



Lab Safety Seminar

Alphabet Soup

**EH&S, IIPP, EAP, SOP, CHP, LSP, PI,
SIT, LHAT, PPE, SDS, CIS, CUPA,
BUA, RUA, JSA (JHA)**

Department of Food Science and Technology

University of California, Davis





General Laboratory Safety “Don’ts”



- *Don’t* eat, drink, chew gum or apply cosmetics where chemicals or biological hazards are used
- *Don’t* store food in refrigerators or cold rooms with chemicals or other hazardous materials
- *Don’t* leave equipment or reactions to run unattended
- *Don’t* work alone in the lab after normal working hours without supervisor’s approval



Don't leave a mess





Safety Seminar Topics

Injury and Illness Prevention Plan (IIPP) **Department**

- Chemical Hygiene Plan (CHP) **UC Davis** Laboratory Safety Manual
 - Lab Hazard Analysis (LHAT), Standard Operating Procedures (SOP) **PI**
- Training
 - Online UC Safety Training (UC Fundamentals of Laboratory Safety) **UCOP**
 - Site Specific Training Checklist (Site-Specific Safety Orientation & Training for New Laboratory Personnel) **PI** (principle investigator)
- Chemical Inventory System (Chemicals) **PI**
- Safety Data Sheet (SDS) Global Harmonized System (GHS)
- Personal Protection Equipment (PPE) **PI**
- Emergency Action Plan (EAP) **Department**
- Hazardous Materials - Handling and Disposal: Lab Standard or Hazard Communication (HazCom) **PI** with **EH&S**

Safety Services Resources - <http://safetyservices.ucdavis.edu/>

Injury and Illness Prevention Plan (IIPP)

- Management commitment/assignment of responsibilities
- Safety communications system with employees
- System for assuring employee compliance with safe work practices
- Scheduled inspections/evaluation system
- Procedures for correcting unsafe/unhealthy conditions
- Safety and health training and instruction
- Recordkeeping and documentation
- Accident Investigation



ELEMENTS OF THE IIPP



Campus Chemical Hygiene Plan

LABORATORY SAFETY MANUAL

University of California, Davis





Chemical Hygiene Plan (CHP)

- Establishes a formal written program for managing the risks posed by health and safety hazards associated with the use of hazardous chemicals in laboratories
- Describes the proper use, handling, storage and disposal practices and procedures to be followed
- Applies to employees who use chemicals in teaching and research laboratories at the UC Davis Campus
- Employer: Shall provide a workplace free from recognized hazards that may cause death or serious injury
- Employee: Shall comply with occupational safety and health standards, rules, regulations, and orders.



Chemical Hygiene Plan (CHP)

- **Rights and Responsibilities** (UC Office of the President and Board of Regents)
 - Campus Administration Policies and Procedures (Chancellor, Provost and Deans Offices)
 - Policy Specifics (Chemical and Laboratory Safety Committee)
 - PI Support and Enforcement (Department Chair)
 - **Site Specific Rules, Training, and Laboratory Safety Procedures (PI)**
 - Training, Standard Operating Procedures, Safety Data Sheets, Personal Protective Equipment (Personnel)
 - Information, Training Tools, Support, Inspections (EH&S)
 - Laboratory Safety Manual
<http://safetyservices.ucdavis.edu/article/laboratory-safety-manual>

Online Tools

ehs.ucop.edu/



Welcome to RSS Platform

- Home
- Action Items
- Workspace
- More Apps >
- Accommodate
- Analytics
- Away
- BIO
- Chemicals
- Drones
- EFR
- Inspect
- Monitor
- OHSS
- Procedures
- Radiation

Action Items ⓘ

[VIEW ALL](#)



You have no outstanding tasks.
Any new tasks will appear here.

