



Chemical Hygiene Plan

Teaching Laboratories

PURPOSE

The University of South Carolina (USC) is committed to providing a safe teaching and learning environment for our teachers and students in our science laboratories. Our university also complies with laboratory safety standards and regulations including, but not limited to, the OSHA Laboratory Standard (29 CFR 1910.1450), OSHA Hazard Communication Standard (29 CFR 1910.1200), International Fire Code, ANSI Standards, Resource Conservation and Recovery Act (RCRA), OSHA Bloodborne Pathogens Standard (29 CFR 1910.1030), National Institutes of Health (NIH) Guidelines, and the Nuclear Regulatory Commission (NRC).

The USC Teaching Laboratories Chemical Hygiene Plan outlines the roles and responsibilities of laboratory occupants and the guidelines that need to be observed to ensure safety and compliance during the conduct of business in our teaching laboratories.

ROLES AND RESPONSIBILITIES

Teaching Lab Coordinators

- Provide overall safety oversight for teaching laboratory spaces, personnel, and students.
- Promote a positive safety culture by following and enforcing safety guidelines outlined in the Teaching Lab Chemical Hygiene Plan.
- Complete the EH&S Chemical and Lab Safety and Hazardous Waste training.
- Consult with EH&S on safety issues when needed.
- Review incident reports and email reports to jlocke@mailbox.sc.edu or aroberge@mailbox.sc.edu within 3 business days of the incident.
- Ensure Lab Managers, Graduate Instructional Assistants (GIAs), Graduate Teaching Assistants (GTAs), and undergrad Teaching Assistants (TAs) are provided required personal protective equipment (PPE).
- Ensure all Lab Managers, GIAs, GTAs, and TAs have completed the EH&S Chemical and Lab Safety and Hazardous Waste training prior to starting work in the laboratory.
- Provide lab-specific safety training to Lab Managers, GIAs, GTAs, and TAs. Training should include lab-specific instructions on safe handling of chemicals and equipment, use of personal protective equipment, how to access and use safety data sheets, location and use of safety equipment, appropriate response to emergencies, and compliance with teaching lab rules. Document this training (when, who attended, and who provided the training).
- Ensure that the Teaching Lab Chemical Hygiene Plan (CHP) and Safety Data Sheets (SDSs) are made readily accessible to all personnel and students. Printed SDSs are required for highly hazardous chemicals (assigned Category 1 or 2 ratings for most Globally Harmonized System hazard classes). Safety data sheets of less hazardous chemicals may be kept electronically and provided upon request.
- Ensure all safety equipment (fume hood, emergency shower, emergency eyewash, first-aid kit, chemical spill kit, and fire extinguishers) are available, visible, tested, and maintained in functional condition.
- Designate appropriate storage cabinets for highly hazardous chemicals.
- Ensure that the laboratory prep room chemical inventory is kept updated and provided to EH&S every Spring and Fall semester.
- Review and approve standard operating procedures (SOPs) for work with highly hazardous chemicals, equipment, and processes. Ensure the SOPs are discussed and are made readily accessible to all users.

Lab Managers, Graduate Instructional Assistants, Graduate Teaching Assistants and Undergrad Teaching Assistants

- Complete the EH&S Chemical and Lab Safety and Hazardous Waste training.
- Follow proper lab attire requirements (full-coverage shoes, sleeved shirts, and long pants or their equivalent) when entering the laboratory.
- Ensure all students work according to the rules and guidelines outlined in the Teaching Lab CHP.
- Instruct students on safe handling of chemicals and equipment, use of personal protective equipment, access to and how to use SDSs, location of and how to use safety equipment, the appropriate response to emergencies, and compliance with teaching lab rules. Document this instruction (when, who attended, and who provided the instruction).
- Instruct students on how to properly dispose of wastes from experiments.
- Inspect and maintain all safety equipment including emergency eye wash, emergency showers, first aid kit, spill kit, fire extinguisher, and broken glass containers.
- Ensure students know the location of the emergency procedures (posted by exit doors) in the event of an emergency involving themselves or someone else.
- Prepare incident reports and submit them to the Teaching Lab Coordinator within 2 business days of the incident.
- Discuss each lab experiment and SOPs with equal emphasis on both experimental methodology and safety.
- Ensure that the Teaching Lab CHP, SDSs, and SOPs are always readily accessible to students.
- Report malfunctioning fume hoods to Facilities (777-9675) and EH&S (777-6457 or 777-7650).

