouse**.

Cal OSHA 8CCR §5191

## Sharps waste

Request sharps  
containers by  
contacting EH&S



To avoid needle sticks,  
promptly place needles and  
syringes in a puncture-  
resistant sharps container.



Common materials treated as sharps waste are:

- > Needles and syringes
- > Razor and scalpel blades
- > Capillary tubes (both plastic and glass)
- > Lancets
- > Microscope slides
- > Contaminated glass and some plastics
- > Other contaminated sharp objects

Careful handling of contaminated sharps can prevent injury and reduce the risk of infection. Containers for contaminated sharps must be **puncture-resistant**. The sides and the bottom must be **leak-proof**. The container must be **appropriately labeled** or color-coded red to warn everyone that the contents are hazardous.

Common materials treated as sharps waste are:

- Needles and syringes
- Razor and scalpel blades
- Capillary tubes (both plastic and glass)
- Lancets
- Microscope slides
- Contaminated glass and some plastics
- Other contaminated sharp objects

Cal OSHA Title 8 CCR §5193

# Medical waste management

**Viral infections**

<ul style="list-style-type: none"> <li>Adenovirus</li> <li>Arboviruses</li> <li>Bacteriophage</li> <li>Chlamydia</li> <li>Coccidia</li> <li>Cryptosporidium</li> <li>Herpesvirus</li> <li>Leishmaniasis</li> <li>Mycobacterium</li> <li>Parasitosis</li> <li>Prion</li> <li>Rotavirus</li> <li>Sarbecovirus</li> <li>Schistosoma</li> <li>Shigella</li> <li>Staphylococcus</li> <li>Streptococcus</li> <li>Tuberculosis</li> <li>Yersinia</li> </ul>	<ul style="list-style-type: none"> <li>Amoebiasis</li> <li>Ascariasis</li> <li>Cryptosporidiosis</li> <li>Giardiasis</li> <li>Leishmaniasis</li> <li>Parasitosis</li> <li>Prion</li> <li>Rotavirus</li> <li>Sarbecovirus</li> <li>Schistosoma</li> <li>Shigella</li> <li>Staphylococcus</li> <li>Streptococcus</li> <li>Tuberculosis</li> <li>Yersinia</li> </ul>
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**Humans & Animals**

**Medical Waste**  
*includes all sharps and any biohazard waste from research involving the treatment, diagnosis or immunization of humans or animals. Riverside County's UCR Medical Waste Permit requires anyone generating, treating, or storing medical waste to comply with the following procedures:*

**AUTOCLAVE TAPE**

**INCLUDE BUILDING NAME & ROOM NUMBER**

**CAUTION: BIOHAZARD**

Biohazard Waste includes any laboratory or research waste that is potentially infectious to humans, plants or animals, or would pose a potential threat to the community or the environment.

Medical Waste includes all sharps and any biohazard waste from research involving the treatment, diagnosis or immunization of humans or animals. Riverside County's UCR Medical Waste Permit requires anyone generating, treating, or storing medical waste to comply with the following procedures:

Check that the waste is double-bagged, containers are compatible with the waste and the red bags have indicator or autoclave tape to ensure proper decontamination prior to disposal as well as a label with the generators building and room number.

Cal OSHA Title 8 CCR §5193 • UCR Disposal Requirement

## Food and drink



**Safety Tip:** Inspect for signage restricting eating or drinking in laboratory work areas



Verify the limitations on where food and drink storage and eating and drinking are allowed are observed. All food and drink should be consumed in specially designated areas, the best way to address this issue is with proper signage. Food and drink should not be stored or prepared in laboratories or chemical storerooms. All food and drink should be consumed in specially designated areas such as a break room.

Avoid storage, handling or consumption of food or beverages in storage areas, refrigerators, glassware or utensils which are also used for laboratory operations.

Do not eat, drink, smoke or apply cosmetics in rooms where chemical, radioactive or biological hazards are present.

Post signs in areas where food and beverage consumption and storage is forbidden.

Cal OSHA Title 8 CCR §3368, 5191



## Sink for hand washing



Hand washing sinks should be provided with:

- soap
- paper towels



**Safety tip:** Personnel working in laboratories must wash their hands

- a) after working with potentially hazardous materials;
- b) after removing gloves; and
- c) before leaving the laboratory.

Each laboratory should have a sink available for hand washing to help minimize contamination.

This sink should be clear and not cluttered with glassware. A sink cluttered with glassware might result in breakage and broken glass under water is hard to see. A sink cannot be easily used without removing what is already in it.

**Soap and paper towels should be available at each hand washing station.**

Personnel working in laboratories must wash their hands a) after working with potentially hazardous materials; b) after removing gloves; and c) before leaving the laboratory.

Cal OSHA 8CCR §3363

## Housekeeping



There is a definite correlation between orderliness and level of safety in the laboratory.

Good housekeeping creates an intrinsically safer workplace and should be maintained scrupulously in areas where highly toxic substances are handled.