Workspace ⓘ

[VIEW ALL](#)

Quick Links

- [My PPE Items](#)
- [Begin a Laboratory Hazard Assessment \(LHAT\)](#)
- [Manage PPE Inventories](#)

Hazard Analysis (LHAT)



ACTIVE RESEARCHERS' PPE ADJACENT INDIVIDUALS' PPE HAZARD

This lists the minimum personal protective equipment the person actually engaged in the activity identified by the lab hazard assessment must wear

Disposable gloves	▼
Lab coat	▼
Safety glasses	▼
Chemical splash goggles for larger volumes	▼
Chemical-resistant gloves	▼
Face shield should be considered	▼
Flame resistant lab coat (NFPA 2112)	▼
Chemical-resistant apron	▼
Shoe covers	▼
Chemical splash goggles	▼
Chemical-resistant apron should be considered	▼
Flame-resistant outer gloves should be considered	▼
Chemical protective apron for H310	▼
Gloves	▼
UV face-shield	▼
Cryogenic protective gloves	▼

BACK NEXT STEPS

HOME

LAB HAZARD ASSESSMENT

- General ✓
- Roster ✓
- Locations ✓
- Assessment ✓
- Summary ✓

Next Steps

SUPPORT

- Help
- Cecillia Joseph
- Sign Out



Laboratory Safety Training Check List

- Take the online UC Laboratory Safety Fundamentals
- Complete site specific training, sign and date
- Attend the Safety Seminar Fall Quarter
- Complete any additional training assigned by your supervisor (Training Matrix)
- Review LHAT and view PPE video
- Obtain Personal Protective Equipment (PPE) as determined by the LHAT
- Receive training on conducting “Standard Operating Procedure” lab functions or “Prior Approval” procedures (specific reactions & equipment)
- Read and understand the IIPP, Emergency Action Plan (EAP) and Chemical Hygiene Plan (CHP)

UC Laboratory Safety Fundamentals

UC Laboratory Safety Fundamentals

This on-line course must be successfully completed by all existing laboratory personnel before any new worker is granted unescorted access to the laboratory

Introduction to laboratory safety fundamentals, chemical safety, and general safety. This course covers relevant campus Laboratory Safety Manual(s) and rights/responsibilities according to applicable regulations

Training Matrix

WHAT:

This document outlines the minimum medical & training requirements for personnel working in a research setting at UC Davis. Answer the questions below to determine which requirements apply to you. If you answer "Yes", the corresponding requirements apply. It is recommended that you complete the requirements in the numeric order listed below. Note, this matrix does not include site-specific training or research-specific training that must be completed.

WHO:

Principal Investigators (PI), lab supervisors, research personnel, volunteers, graduate & undergraduate students in research laboratories as well as general staff working in laboratories and animal housing facilities.

Are you a UC Davis faculty, staff, or student who...

Complete this Medical or Training Requirement

		1. UC Lab Safety Fundamentals	2. Controlled Substances	3. LHAAT PPE Training	4. PPE – Dependent on what is used/worn	5. Enroll in Respiratory Protection Program	6. UC Shop Safety	7. Hearing Conservation	8. Hazard Communication	9. Heat Illness Prevention	10. Field Safety - Depending on Activity	11. See Biosafety webpage (link in Appendix)	12. Radioactive Materials Safety and/or Hydroprobe Safety	13. Laser Safety	14. Analytical and/or Diagnostic X-ray Producing Machine Safety	15. Medical History Questionnaire (MHQ) **	16. Animal Care and Use 101
Laboratory Safety	will use chemicals or work in a wet lab?	X															
	will have access to controlled substances?	X	X														
	will use/wear PPE?	X		X													
Industrial Safety	will use/wear specialty PPE?	X			X												
	will need respiratory protection?	*				X											
	will use shop equipment?	*					X										
	will encounter noise in workplace?	*						X									
	will work with hazardous materials in an industrial setting?	*							X								
Field Safety	will be working outdoors?									X							
	will be conducting field research?										X						
Biosafety	will work with any material that falls under Cal OSHA Bloodborne Pathogen Standard?	X										X					
	will work with recombinant DNA	X										X					
	will work with materials that are infectious or contain infectious agents (to plants, animals, or humans)?	X										X					
Radiation Safety	will handle radioactive materials?	X											X				
	will work with lasers?	*												X			
	will work with x-ray producing equipment?	*													X		
are ***	will handle animal carcasses, animal tissue or will have access to vivarium?	X														X	



LMS Safety Training Classes and EH&S Safety Nets

- Research and Laboratory Safety
- General and Equipment Safety
- Ergonomics
- Biological Safety – BUA
- Animal Care



Dilbert.com DilbertCartoonist@gmail.com

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Laboratory Chemical Use Check List

