



DEPARTMENTAL SAFETY PROCEDURES

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Chemistry Department Safety Committee

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DEPARTMENTAL SAFETY PROCEDURES

University of South Florida-Department of Chemistry

Department of Chemistry Safety Commitment

Recognize and assess hazards in the chemistry labs, establish methods to minimize exposure to hazardous materials, eliminate unsafe laboratory practices, reduce chemical waste, and prevent accidents. Develop and sustain a safety culture within the chemistry department research and undergraduate laboratories. The chemistry department is committed to comply with laws, regulations, and organizational requirements applicable to our daily operations. We aim to improve safety continually and offer to our students a safer working and learning environment.

Introduction

All laboratories using or storing hazardous chemicals must have on hand a Chemical Hygiene Plan, that is read, understood and signed by all laboratory personnel. The USF Division of Environmental Health and Safety (EH&S) provides a Chemical Hygiene Plan to each laboratory that can be further customized, and is available for download at: <http://www.usf.edu/administrative-services/environmental-health-safety/resources/manuals-procedures>.

Prior to beginning any laboratory work, the Principal Investigator (PI) must ensure that all laboratory personnel register with EH&S by filling out a lab personnel registration form available at this website. The regulations in this document apply to undergraduate students, graduate research assistants (RA), graduate teaching assistants (TA) and postdoctoral researchers.

Personal Safety in the Laboratory

The Principal Investigator is responsible for ensuring that all laboratory personnel practice proper etiquette and safety in the laboratory, and have the necessary training and personal protective equipment for their work.

Training: All personnel working in laboratories are required to attend laboratory safety training (given by EH&S) before beginning to work in the lab. Refer to <http://www.usf.edu/administrative-services/environmental-health-safety/programs-services/laboratory-safety/lab-safety-training2.aspx>. Training must be updated annually by attending an EH&S laboratory safety-training refresher course. In addition, PIs must provide their research personnel with specialized training on lab-specific hazards. Any researcher planning to work with biological, lasers, or radiological hazards, or with laboratory animals or human subjects, must also receive specialized training before beginning.

*Departmental Safety Procedures, December 2017
USF Chemistry Safety Committee*

Working Alone: Personnel should never work alone where hazardous chemicals are being handled or stored. There should always be someone nearby who can provide assistance quickly if an accident occurs.

Laboratory Etiquette: The chemical laboratory is inherently a dangerous environment and all who enter and work in it must be properly trained and professional in work ethic. Personnel should be respectful of others and cognizant of safety hazards around them. Proper Personal Protective Equipment and proper attire must be worn at all times.

Laboratory Clothing: Proper attire should be worn to completely cover as much of your skin as possible. Long pants and long sleeve shirts are recommended to completely cover the legs, arms, and torso. Shoes must be worn at all times while in the laboratory, regardless of the experiment or curricular activity. Shoes must totally cover your feet up to the ankles, no skin should be shown. Socks do not constitute a cover replacement for shoes. Sandals, backless and open toed shoes are unacceptable. Shoes must be made of non-permeable material. All parts of the legs and feet must be covered.. Hair, loose clothing or jewelry that might come into contact with chemicals or get tangled in equipment must be tied back or secured.

Lab Coat: Wear your lab coat at all times in laboratories (including teaching and research labs) to prevent incidental and unexpected chemical exposures to your skin and clothing. The lab coat must be wrist-fitted. Keep the lab coat buttoned at all times. In research labs, the lab coat should be composed of a material compatible with the chemicals being used (flame-retardant materials for working with flammables and pyrophoric reagents). *It is the PI's responsibility to provide this protection for their researchers.*

Earphones or ear buds should never be worn when working in the laboratory (unless needed for the experiment or to provide protection from loud equipment), due to the risk of not hearing someone calling for help or a potentially harmful event occurring in the laboratory.

Eye Protection: Chemical splash-proof goggles meeting the **OSHA approved, ANSI Z87.1** standard (imprinted on the goggle) for impact and splash protection must be worn over the eyes at ***all times in laboratories in which chemicals are stored or used.*** In situations where highly hazardous (corrosive, shock sensitive, explosive, toxic) chemicals are in use, a full face and neck shield meeting the ANSI Z87 standard should be worn in addition to goggles for complete protection. The PI has the responsibility of assessing the potential for eye/face injuries due to exposure to hazards and determine the type of eye/face protection to be used in the laboratory.