The philosophy of good housekeeping and maintenance of your laboratory can go a long way in minimizing hazards.


Keep work areas and storage areas clean and uncluttered.

Chemicals and equipment are to be properly labeled and stored.

Clean up area on completion of an operation or at the end of each day.

Cal OSHA Title 8 CCR §3362, 5191

## Working alone in lab



Emergency contact  
Buddy system  
Safety considerations  
Identify hazards  
Procedures to control risks  
Methods of communication  
Working hours

**Safety tip:** Discourage working alone if the procedures being conducted involve pyrophoric materials.

Principal Investigators are responsible for ensuring that lab personnel have received sufficient information, instruction and training to enable the work to be undertaken safely while working alone.

Perform risk assessment which addresses the following:

Identify all the hazards

Evaluate the risks

Describe all existing control measures

Identify any further measure required

Information should be posted indicating how to contact the responsible individual in the event of an emergency.

Be sure to document this training.

Cal OSHA Title 8 CCR §5191

# Personal Protective Equipment (PPE)



**Safety Tip:** Personal apparel in lab includes confining long hair, wear loose clothing, long sleeves and closed-toe shoes

**NOTICE**  
PROPER PERSONAL  
PROTECTIVE EQUIPMENT  
REQUIRED IN THIS AREA  
AUTHORIZED PERSONNEL ONLY

AUTHORIZED PERSONNEL ONLY  
REQUIRED IN THIS AREA



Personal protective equipment (PPE) shall be selected, provided and used to protect laboratory personnel from the hazards and potential hazards they are likely to encounter while performing research. It is the principal investigators responsibility for supplying PPE and enforcing its use. Assess the lab for the availability of PPE and that it is in good condition. Advertise the requirement for wearing PPE by posting signs throughout the lab.

Cal OSHA Title 8 CCR §5191

## Disposable respirator safety

A [workplace evaluation](#) must be performed by EH&S to determine if respiratory protection is necessary.

Proper use and storage requirements should be observed:

- › Approval from EH&S - form should be kept with the lab safety manual (LSM)
- › Unit is stored inside an air-tight bag
- › Storage bag sealed when respirator is in use



**Safety tip:** Dust masks do not protect against aerosols, gases, vapors, paint spray, asbestos and very fine dusts.

Proper Storage



Improper Storage



Many UCR labs and work areas use dust masks. EH&S wants to make sure that the user of a dust mask knows the limitations of the protection. The voluntary use of dust masks at UCR is allowed only in **atmospheres that are not hazardous**.

N95 respirators are the most common and basic for of disposable respirators.

A workplace evaluation must be performed by EH&S to determine if respiratory protection is necessary.

Proper use and storage requirements should be observed

Approval from EH&S - form should be kept with the lab safety manual (LSM)

Unit is stored inside sealed plastic bag

Storage bag sealed when respirator is in use

Cal OSHA Title 8 CCR §5144

## Safety placard

Post placard at the entrance to the laboratory

- ❑ Check the date at the bottom right hand corner to verify annual update.
- ❑ Check that personal protective equipment requirements are displayed.
- ❑ Check that hazard warning symbols displayed resemble the hazards of the chemicals stored in the lab.

**PLACARD UPDATE DATE SHOWN HERE**

To aid emergency responders, and comply with fire safety regulations, **every entrance to an area with chemical, radioactive or biological hazards** must have a placard conveying information regarding the types and degree of hazards within and emergency contacts.

You can **create a placard** at any time using the eContact system.

Ensure that the information on your placard is **updated at least annually** or as often as the information regarding the lab changes.