- Check lab chemical inventory before ordering a chemical
- Add each new chemicals to chemical inventory with barcode tag (ChemTag)
- Read Safety Data Sheet (SDS)
- Add to the Standard Operating Procedure (SOP) or create a new SOP if required
- Use proper personal protection (long pants, sleeved shirt, closed-toe shoes, eye protection, lab coat, proper gloves, etc.)
- *Dispose of chemical waste in properly labeled and dated container

*WASTE online system, SafetyNet 8

Chemical Inventory System (Chemicals)

Inventory ▾

Keyword

Substructure

Search by cas #, name, formula, GHS or container barcode

Location

Tags ▾

Camphene

CAS: 79-92-5

Physical State: solid

GHS: H228 , H313 , H319 , H400 , H410

Containers: 1



2-Methoxy-4-vinylphenol

CAS: 7786-61-0

Physical State: liquid

GHS: H315 , H319 , H335

Containers: 1



Ammonium phosphate monobasic

CAS: 7722-76-1

Physical State: solid

GHS: H315 , H319 , H335

Containers: 1



TWEEN 20

CAS: 9005-64-5

Physical State: liquid (viscous liquid)

GHS: H316

Containers: 1

2-Nonanone



SDS Information

- Identity of the chemical
- Hazardous nature of chemical
- Physical characteristic (e.g., boiling point)
- Fire and explosion information
- Reactivity data
- Health hazard data (e.g., health effects, symptoms)
- Personal protective equipment needed
- How to handle leaks, spills and disposal
- Special precautions

1. PRODUCT AND COMPANY IDENTIFICATION**1.1 Product identifiers**

Product name : Cycloheximide

Product Number : C7698
Brand : Sigma
Index-No. : 613-140-00-8

CAS-No. : 66-81-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION**2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Acute toxicity, Oral (Category 2), H300
Germ cell mutagenicity (Category 2), H341
Reproductive toxicity (Category 1B), H360
Acute aquatic toxicity (Category 2), H401
Chronic aquatic toxicity (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H300 Fatal if swallowed.
H341 Suspected of causing genetic defects.
H360 May damage fertility or the unborn child.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P264 Wash skin thoroughly after handling.

SDS

Information

The Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

- Signal word – either **DANGER** or **WARNING**
- Precautionary statement indicating product handling to minimize risks to the user
- H200 Physical Hazard
- H300 Health Hazard
- H400 Environmental Hazard
- The lower the number within the category the higher the hazard i.e. H300 is more hazardous than H304

Hazard Symbols



Old Hazard Symbols



New Hazard Symbols



Hazardous Material Control Systems

- Chemical Fume Hoods
- Glove Boxes
- Flammable Liquid Storage Cabinets
- Biological Safety Cabinets
- Chemical Spill Clean-up Kit
- Other Engineering Controls

Standard Operating Procedure

- Document the laboratory-specific procedures for the safe handling, storage and disposal of hazardous chemicals
 - Principal Investigators and laboratory supervisors are responsible for establishing SOPs relevant to health and safety for laboratory activities involving hazardous chemicals under their direction
- Cal/OSHA requires standard operating procedures (SOPs) be established for work with hazardous chemicals
 - Stated in the [8 CCR § 5191](#) (Occupational Exposure to Hazardous Chemicals in Laboratories, “Laboratory Standard”) under the provisions of the Chemical Hygiene Plan

Elements of an SOP

- Document laboratory-specific procedures for safe handling, storage, and disposal
- Establish a designated work and storage area
- Determine engineering controls, i.e. fume hood
- Determine proper personal protective equipment
- Establish procedures for waste removal
- Set up decontamination procedures

Hazard Class SOP

- Acutely Toxic Chemicals
- Carcinogens
- Corrosives
- Cryogenics
- Flammable Solids and Liquids
- Reproductive Toxins
- Pyrophorics
- Working Alone
- Water reactives
- Potentially Explosive Compounds

Personal Safety



NO PANTS, NO SHOES NO SCIENCE



FOR MORE INFORMATION CONTACT ENVIRONMENTAL HEALTH AND SAFETY AT (806) 742-3876
WWW.EHS.TTU.EDU | WWW.SAFETY.TTU.EDU

SAFETY  TTU

UCDAVIS  food
science &
technology



Personal Protective Equipment (PPE)