Gloves: Gloves must be worn when handling hazardous materials, sharp, or very hot or cold items. Refer to a chemical glove compatibility chart to choose appropriate gloves specific to the material being used. The gloves should be inspected for tears or punctures before use and frequently while being worn. Know the limitations of the gloves you choose to wear- latex gloves are not suitable for work with hazardous chemicals. Refer to <http://www.usf.edu/administrative-services/environmental->

Food: *Food and beverages must not be brought into or stored in laboratories.* Eating, drinking, chewing gum, and smoking are prohibited in the laboratories. Cosmetics should not be applied while in the lab.

Safety Data Sheets (SDS): Fire code requires that all laboratories must have up-to-date SDS for all chemicals used or stored in that facility, and be readily accessible at all times. It is advised that printed copies be kept near or within the Chemical Hygiene Plan binder, and that labs choosing instead to access SDSs online must ensure that the computer is always accessible for this purpose, and all research personnel know where to find them in case of any emergency. Laboratory personnel should read and understand the SDS for any chemical before using it for the first time.

Safety Operating Procedure (SOP): According to the USF Chemical Hygiene Plan, SOPs must be developed and made available to laboratory personnel. Research laboratories as well as teaching laboratories's stockroom in the Department of Chemistry must develop SOPs. Written SOPs are required for work involving hazardous chemicals, including EPA p-listed, DHS listed, carcinogens, toxic gases, time-sensitive, and pyrophoric. Refer to <http://www.usf.edu/administrative-services/environmental-health-safety/programs-services/laboratory-safety/sops.aspx>

Teaching Laboratories

All the teaching laboratories in the Department of Chemistry must use the Laboratory Safety Rules, Procedures and Practices provided in this document, as well as the Safety Laboratory Agreement. The signed Safety Agreements should be kept in the stockroom or by the TA teaching the corresponding lab section. The document should be kept for the duration of the semester (see attachment).

TAs working in the teaching labs must comply with all safety regulations mentioned in this document. TAs are responsible for enforcing the safety rules in their assigned lab section.

In case of repetitive safety violations by a TA or RA, the safety coordinator or any other faculty member can write an official memo and a safety evaluation for the TA/RA with a copy to the Department of Chemistry Chair and student's PI.

Laboratory Equipment

Electrical Hazards: Any motor-driven electrical equipment cannot be used where flammables are present unless equipped with a non-sparking induction motor. Equipment with frayed cords or other damage must be taken out of service until repaired. All electrical connections must be properly grounded and use electrical cords approved for the current and voltage. No extension cords are permitted in the laboratory. Be aware of wet floors or wet hands when using electrical equipment of any type.

Refrigerators and Freezers: Any refrigerator or freezer used to store flammable chemicals must be rated as suitable for storage of such materials.

Hot Plates/Stirring Motors: Hot plates, unless designed as explosion-proof, cannot be used in conjunction with flammables in open containers that can splash or whose vapors can come in contact with the hot surface. Hot plates must not be covered with aluminum foil or any material that can disrupt temperature regulation of the plate.

Explosion/Implosion Risks: When there is the possibility of a reaction or procedure producing an explosion or implosion, the apparatus should be confined in a fume hood or portable safety shield. Vacuum lines and glass-lined thermos-style containers are highly prone to implosion, and must be carefully handled and outfitted with proper protective barriers.

Ovens: Wear thermal gloves when handling hot glassware from the ovens. Keep flammables such as volatile solvents away from the vicinity of hot ovens and surfaces.

Cryogenics: Cryogenic liquids and gases can cause severe burns, and must be handled with care. Insulated gloves should be worn when handling equipment containing refrigerants. Low-temperature vacuum traps may collect liquid oxygen if exposed to air, and can lead to explosions.

Radioactive Agents and Lasers: For research involving the use of radioactive isotopes or lasers, refer to <http://www.research.usf.edu/dric/radiation-safety/> for more information.

Diving, Biological Agents, Selected Agents, Animal Studies and Human Subjects: For research involving any of these, you must receive training and approval. Refer to the following websites for more information:

Diving: <http://www.research.usf.edu/dric/diving/diving.asp>

Biosafety: <http://www.research.usf.edu/dric/biosafety/>

Animals: <http://www.research.usf.edu/dric/iacuc/>

Human Subjects: <http://www.research.usf.edu/dric/hrpp/>

Safety Equipment

The Principal Investigator is responsible for ensuring that all laboratory personnel know the location and use of all safety equipment and the exits from the laboratory, as well as the proper maintenance of the safety equipment.