Students

- Maintain professional, courteous, and safe conduct. Attending GIAs, GTAs and TAs, and other lab supervisors reserve the right to excuse from the laboratory any student who appears inebriated, under the influence of drugs or alcohol, and/or behaving in an unsafe manner.
- Follow safety guidelines, rules, requirements, and restrictions outlined in the Teaching Lab CHP and any other instructions provided by the GIAs, GTAs, TAs, and other lab supervisors.
- Follow proper lab attire requirements as outlined in the Teaching Lab Rules for Students.
- Wear all required PPEs before entering the laboratory area.
- Follow safe practices and universal precautions when working with chemicals and other hazardous materials or equipment as instructed by the attending GIA/GTA/TA.
- Immediately report any unsafe conditions and/or unsafe practices to the attending GTA/GIA/TA.
- Keep work areas neat, clean, and orderly. Clean up work areas after every experiment, put materials back do designated storage cabinets, and check with the GIA/GTA/TA before leaving.
- Immediately report any incident or accident to the attending GTA/GIA/TA.
- Dispose of chemical waste in designated chemical waste containers as instructed by the attending GIA/GTA/TA.

SAFETY GUIDELINES

Safety Data Sheets (SDSs)

Each teaching laboratory must keep copies of the Safety Data Sheets of all chemicals used and stored in the laboratory. This document must be made readily accessible to all lab personnel and students. Highly hazardous chemicals (Category 1 or 2 for most GHS hazard classes) are required to have printed copies of SDSs. Electronic access to the SDS of less hazardous chemicals is acceptable. The hazards of all chemicals must be clearly communicated to all users prior to handling the chemicals. Prior to starting work in the lab then periodically as needed, lab supervisors must review the SDSs of chemicals with lab personnel and students to ensure that they are aware of the risks involved in handling these materials.

Location of Safety Equipment

Safety equipment are available in the laboratory. They include emergency showers, emergency eyewashes, chemical spill kits, first-aid kits, and fire extinguishers. They are used to immediately respond to a minor incident or mitigate the consequence of a larger incident until emergency responders arrive. For example, when chemicals are splashed on the eyes, the affected person can use the emergency eyewash to wash the chemicals off until they get to an ophthalmologist for medical treatment.

All safety equipment must be visible (their location clearly labeled if they are small or concealed), periodically checked, and maintained in functional condition. All content of kits must be present for them to be functional.

Emergency Procedures

Incidents are common in laboratories due to inherent risks involved in handling hazardous materials, equipment, and processes. Common incidents include chemical spills, splashes of chemicals to the eyes or skin, fires, and fume hood malfunction. Procedures in dealing with these incidents need to be posted in the laboratory, either on a designated safety bulletin board or by the exit door as a ready reference for all lab occupants. The procedures should include step-by-step what-to-dos and the phone numbers to call when needing assistance.

Chemical Fume Hoods

A chemical fume hood is an important engineering control that contains, captures, and eliminates chemical fumes from the general lab area. Fume hood malfunction is a serious safety concern, especially when it occurs in the middle of an experiment that involves heating any type of chemicals and/or manipulating chemicals that are volatile and toxic or volatile and corrosive even without heating. The signs of a malfunctioning fume hood include an alarm going off (if fume hood is equipped with an alarm), the airflow on the face of the sash appears low or non-existent (a Kimwipe barely or does not get pulled in when placed along the plane of the sash) or chemical odors start migrating from inside the fume hood to the general lab area.

Malfunctioning fume hoods must be reported to Facilities (777-9675) and EH&S (777-6457 or 777-7650) for repair and recertification to resume the use of the fume hood.

Teaching Lab Rules for Students

- Students are not allowed in the lab without an instructor present.
- The minimum clothing requirement for the teaching labs as enforced by EH&S is as follows: **the entire torso to the mid-thigh must be covered by clothing (preferably 100% cotton)**. Appropriate clothing for lab includes shirts that cover the entire torso and upper arms and pants/shorts that cover at least the mid-thigh and longer. Shirts that expose the abdomen are not permitted. It is up to the discretion of the lab manager to approve clothing in the laboratory. Some laboratory experiments may require full coverage clothing, and this is left up to the lab manager to decide on a lab-by-lab basis.
- Personal protective equipment (PPE) must be worn in the laboratory at all times. PPE consists of approved safety glasses or goggles, protective gloves, and footwear that provides adequate protection against spills and/or safety hazards.
- Long hair must be tied back.
- Headphones are not permitted in the lab.
- Eating, drinking, chewing gum, and the use of tobacco products (including e-cigarettes) is not permitted in the lab.
- Never apply cosmetics (makeup) in the lab.
- If oral medication needs to be taken during lab it should be taken outside of the lab.
- Never sit or stand on lab benches or countertops.
- Chemical spills must be immediately reported to the instructor.
- Handle all chemicals and equipment with caution. Read the labels and follow directions carefully.
- All waste and excess materials must be disposed of according to USC guidelines. Consult the lab manager or GIA/GTA/TA with any questions about waste disposal.
- Never remove chemicals or equipment from a laboratory.
- Always close chemical containers after use.
- Cell phones and other portable electronic devices may not be used during lab.
- Firearms, knives, and other weapons are strictly prohibited in all USC teaching laboratories.
- Horseplay or other acts of carelessness are strictly prohibited.
- Unauthorized experiments are not permitted.
- Unapproved variations in experiments are prohibited.
- Illegal drugs and alcoholic beverages are strictly prohibited.
- Additional requirements for students working in teaching laboratories may be found in Appendix A: Additional Requirements for Students.