- Eye Protection
 - Safety Glasses, Safety Goggles, Face Shields
- Gloves
 - Nitrile, Chemical-handling, High-temp. Lo-temp.
- Other Protective Clothing
 - Lab Coats, Aprons, etc.
- Respiratory Protection
 - Dust and Mist Respirators
- Other
 - e.g., Hearing Protection



NO PANTS
NO SHOES
NO SCIENCE

PPE Etiquette

- Do not wear soiled or contaminated lab coats in shared spaces
 - Wear clean lab coats for use in autoclave rooms
- Transport items in clean secondary containers and do not use gloves in hallways.
 - If transporting large amounts of liquids (1 L or more) use a clean cart to transport items (still must be stored in clean secondary containers)
- If working in another lab, have another lab coat in that lab OR bring a clean lab coat with you
- Remove gloves before putting on or taking off lab coat.
- Do not touch face, phones or any exposed body part with gloves
- Wash hands after removing lab coat

Safety Services

<http://safetyservices.ucdavis.edu/>



Campus emergency notification system



Aggie Guardian - personal safety mobile app



Emergency Action Plan (EAP)

The program must be in writing and include the following elements:

- Emergency escape procedures and emergency escape route assignments
- Procedures to account for all employees after an emergency evacuation
- The preferred means of reporting fires and other emergencies
- Names or regular job titles of persons or departments who can be contacted for further information or explanation of duties under the plan
- A system to notify employees of an emergency
- Procedures for employees who remain to complete critical operations before they evacuate
- Rescue and medical duties for those employees who are to perform them
- Training for all employees on the EAP
- The written plan must be kept in the workplace and made available for employee review





Emergency Action Plan

Know the locations of:

- All exits for your workplace and the building
- Alarm pull boxes and fire extinguishers
- Nearest phone
- Safety showers and eyewashes
- First-aid kits
- Chemical spill kits

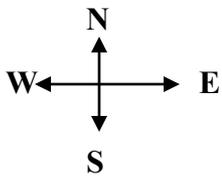


Evacuation Plan - RMI South - 2nd Floor

-  Fire Extinguisher
-  Fire Alarm Box
-  Exit
-  You Are Here
-  Exit Hall
-  Exit Stairs

Fire Alarm:
-Sound: Horns
-Visual: Strobe





EMERGENCY EVACUATION MAP

Old Davis Road

RMI
Sensory

RMI North

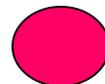
RMI
South

BVTF

Hilgard

Walkway

DEPT. OF VIT. & ENOLOGY
MEETING AREA



Entrance/Exit



DEPARTMENT OF FOOD
SCIENCE & TECHNOLOGY
MEETING AREA

Parking
Garage



Procedures in Case of Fire

- If fire is small you may attempt to neutralize the threat without endangering yourself
- If you are unsure - Leave the area, being sure others are out
- **CLOSE THE DOOR!**
- **ACTIVATE THE NEAREST BUILDING FIRE ALARM**
- **DIAL 911 (or 530-752-1230)**
- **STAY AWAY FROM AREA AND CLOSE THE DOOR!**
- Go to agreed meeting place
- Stand by to advise the emergency personnel when they arrive



Procedures in Case of Earthquake

- Get under a desk, table, archway, etc. during the shaking
- Leave the building after the shaking is over
- If outside during shaking, stay clear of buildings, trees, etc.
- DIAL 911 (or 530-752-1230) to report any fires, ruptured pipes or downed electric lines
- Assist injured persons in securing medical attention
- Go to agreed meeting place
- Stand by to advise emergency personnel when they arrive

Contributors to accidents

- Rushing, Frustration, Fatigue, Complacency

Leads to Errors:

- Eyes not on task
- Mind not on task
- Line-of-fire
- Balance/Traction/Grip

CHEMICAL SPILL



Procedures in Case of Chemical Spill

- 1 pint or more or when in doubt, call UC Davis Fire Department (911)
- Evacuate the room, close the door, and wait for emergency personnel
- Flammable? Turn off all ignition sources before securing the room
- In case of chemical contact with skin or eyes, flood the affected area immediately with water; Seek medical assistance
- All contaminated clothing must be removed immediately
- Small spills (1 pint or less) may be cleaned up by laboratory personnel with a spill kit
 - Acids and bases should be absorbed and neutralized
 - Flammable liquids may be absorbed
 - DO NOT attempt to blot cryogenic liquid spills with unprotected hands, allow the liquid to evaporate
 - Solid spills are not usually emergencies. If the material spilled is toxic, use dampened cloths or paper towels to transfer it to plastic bags and disposed of as hazardous waste.