Cal OSHA 8CCR §3203

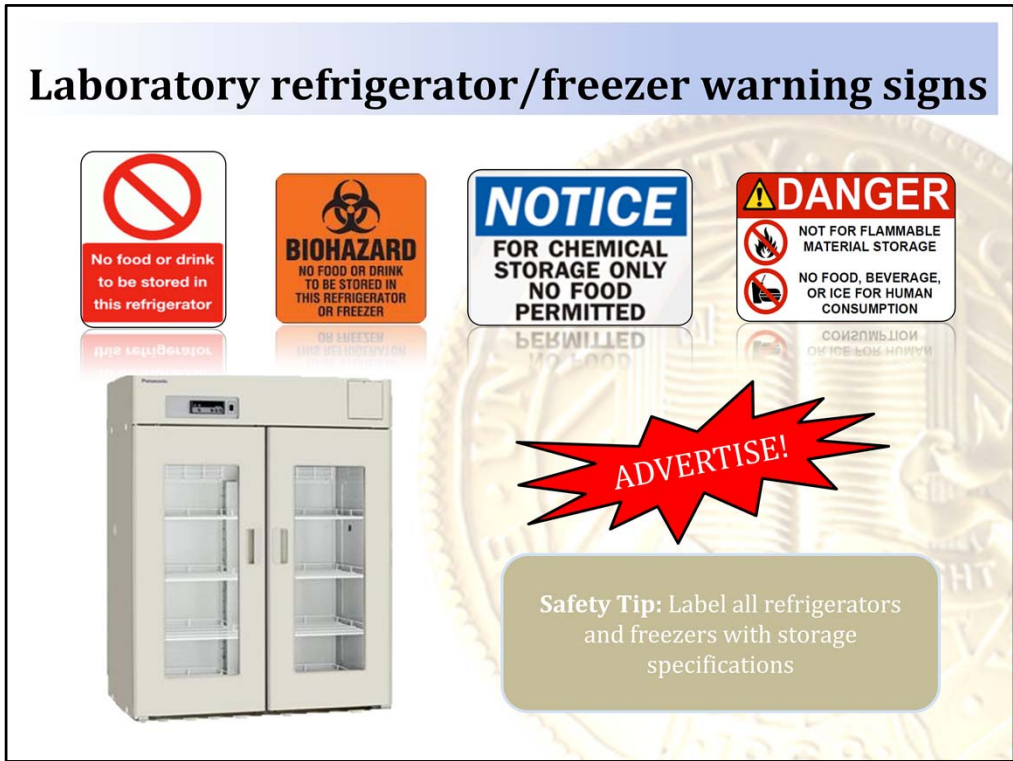
## Equipment hazard warning signs



Laboratories are unique environments with many potential physical hazards related to equipment use.

Post signs to advertise possible hazards such as electrical, chemical and radiological. Accident prevention signs will be classified according to use and shall be used to indicate a potentially hazardous situation which precautions should be taken.

Cal OSHA Title 8 CCR §3340, 5191



Prohibiting the storage of food in chemical refrigerators is one of the basic rules of good practice.

It is intended to prevent the ingestion of toxic or infectious materials, therefore do not store food or beverages in the laboratory refrigerator or freezer.

**Add permanent labels** warning against the storage of food and beverages to all laboratory refrigerators and freezers.

Cal OSHA Title 8 CCR §5191 and UCR CHP



# Injuries & Medical Treatment flipchart



The Injuries & Medical Treatment flipchart is published to provide guidance regarding illness and injury reporting and treatment based on the injured party's classification at the time of the incident.

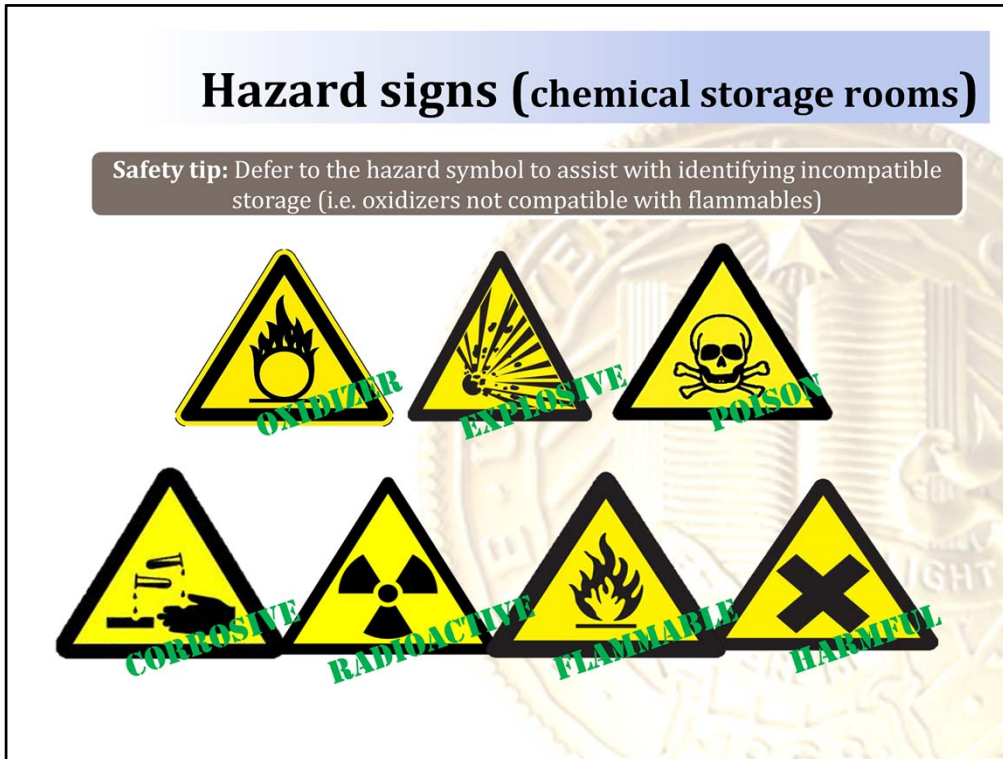
Every lab **shall post and keep posted** in a common area for lab worker to have access to during the workday

Lab members should **review** the information contained in the posting.