Eyewash Stations: The eyewashes should be flushed weekly and noted on the card. Nothing should be placed near or around the eyewash to block access.

Safety Showers: Safety showers should be checked routinely by Facilities Management. Access to the shower should not be blocked.

Spill Kit: Every laboratory must have a spill kit. Its location must be clearly marked on the laboratory doors and available to all personnel. The kit must contain sufficient types and amounts of materials to enable personnel to clean up a spill of the largest size container of any chemical in the lab. The spill kit must be replenished after each use and expired contents must be replaced immediately. For more information, see <http://www.usf.edu/administrative-services/environmental-health-safety/programs-services/laboratory-safety/chemicals.aspx>

First Aid Kit: Every laboratory must have a first aid kit. Its location must be clearly marked on the laboratory doors and available to all personnel. The kit must be inspected periodically, and its contents replenished as needed.

Fire Extinguishers: All laboratory personnel must know the location of the fire extinguisher in every laboratory and trained to use it in an emergency. Access to the extinguisher must not be blocked. Those handling water-reactive agents, such as organometallics and pyrophoric substances, or electrical equipment, should have Class D extinguishers available in case of an electrical or chemical fire.

Fume Hoods: Experiments that produce flammable, noxious, odiferous or toxic vapors must be done in an operating fume hood according to the manufacturer's instructions. EH&S will inspect the operation of the fume hoods annually.

Chemical Storage and Containment

- a.** All laboratories must have a complete, accurate and up-to-date inventory of chemicals used or stored in that facility. It is highly encouraged to keep an inventory of all the chemicals using a digital source like an Excel sheet or other software, and review the inventory twice a year. Chemicals that are used up or pass their shelf-life must be properly disposed of and removed from HITS. Refer to <http://www.usf.edu/administrative-services/environmental-health-safety/hits/index.aspx>
- b.** Chemicals must be marked with a date when they are received and opened, and kept in preferably the same container in which they were received.
- c.** Chemical containers must be clearly and accurately labeled.
- d.** Liquids that can splash if the bottle falls and breaks must not be stored above eye level, and preferably no higher than bench top.
- e.** Chemicals must be stored according to their chemical reactivity, as described at <http://www.usf.edu/administrative-services/environmental-health-safety/documents/labsafety-chemicalcompatibility.pdf>
Incompatible chemicals must be stored separately from each other.
- f.** Flammables and corrosives should be stored in cabinets designed to hold them.
- g.** All chemicals should be returned to storage when not in use.
- h.** Many chemicals have limited shelf-life and must not be kept beyond the manufacturer's expiration date.
- i.** Gas cylinders must be stored in an upright position, securely strapped or chained to a wall or bench top. Compressed gas cylinders must be capped when not in use or outfitted with an approved regulator.

Transfer and Transportation of Hazardous Materials

- a. When transporting or moving gas cylinders, use a cylinder cart and be sure to cap the cylinder (do not move it with a regulator on it), and secure it tightly to the cart with a chain or strap.
- b. When walking from one laboratory to another (transporting materials or moving equipment) lab coat can be worn but gloves should be removed before leaving the laboratory.
- c. Individuals transporting chemicals between labs must **wear appropriate Personal Protective Equipment (PPE)**. A lab coat must be worn while transporting chemicals. Lab appropriate attire is required. Additional personal protective equipment may be required if deemed necessary by a risk assessment. A pair of chemical resistant gloves must be maintained in a pocket for use as-needed. To prevent the spread of contamination from laboratories into public spaces, **do not wear gloves in public, unless a spill or other incident dictates the precaution.**
- d. Chemicals must be transported in **break-resistant secondary containers that are capable of containing all materials in the event of breakage or spill**. Secondary containers are defined as commercially available bottle carriers made of rubber or plastic, with carrying handle(s). Or, if the chemicals are too numerous to safely carry with a bottle carrier, an easily maneuverable cart with leak resistant sides of several inches in height on all four sides must be used. Chemicals must not be carried without the secondary containment and support described in this policy
- e. Small chemical spill procedures can be found in the following link.
<http://www.usf.edu/administrative-services/environmental-health-safety/documents/labsafety-smallspillcleanup2016.pdf>

Reporting Accidents and Near Misses

In case of emergency, call 911 for immediate medical care for the injured or ill employee.