Safety Shower and Eyewash Procedure

- If someone is contaminated with hazardous chemical
- Remove contaminated clothing if possible
- Rinse in emergency shower 15 minutes
- If eyes are involved, rinse eyes in the eye wash for 15 minutes holding eye(s) open
- Call 911 or (530)752-1230 or go to the hospital emergency room

Chemical Incident Response - Decision Logic

Key Information



- Container label is legible
- MSDS available

- No injuries
- Low reactivity
- Low flammability
- Familiar quantity
- No fire
- Low volatility
- Not a strong oxidizer

- I feel comfortable enough, to deal with this situation.
- I am trained in proper protective equipment use.
- I am trained how to use spill control equipment.
- All the right equipment is available to me here and now.

Ask yourself

Do I know what this substance is?

NO

YES

Is this release small enough to manage myself?

NO

YES

Can this chemical be contained or isolated safely?

NO

YES

Get Help!
This is not a "Simple" Spill

Follow your campus emergency response procedures. This could involve:

- Pull Alarm
- Evacuate
- Call 911
- Call your campus Environmental, Safety, or Facilities Management department

This is a "Simple" spill
I can clean it up myself, within my normal workday.

Spill Kit

Guidelines for Chemical Spill Control SafetyNet #13: General Steps To Follow



Steps for Clean Up



Reporting a “Near Miss”



Report a “Near Miss” to Safety Services

- **Report an Incident or Concern**
- All faculty members, staff, students and visitors at UC Davis can participate in making the campus a safe place to work, study, and live by identifying health and/or safety hazards or unsafe conditions by informing those responsible for the problem area.
- **Employees are advised that use of this form or other reports of unsafe conditions or practices are protected by law. It would be illegal for the employer to take any action against an employee in reprisal for exercising rights to participate in communications involving safety.**



Definition of Hazardous Waste

- Toxic

- Any substance which may be harmful to the environment or hazardous to your health if inhaled, ingested or absorbed through the skin.
- Includes acute toxins, carcinogens, other chronic toxins with bio-accumulative properties or persistence in environment

- Reactive

- Substances that can produce toxic gases, are explosive, react violently with water, or contain cyanide or sulfide
- Includes explosives, oxidizers, reducers, water sensitive, acid sensitive, air sensitive and unstable chemicals

- Flammable

- Flash point < 140 ° F (60 ° C)
- Capable of causing fire through friction, moisture or reactivity
- Includes oxidizers and flammable compressed gases

- Corrosive

- $\text{pH} \leq 2$ or $\text{pH} \geq 12.5$
- Corrosive to tissue or metals



Guidelines for Disposal of Chemical Waste

- **SafetyNet #: 8**
- **WASTE** program required
 - All hazardous material and hazardous chemical waste must be picked up by Environmental Health and Safety (EH&S) or an EH&S-approved contractor.
- **Drain Disposal**
 - Drain disposal of non-hazardous materials is strictly regulated. See Safety Net #6 “Can This Go Down the Drain?” for more information on the Local Limits Program.



Hazardous Waste Disposal

- Reduce volume of source and minimize generation of waste
- Designate a lab location in which to store hazardous waste for disposal
- Use “Hazardous Waste” label supplied by WASTE
- Use screw-capped leak-proof container for liquids
- Keep bottled liquid waste in secondary container (e.g., lab tray)
- Segregate waste by hazard class (Stanford segregation guide)
- Arrange for pickup within 9 months* of initial label date
 - *90 days required for some hazardous chemicals*
- Triple-rinse empty containers before disposal in trash
 - Some empty containers may require pick up by EH&S
- Dispose of syringes, glass pipettes and other sharps material in specially-designed rigid container

Waste Accumulation Storage Tracking

Waste Accumulation Storage Tracking electronically (WASTE) facilitates the labeling, tracking, collection, and shipping of hazardous waste.

My Notifications + ↻ ✕

You have no new notifications...