Cal OSHA Title 8 CCR §3203

## Hazard signs (chemical storage rooms)

**Safety tip:** Defer to the hazard symbol to assist with identifying incompatible storage (i.e. oxidizers not compatible with flammables)



Chemical hazard warning signs keep your lab members safe by clearly indicating the hazards associated with the materials being stored. Rooms that are used specifically for chemical storage and handling should be controlled-access areas that are identified with **appropriate signage**.

**Warning signs** serve as a valuable reminder of key hazards present in chemical storage areas.

Cal OSHA Title 8 CCR §5191 • UCR Policy

## Carcinogen safety

### OUT WITH THE OLD... (FORMER CARCINOGEN SYMBOL)



### ...IN WITH THE NEW (GHS SYMBOL)



- › Determine if you have carcinogens
- › Check product label for GHS cancer hazard symbol
- › Identify a designated area for using carcinogens
- › Post signs and labels to communicate the hazard



Carcinogens are agents that can cause cancer. In a laboratory setting, there are many potential exposures to carcinogens. Generally, workplace exposures are considered to be at higher levels than for public exposures. Carcinogens are addressed in specific standards and the identification, classification, and regulation of carcinogens. Being unaware of the potential hazards in the workplace yields vulnerability to injury.

Label **carcinogen storage areas** with appropriate warning signs.

Entrances to **regulated areas** shall be posted with signs.

Regulated areas are where carcinogens are stored and handled.

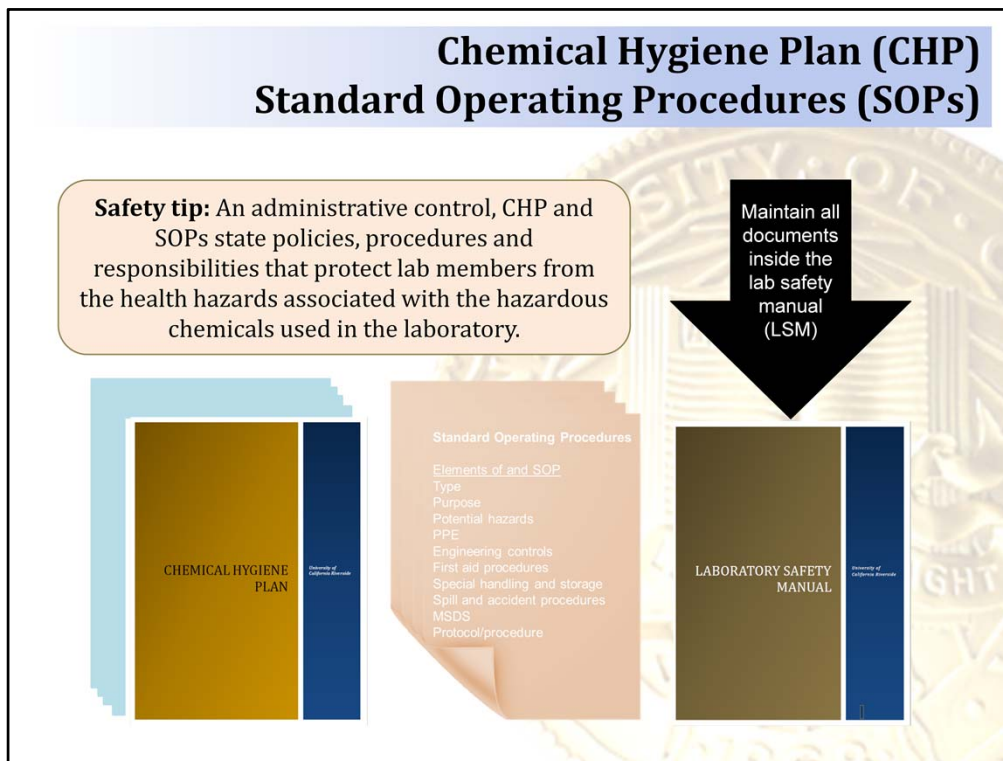
**Take precautions when storing carcinogens, reproductive toxins** and chemicals with a high degree of acute toxicity:

Store chemicals known to be highly toxic in ventilated storage in unbreakable, chemically resistant secondary containment.

Keep quantities at a minimum working level.

Limit access to storage areas.

Cal OSHA Title 8 CCR §5200-5220, 5191



Each laboratory using chemicals must maintain a written chemical hygiene plan (CHP). Your CHP must be updated whenever conditions change, reviewed and **updated at least annually**.

All lab personnel **must review the plan**.

In addition, Standard operating procedures (SOPs) is a set of written instructions that describes in detail how to perform a laboratory process or experiment safely and effectively.

SOPs are an element of the CHP.

SOPs should be PI-approved

All SOPs must be reviewed and signed by laboratory members.