Working Alone

No student is permitted to work alone in a teaching lab. The reason for this is to minimize the risk of serious injury while working alone with or around materials and equipment that can cause major injuries if established controls fail. Working alone means an isolated student working with hazardous materials or equipment or an isolated student working in an area where hazardous materials and equipment are stored and that if safety controls fail, could reasonably result in incapacitation or life-threatening injury for which immediate first aid assistance is not available.

Responding to an Incident

The Student Health Services provides medical care for USC students during regular work hours. If a student or GIA/GTA/TA requires medical assistance after normal business hours, proceed to the nearest emergency room. The address and phone number for Prisma Health Richland are in the Emergency Phone Numbers table at the end of this document.

Skin and Eye Exposure

If a hazardous chemical is splashed on the eyes:

1. Assist the person to the emergency eyewash.
2. Activate the eyewash by pushing its activation lever.
3. Rinse the eyes for 15 minutes by keeping the eyelids open and moving the eyeballs side to side and up and down.
4. Consult with an ophthalmologist for follow-up checks and treatment.

If a hazardous chemical is splashed on the skin:

1. Assist the exposed person to the emergency shower.
2. Activate the emergency shower by pulling its activation lever.
3. Rinse the areas of contact with copious amounts of water for 15 minutes. Remove any contaminated clothing in the way of the skin area in contact with the chemical.
4. Send an uninjured person to notify the lab manager or GIA/GTA/TA to ensure injuries receive proper treatment.
5. Proceed to the Student Health Services for medical treatment during normal office hours and to any emergency room after office hours.

Chemical Spill

Do not attempt to clean a spill without proper training and proper personal protective equipment. Clean up only spills of chemicals that are well contained, small in volume, are not acutely toxic, and are not volatile and toxic. Call EH&S 777-1935 or 777-5269 for guidance and/or assistance with cleaning up spills of chemicals that are over 1 liter for most chemicals, any volume of acutely toxic chemicals, any volume of volatile toxic chemical, any volume of HF and mercury.

Immediately notify your supervisor before attempting to clean up a spill. Cleaning up a spill always starts with donning appropriate PPE.

1. Put on a lab coat, safety goggles, regular nitrile inner gloves, thick and chemical-resistant gloves that cover past the wrist area, and slip-resistant shoes.
2. Depending on the type of chemical spilled (base, acid, flammables, others), pour neutralizer/absorbent or place spill pillows/absorbent pads around the edge of the spill area moving inwards.
3. Allow at least 30 minutes to complete the neutralization/absorption process.
4. Collect the spent absorbent/neutralizer/spill pillows/ absorbent pads in a plastic bag that can be sealed or closed.
5. Spray soapy water on the spill area and wipe with paper towels. Repeat two more times.
6. Collect the spent paper towels in the same bag with the spent absorbents.
7. Seal the bag then place it inside another bag. Close and seal the second bag and place the double-bagged material in a 5-gallon bucket with a lid.
8. Label the bucket with a hazardous waste tag and include it in the next hazardous waste pick-up request.

Building Evacuation

When instructed, leave the lab immediately. If it is safe to do so, extinguish all open flames (Bunsen burners), shut down equipment, and take all personal belongings before evacuating. Use stairs, never elevators (power may fail in an emergency). Pull the fire alarm as you exit. At a safe location, call 803-777-4215 and report the situation to the USC police department. Proceed to the assigned assembly point for your lab or building. The GIA/GTA/TA will take attendance (to ensure everyone has safely exited the building) and provide this information to responding emergency personnel. Do not leave the area or reenter the building until instructed to do so. Report any injuries to yourself or others and any remaining dangers to the GIA/GTA/TA or emergency personnel. Provide assistance to injured persons, as long as you do not place yourself in additional danger.