Containers

- Create a New Tag
- Chemical
- Mixed
- Radioactive
- Universal
- Biological

View My Tags

My Labs / Facilities

Search by lab/f

Harris Lab
Personnel: 7
Locations : 2

ehs.ucop.edu/waste

safetyservices.ucdavis.edu

Search: Waste tracking

STANFORD COMPATIBLE STORAGE GROUP GUIDE

Effective segregation in chemical storage reduces the risk of dangerous chemical reactions.

This guide must be used in conjunction with information from the manufacturer's safety data sheets and chemical-specific expert knowledge.

This storage group system is intended to be used in research settings to store laboratory-scale quantities of chemicals.

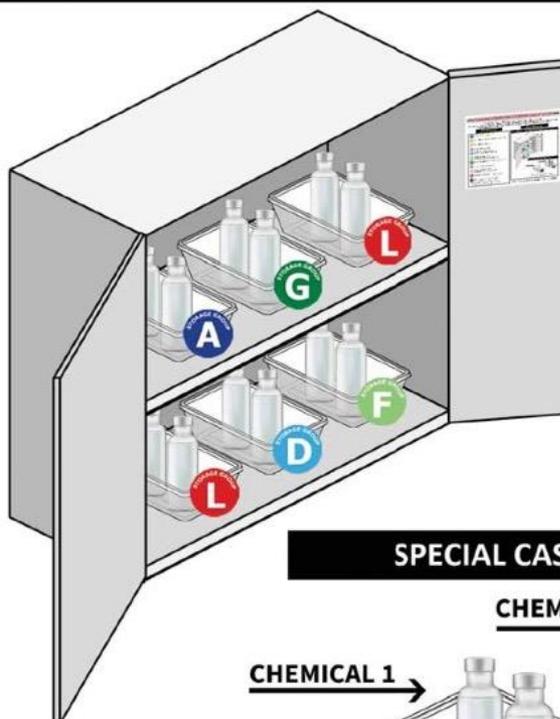
What to Segregate

- A** Compatible Organic Bases
- B** Compatible Pyrophoric & Water-Reactive Materials *
- C** Compatible Inorganic Bases
- D** Compatible Organic Acids
- E** Compatible Oxidizers & Peroxides (not including Strong, Oxidizing Acids) *
- F** Compatible Inorganic Acids (not including Oxidizers or Combustibles)
- G** Not Intrinsically Reactive, Flammable, or Combustible
- I** Compatible Strong, Oxidizing Acids
- K** Compatible Stable Explosives (not including Oxidizing Explosives) *
- L** Flammables, Combustibles, & Organic Solvents
- X** Incompatible with ALL Other Chemicals (including other chemicals within X) *

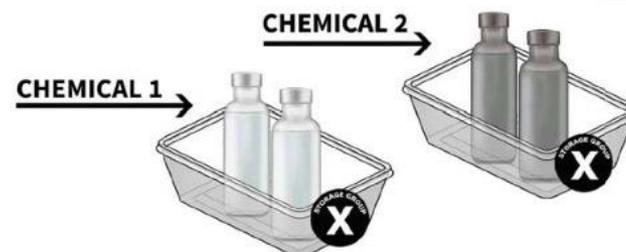
* These materials are likely to require special handling & storage conditions. Use extreme caution.

How to Segregate

USE SEPARATE SECONDARY CONTAINERS FOR EACH GROUP



SPECIAL CASE FOR GROUP X



NOTE: Different chemicals within Storage Group X must be segregated from each other.

Questions? Contact the EH&S Lab Safety Program at 723-0448
Use ChemTracker to find a chemical's Storage Group - stanford.chemtracker.org