An SOP library is available at [ehs.ucr.edu](http://ehs.ucr.edu)

## Safety Data Sheets (formerly MSDS)

Section 1: Chemical Product and Company Identification	
Product Name: Phenol 40	Supplier Information:
Emergency Phone No. (24/7):	Manufacturer: J.T. Baker
MSDS No. (if applicable):	Address: 1400 S. 17th St., P.O. Box 1400, Muskegon, MI 49441-1400
UN/NA: 1500 (Flammable Liquid 2.3)	Phone: (231) 221-2200
HAZARDOUS: Yes	Fax: (231) 221-2200
Other Name: Phenol	For more emergency assistance, call 1-800-421-4200
Chemical Name: Phenol	
Chemical Formula: C <sub>6</sub> H <sub>5</sub> O	

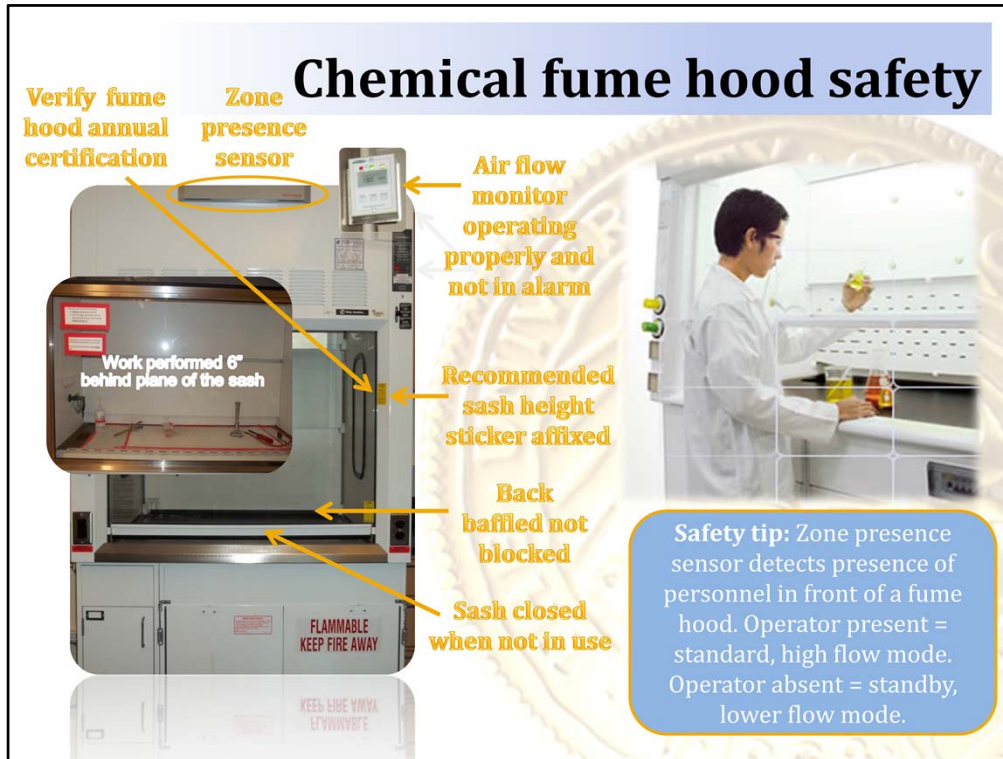


Safety tip: Go to [ehs.ucr.edu/services/msds.html](https://ehs.ucr.edu/services/msds.html) to access over a million SDSs provided for many manufacturers. Must access site from a UC-affiliated computer.

A safety data sheet is a document containing important information about a hazardous chemical.

Lab workers are expected to be familiar with the hazards of the materials in labs. Lab members should be able to easily consult Safety Data sheets to obtain this information. Hard copies or online access should be available in the lab to serve this purpose.

Cal OSHA Title 8 CCR §5194



Chemical fume hoods are the primary engineering control device for protecting lab workers when working with flammable and/or toxic chemicals. Laboratory fume hoods must be kept clean and clear; do not clutter with bottles or equipment. Allow only materials actively in use to remain in the hood.

Promptly report any hood that is not functioning properly to EH&S.

Inspect for the following fume hood safety standards:

Air flow monitor operating properly and not in alarm

Sash is stationed at the recommended height.

Back baffle unobstructed

Fume hood certified annually

Materials are kept inside the hood at least six inches from the sash opening

Sash is closed when not working

Disabling a fume hood alarm by any means should be discouraged.

Lab workers must be trained how to use the hood and its features safely. Document all chemical fume hood training.

Cal OSHA 8CCR §5154

## Biological Safety Cabinet (BSC)

**Biological safety cabinets must be certified when installed, whenever they are moved and at least annually.**



Properly maintained Biological Safety Cabinets protect laboratory workers and the immediate lab environment from infectious aerosols generated within the cabinet. Biological safety cabinets must be certified when installed, whenever they are moved and at least annually.

Records of tests performed are to be retained for at least 5 years.

Verify the cabinet is operating properly by checking the airflow gauges

Do not disturb the airflow by covering any of the grill or slots with materials.