Fire

For clothing fire, respond immediately: stop, drop and roll. Use the emergency shower only if it is within the immediate vicinity. Running, even for a short distance while on fire will only fan the flames and make the fire worse. Do not use the fire extinguisher to quench fire on a person. Do not attempt to fight equipment/property fires in the lab unless the fire is as small as a regular trash can and you are trained on how to use a fire extinguisher. If you smell smoke and suspect a fire or see a fire, evacuate the lab quickly (see Building Evacuation). Close the lab doors and call for assistance.

Small fires can be extinguished by using a fire extinguisher available in the laboratory.

1. Remove the fire extinguisher from its mount.
2. Make sure that your back is towards an OPEN, EXIT DOOR and that you can retreat safely if needed.
3. Pull the pin, aim the nozzle toward the base of the fire then squeeze the trigger.
4. Move the nozzle from side to side to cover the base of the fire adequately.
5. If the fire reignites after fully discharging the fire extinguisher, call USCPD at 777-4215 for assistance.
6. Call EH&S Fire Safety at 777-5269 to have the fire extinguisher replaced.

Earthquake. Move away from overhead lights, heavy unsecured objects, and hazardous materials. Choose a sheltered position to wait (under a table, in the frame of a closed door, or against a load bearing wall). Once tremors stop, shut down gas lines and heat sources. Exit the building quickly (see Building Evacuation).

Tornadoes. Go to a hallway on the lowest level of a building. Stay away from corners, windows, doors and outside walls. Put as many walls as possible between you and the outside. Get under a sturdy table and use your arms to protect your head and neck. Watch out for flying debris. Flying debris from tornadoes causes most fatalities and injuries.

EMERGENCY PHONE NUMBERS

Department/Agency/Safety Personnel	Phone Number	Type of Emergency
USC Police Department	(803) 777-4215 911 from any campus landline	Fire, explosion, serious chemical exposure, serious injury, other life-threatening situation or medical emergency
Environmental Health & Safety (EH&S)	(803) 777-5269 8:00 AM - 4:30 PM	Non-emergency chemical spill, chemical exposure, unsafe conditions
Facilities	(803) 777-9675 24-hour phone number	Emergency and non-emergency facility repair requests
Student Health Services 1409 Devine St. Columbia, SC 29208	(803) 777-3175 (803) 777-3174 <i>Fall and Spring Semesters</i> Monday – Friday: 8 AM - 5 PM Sunday: 12PM – 6 PM <i>Summer Hours</i> Monday – Friday: 8:30 AM - 4:30 PM <i>Closed on University holidays</i>	Medical evaluation / treatment for USC Columbia students during normal business hours
Prisma Health Richland ER 16 Medical Park Rd, Columbia, SC 29203	(803) 434-7000	Medical evaluation / treatment for USC Columbia students and employees after regular office hours

Appendices

Appendix A: Additional requirements for students to work safely in a teaching laboratory as determined by the lab management.

Biology Teaching Lab Dissections

Preserved specimens used for dissections are often preserved in Carosafe® or a similar solution. Carosafe® is a preservative and holding solution for biological specimens. Carosafe® does not contain formaldehyde but the specimens along with their surrounding fluid likely contain some residual formaldehyde which is a by-product of the initial preservation process.

The following rules must be followed when handling preserved specimens and performing dissections:

- Each person handling preserved specimens must wear gloves, splash-resistant goggles, and a lab apron.
- If a splash to the eyes occurs, immediately flush the eyes for a minimum of 15 minutes using an eyewash station. The eyewash can be used for splashes to the face as well.
- If a splash occurs on the skin, wash the affected area with soap and water.
- Lab supervisors must instruct students on proper dissection techniques and procedures, including how to safely handle scalpels and other sharps and how to dispose of sharps.
- When using a scalpel, always cut away from the body and away from others.
- Specimens should be properly mounted in a dissection tray or pan. Do not dissect a specimen while holding it.
- Avoid excessive force when using a scalpel or other sharp instruments to cut specimens.
- Scissors should be substituted for scalpels wherever possible.
- Inspect dissection tools routinely to ensure dull scalpels/blades are replaced. Dull scalpels/blades can present a greater hazard than well-sharpened instruments.
- Once a glove has touched the specimen or instrument, it is contaminated. Avoid unconscious gestures, such as scratching the face and adjusting safety glasses.
- Students must dispose of, or store specimens as instructed by the lab supervisor.
- Works areas should be cleaned, and instruments returned to their proper place after dissections are complete.
- Once a dissection is complete, personal protective equipment should be removed and hands washed before leaving the lab.

Revisions

1: November, 2016: First revision of the teaching lab CHP.

1.1: February, 2023: Added dissection information to Appendix A,
Revised and expanded all sections.