All other non-medical emergency injuries or illnesses are to be reported to **AmeriSys 1-800-455-2079**. The injured person should be present for the call.

All accidents, injuries, near misses and hazardous situations in the laboratory must also be reported to EH&S at <http://www.usf.edu/administrative-services/environmental-health-safety/reporting/index.aspx>

In the case of injury, Worker's Compensation forms must be filled out within 24 hours. The forms can be downloaded from <http://chemistry.usf.edu/departement/policies/#Accident>

More information about laboratory safety can be found at <http://www.usf.edu/administrative-services/environmental-health-safety/>

Signature Form

By signing this form, you acknowledge that you have received a printed copy of the Departmental Safety Procedures manual, and that you will adhere to the stated practices throughout your research and teaching in the Department of Chemistry.

Signature

Date

Printed Name and University Number

Please sign this form and give the original copy to Ms. Kaitlyn Kroner for the departmental files.

ATTACHMENTS

Laboratory Safety Rules, Procedures and Practices

Safety is the number one priority in the General Chemistry Laboratories at USF. Read all of the following items carefully. If you have any questions do not hesitate to ask your instructor for clarifications.



Lab Coat: Wear your lab coat at all times in laboratories (including lab presentations or examinations) to prevent incidental and unexpected chemical exposures to your skin and clothing. The lab coat must be wrist-fitted. Keep the lab coat buttoned at all times.

Eye Protection: Splash goggles that meet OSHA approved ANSI Z87.1 standard must be worn over by all persons at all times in the laboratory. *Safety glasses, with or without side-shields are not an acceptable substitute.* Contact lenses should not be worn during the lab period.

Foot wear: Shoes must be worn at all times while in the laboratory, regardless of the experiment or curricular activity. Shoes must totally cover your feet up to the ankles, no skin should be shown. Socks do not constitute a cover replacement for shoes. Sandals, backless and open toed shoes are unacceptable.

Clothing: Clothing like pants or skirts must be worn which completely covers the entire leg from the waist to the ankle. Clothing like shirt, blouse, etc. must be worn which completely covers the torso from the waist to the neck. Shoulders must be completely covered and sleeves must be worn that cover the arm from the shoulder to at halfway to the elbow. Tank tops, halters, shorts, cutoffs, etc. are not acceptable.

Hair: if hair is long it must be tied back.

Accidents: report all accidents including minor incidents to your instructor immediately.

Work space: Working spaces must be kept neat at all times and cleaned up before leaving. Equipment must be returned to its proper place. Keep backpacks or bags off the floor as they represent a tripping hazard.

Food: eating or drinking in the laboratory is completely prohibited.

Smoking: smoking in or near the laboratories is completely prohibited.

Open flames: open flames of any kind are prohibited in the laboratory, unless specific permission is granted to use them during an experiment.

Schedule: students may be present in the laboratories only during their scheduled class period and never alone or unsupervised.

Emergency equipment: know the location and use of all safety equipment and exits.

Chemicals:

- Never taste any chemical in the lab and never pipet with your mouth.
- If you spill chemicals in your hands or body, immediately flush the affected area liberally with water. Get further directions from your instructor.
- Use chemicals that generate harmful vapors in the fume hood.
- Return reagent bottles to their place after using.
- Never pour unused chemicals back into the reagent bottles or lab sinks.

Waste disposal: Chemicals and used materials must be discarded in designated containers. Keep the container closed when not in use. When in doubt, check with your instructor.

As previously mentioned, safety is the number one priority in USF chemistry laboratory instruction! All students are required to know and comply with good laboratory practices and safety norms; otherwise they will be asked to leave the laboratory. Make sure you understand all of the safety precautions before starting your experiments, otherwise ask your instructor.