Lab members should be trained on how to use the BSC and this training should be documented.

Cal OSHA Title 8 CCR §5154

**ROLLING  
MIXING  
PRESSING  
CUTTING  
PUNCHING  
SHEARING  
DRAWING  
SQUEEZING  
GRINDING**

## Equipment guarding

**Verify the following conditions:**

- Be secure
- Prevent contact
- Protect from falling objects
- Replace faulty guarding equipment





Machines having a rolling, mixing, pressing, cutting, punching, shearing, drawing, squeezing, grinding or similar action, in which a lab worker comes within the danger zone must be guarded at the point of operation.

When ensuring proper equipment guarding check for the following:

Be secure – guards are firmly secured to the machine

Prevent contact – the guards prevent hands, arms or any part of a person's body or clothing from making contact with dangerous moving parts

Protect from falling objects – the guards ensure that no objects can fall into moving parts

If a guard is defective or damaged or in any way does not meet the requirements of these procedures, do not use the machine

Cal OSHA Title 8 CCR §4184



## Mobile step ladder safety



Each year, many serious injuries result from falls from ladders.



### Have a mobile step ladder in your lab?

Step ladders with 4 or more steps must be equipped with:

- Handrails

Top step greater than 48" from floor must be equipped with:

- Guardrail protection

A mobile step ladder stand is a moveable fixed height self-supporting ladder intended for one person

Falls from portable ladders are one of the leading causes of occupational fatalities and injuries. Overreaching is the most common cause of ladder accidents.

If a mobile step ladder is used in lab verify unit meets the following safety criteria:

- Ladders having steps with 4 or more risers should be equipped with handrails
- Top step  $\geq$  48 inches from the floor shall have guardrail protection
- Top step  $\geq$  30 inches but  $<$  48 inches have a guardrail at least 30 inches (+1 inch) in height.

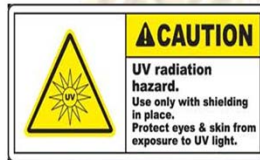
• Never use a mobile ladder for any purpose other than the one for which it is intended.

Cal OSHA Title 8 CCR §3627

## UV radiation safety

**Safety tip:** In relation to non-solar sources of UV radiation well-designed engineering and administrative controls and PPE can keep exposure risks to a minimum.

**Germicidal lamps**



**Transilluminators**



**Hand-held UV units**

Ultra-violet (UV) producing equipment is arranged or shielded to prevent exposure. Some equipment used in lab such as hand-held UV units, biosafety cabinets and transilluminators present a UV exposure hazard. Inspect these instruments to ensure the proper shielding controls are in place.

If such arrangement or shielding is not practical, goggles or face shields designed to protect against the UV wavelength should be provided.

Warning signs should be posted where UV exposure may occur.

Cal OSHA Title 8 CCR §5079



Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body must be provided within the work area for immediate emergency use.

Approved emergency eye wash and safety showers provided within the work area must be:

Unobstructed and have signs posted to the location.

Readily accessible (no more than 10 seconds for the injured person to reach).

Activated monthly (by Physical Plant) to flush line and ensure proper operation (verify testing by checking the monthly inspection tag).

Instruct all lab member about the proper use and location of the unit.

Don't forget to document this training!

Cal OSHA Title 8 CCR §5162



Adequate first aid materials, approved by the campus physician should be readily available.

First aid kit materials must be:

Kept in sanitary and usable condition.

Inspect the kit frequently removing expired items and replenish as necessary.

Approved first aid kits are available for purchase at the campus storehouse.

Cal OSHA Title 8 CCR §3400

**Egress**

**DO NOT BLOCK AISLE**

Minimum egress path width for any location normally occupied is 28" for straight aisles to accommodate wheelchairs is 36" and for exit rated corridors a minimum of 44".

**BAD**      **BETTER**      **BEST**

Exits must be arranged and maintained as to provide free and unobstructed egress from all parts of the building or structure at all times when it is occupied. Access to exits, emergency equipment and utility controls should never be obstructed.

Exits and aisles must be clear and free of potential obstructions.

Cal OSHA Title 8 §3272

## Overhead storage

**GOOD CLEARANCE**



**Safety tip:** Overhead storage of supplies should be limited to lightweight items only

Identify overhead storage fall hazards by avoiding storage of materials and equipment on top of cabinets.

With all stored items, maintain a minimum vertical clearance between sprinklers and material below 18" so not to impede proper functioning of the sprinkler system.

Any overhead storage of supplies on top of cabinets **should be limited** to lightweight items only.

Cal OSHA Title 8 §6170

## Fire extinguisher

Perform visual inspection of the unit monthly.



Portable fire extinguishers must be available for use within a travel distance of 75' for Class A (paper) fires and 50' for Class B (flammable liquids) fires.

Inspect for the following conditions:

The unit must be readily accessible and unobstructed.

In addition, check that the unit is mounted, pressure gauges show adequate pressure, pin and seals are in place, show no visual sign of damage or abuse and nozzles are free of blockage. Document inspection by initialing and dating inspection tag.