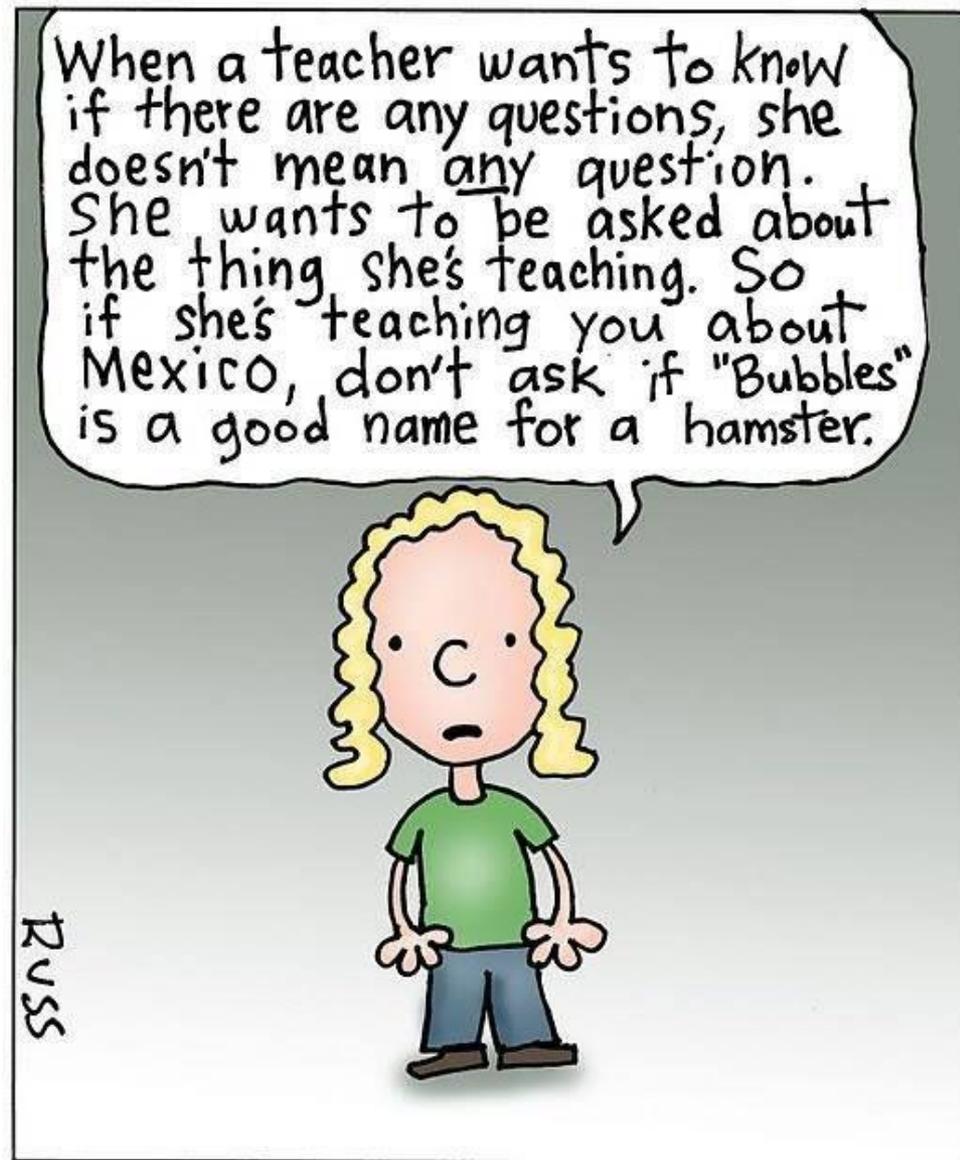


Most Frequently Violated Safety Rules

- **Hazardous wastes** must be properly managed
- **Labeling** hazardous solutions
 - The full contents **spelled out in English not chemical formulas**
 - Initials of researcher and date of preparation
- Lab workers must wear protective clothing, minimum **closed-toe and heel shoes and long pants** or skirt
- Work with acids, bases, solvents, powders, pressure or vacuum requires **lab coat** or apron and **eye protection**
- Lab workers must be trained on all safety equipment and standard operating procedures (**SOP**)
- Labs must be “clean” and “**without clutter**” and **no food or drink** allowed

COVID specific training and requirements

- Campus required training
 - Found here: <https://campusready.ucdavis.edu/training>
- Performing essential research during COVID-19
 - Found here: <https://www.bftv.ucdavis.edu/functional-area/safety-information>
 - Department specific for laboratory workers
- Lab specific COVID-19 training
 - SOP specific to individual labs for COVID-19 practices
 - Face Coverings Guidance Document
 - Public Spaces SOP
 - Employee checklist
- Daily Symptom Survey
 - Must be filled out fresh each day an individual is on campus
 - Submitted to supervisor or PI
- Flu Vaccine
 - Must be received prior to November 1, 2020



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