Visual inspections are to be conducted monthly.

Cal OSHA Title 8 CCR§6151, 6184

# Fire extinguisher training

Annual training available online or in-person (hands-on) through EH&S.



Where portable fire extinguishers are used in the workplace, lab personnel must be trained on the principles and use of fire extinguishers.

Training shall be provided upon initial appointment and at least annually thereafter. This training is covered in the **Laboratory Safety Orientation (fundamentals)** online course.

Cal OSHA Title 8 CCR§6151



## Fire alarm system

### Visual alarms



Strobe lights use high intensity flash tubes that are ideally suited for areas where high ambient light levels make traditional rotating or flashing lights difficult to distinguish or where ambient noise makes audible signals difficult to hear.

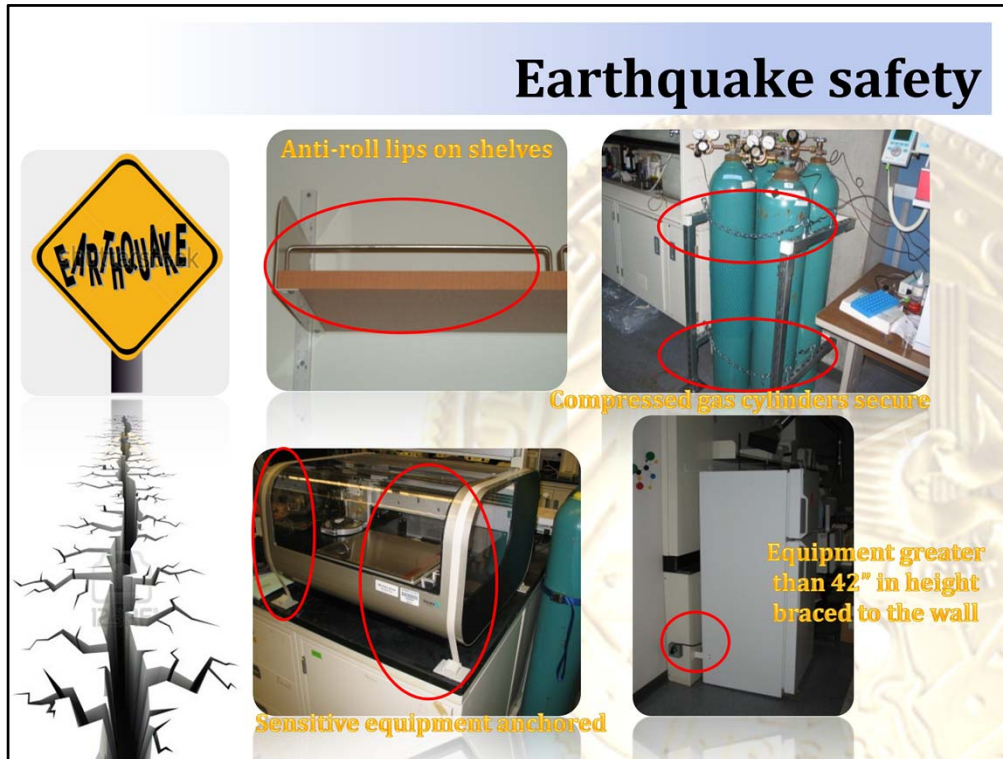
### Audible alarms



Horns produce a very loud distinctive sound that immediately attracts attention. Horns can be useful to call attention to critical situations. Signals other than those used for evacuation purposes do not have to produce the temporal coded signal.

Vibrating bells are the most common signal device. Bells are commonly used in schools for fire alarms.

Do a visual check to ensure that alarm devices are not obstructed/installed in a manner that would prevent sound or light from reaching or entering the protected areas. Fire alarm bells, horns/strobes must not be visually blocked or muffled. Access to these devices are critical to alerting occupants to workplace emergencies. Cal OSHA Title 8 CCR§6184



To mitigate falling hazards, shelving and other storage units and other items of significant mass should be secured and contain a front-edge lip to prevent containers from falling. Sensitive equipment such as computers and analytical equipment should be anchored or braced to a support structure (i.e. desk, bench top). Avoid storing materials and equipment on top of cabinets.

Equipment, cabinets and bookshelves greater than 48" in height must be anchored or braced to the wall. All freestanding equipment that may shift or fall during an earthquake should be secured.

Items on open shelves should be appropriately organized (i.e. heavier items below, anti-roll lips, restraints where needed).

It is recommended that compressed gas cylinders be secured by two straps or chains located at 1/3 and 2/3 of the cylinder height above the floor, because cylinders secured by a single strap have been found to escape the strap during an earthquake.

Cal OSHA 8CCR §3241

# Electrical Safety

Check for the following when inspecting your lab...



Electrical cords must be grounded and double insulated, extension



Electrical outlets should not be overloaded



Power surge strips in use



Electrical cords are off surfaces where spills of flammable materials are likely.



Power cords do not present a tripping hazard.



Daisy chaining of extension cords and/or power strips should not be permitted.



Cords are in good condition, not displaying signs of excessive wear or fraying; cords not pinched.



Junction boxes (J-boxes) should be covered so not to expose electrical wiring



Outlets have outlet cover or faceplate



Electrical panels are covered and there is 36 inches of clearance in front

Electricity has long been recognized as a serious workplace hazard. Many workers are unaware of the potential electrical hazards present in their work environment, which makes them more vulnerable to the danger of electrocution. Precautions must be taken to ensure electrical safety in the lab.

Inspecting your workplace for the following conditions will aid in recognizing electrical hazards.

Turn off the power to equipment before inspecting it.

Items to **inspect** include:

The condition of electrical cords

Evidence of daisy chaining

Electrical outlets

Electrical panel access

Tripping hazards

Make sure that any electrical equipment and cords are off surfaces where spill of flammable materials are likely.

Cal OSHA 8CCR §2390, 2473

# Laboratory Safety Audit Process

1. Take the training (online or PowerPoint) and review the checklist.
2. Inspect-observe-evaluate lab area according to the lab safety audit checklist.
3. Complete online audit form for each lab room inspected.



The lab safety audit entails a comparison of all items on the lab safety checklist with the actual conditions in the laboratory. The lab audit process has been divided into 3 simple steps.

One, complete the training and review the checklist before you begin your audit

Two, inspect the lab area according to the lab safety checklist

Three, enter collected data into the online audit form for each lab room that is inspected

Self-audits should be performed annually.

# Lab Self-Audit Checklist

UCRIVERSIDE UNIVERSITY OF CALIFORNIA  
Laboratory Safety Self-Audit Checklist

**Instructions:** Use this form to enter all responses to the lab safety self-audit checklist.  
Click the "SUBMIT" button below to send form to EH&S.  
CAI = Corrective action completed at time of inspection.  
[NEW] = newly added checklist items or changes from previous checklists

Lab or Group Name\*  Lab Room Number\*

What are the names of the lab group members under your supervision?\*

Department\*  Building Name\*

Auditor Name\*  Auditor Title\*

2nd Auditor Name:  2nd Auditor Title:

E-mail (where audit report will be sent):\*  Audit Date\*

Available online:  
[www.ehs.ucr.edu/laboratory/laboratory\\_safety\\_audits.html](http://www.ehs.ucr.edu/laboratory/laboratory_safety_audits.html)

Read instructions

Select "CAI"  
(CORRECTED AT TIME OF INSPECTION)  
when corrections are made  
during audit

Enter comments as needed

Determine whether each condition is met;  
Check each box as you confirm each condition  
Mark "No" if one or more conditions have not been met  
Mark "Yes" if all conditions have been met

## INSPECTION ITEMS

### Chemical Storage and Containment

1. Are hazardous liquid chemicals stored in secondary spill containers?\*

YES  NO  N/A  CAI

COMMENTS

2. Are hazardous chemicals stored below eye level (<56")?\*

YES  NO  N/A  CAI

COMMENTS

3. Are flammable liquids in excess of 10 gallons being stored in an approved flammable storage cabinet?\*

YES  NO  N/A  CAI

COMMENTS

4. Does the condition of the approved flammable storage cabinets in the lab match the following criteria?\*

YES  NO  N/A  CAI

Check for the following:

- Maintained and in good condition
- Self-close and auto-latch
- Labeled - "Flammable"
- Stored quantity <50 gallons

COMMENTS

# Lab Self-Audit Checklist

Help buttons display corresponding regulation

Active hyperlinks to additional information

[NEW] Indicates checklist items added this audit period

6. Does the lab have a chemical spill kit in place in the event of an accidental hazardous chemical release?\*

YES  NO  N/A  CAI

Check for the following:

Researchers know the location of and how to use the chemical spill kit

COMMENTS

7. Are incompatible chemicals stored separately?\*

YES  NO  N/A  CAI

Check for the following:

Flammables separate from oxidizers

Acids separate from bases

COMMENTS

[NEW] Hydrofluoric acid (HF) safety observed in the lab?\*

YES  NO  N/A  CAI

Check for the following:

Stored properly (in glass)

Calcium gluconate available for first aid

COMMENTS

[NEW] 9. Pyrophoric chemical safety observed in the lab?\*

YES  NO  N/A  CAI

Check for the following:

Written PI-approved standard operating procedures (SOP) available

Handled and stored in accordance with the SOP

COMMENTS

[NEW] 14. Is the chemical inventory complete and updated quarterly?\*

YES  NO  N/A  CAI

Please enter a value.

COMMENTS

Next Page 1 of 6

Cal OSHA 8CCR §5164

Cannot proceed to subsequent pages or submit unless a response is entered for each question

## For more information



[ehs.ucr.edu](http://ehs.ucr.edu)



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