The following are some general guidelines that should always be followed:

- Bring your personal protective equipment (PPE) in good condition to the lab, including a basic wrist-fitted lab coat and splash-proof goggles.
- Do not wear open-toed shoes, sandals, flip-flops, etc.
- Check the Safety Data Sheets (SDS) for every chemical used in the laboratory. Documents can be found in each laboratory
- Keep the sash of the hood closed when not in use or to the proper level when working with chemicals. (see hood marking for reference)
- Do not casually pour chemicals down the drain.
- Do not taste or sniff chemicals in the laboratory.
- Do not eat or drink in the laboratory.
- Do not apply makeup while in the lab.
- Do not hazardously mix chemicals.
- Do not pipette by mouth.
- Do not fool or play around in the laboratory.
- All backpacks, skateboards, or other items are off the floor where they could be a tripping hazard.
- Do not wear headphones in the lab.
- Avoid the use of personal items like cellphone, computers, notebook, pens etc. when wearing gloves. Cross contamination may occur while performing those activities and you and others may result affected. Remove your gloves and wash your hands before you use the items mentioned above.

Student Laboratory Agreement

Read all of the following items and initial in the blank next to each statement to indicate that you understand and agree to abide by it. If you have questions about the items, please ask your instructor for clarification. Once you read all items, complete the information at the bottom of the sheet.

_____ **1.** I have received a copy of the Laboratory Safety Rules, Procedures and Practices. They have been explained to me by the laboratory instructor. I understand these rules and recognize it as my responsibility to follow at all times.

_____ **2.** I recognized that my instructor may give me additional safety instructions, either verbally or in writing, during the laboratory period. I agree to follow these additional instructions and accept this as my responsibility.

_____ **3.** I accept the authority of the laboratory instructor, the laboratory coordinator, laboratory manager, stockroom personnel or any other official of the University of South Florida (Faculty or Staff). I understand that failure to follow the safety rules, procedures and practices presented to me may result in dismissal from the laboratory session or, for repeated offences, dismissal from teaching laboratories with the consent of the chemistry department.

_____ **4.** Check-in Day: I have inspected the equipment provided in the blue BIN assigned to me and my group and I acknowledge that all equipment is in good condition. I consulted with my instructor to replace damaged equipment, if any.

Check-in Day

Name (Print): _____

University ID Number: _____

BIN Number: _____

Course Number: _____ Lab Section Number: _____ Room Number: _____

Lab Schedule (Day/time): _____/_____

Date: _____/_____/_____ Signature: _____

Safety Expectations for Teaching Assistants in the Department of Chemistry

Graduated students teaching in chemistry laboratories need to know and follow the appropriate safety practices mandated by the Department of Chemistry. Teaching laboratories is part of your duties as graduated student and your attitude towards safety should include value safety, work safely, prevent at-risk behavior, promote safety, and accept responsibility for safety¹. Teaching assistants (TAs) have responsibilities for operating and overseeing undergraduate students and laboratories. A list of minimal expectations that encompass the department commitment is described below².

- Understand the organizing principles of safety (**RAMP**). **R**ecognize the hazards, **A**ssess the risk of hazards, **M**inimize the risk of the hazards, **P**repare for emergencies from uncontrolled hazards and how these apply to each experiment.
- Read and sign the Safety Agreement for Instructors for the teaching laboratories.
- Participating in safety training programs as required by department of chemistry policy and their supervisors and instructors.
- Know the location of the Safety Data Sheets (SDS) and Chemical Hygiene Plan (CHP) for their assigned laboratories
- Know the underlying chemistry for each experiment being taught.
- Demonstrate proper laboratory techniques for each experiment to the students.
- Demonstrate appropriate procedures for operation of common laboratory equipment (In accordance with the assigned teaching lab), such as burners, hot plates, stirring plates, melting points, IR, GC, NMR, pH meter, spectrometer etc.
- Provide appropriate laboratory safety instruction to students, including explaining the health hazards and risks associated with each experiment.
- Manage the setup and cleanup of laboratory experiments.
- Follow appropriate safety and PPE protocols during laboratory preparation activities, such as making solutions and preparing student samples.
- Maintain good housekeeping in assigned laboratories.
- Know, follow, and enforce the institutional policies and procedures for the following: Appropriate use of PPE and laboratory clothing, responding to students who have mental health problems, generation and disposal of hazardous waste.
- Know, follow, and enforce institutional procedures and reporting protocols for emergencies, including: Lab chemical spills, building evacuation, near miss, injury and non-injury incident, fire and fire alarm

Student's name

Signature

Date

Safety Expectations for Research Assistants in the Department of Chemistry

Graduated students teaching in chemistry laboratories need to know and follow the appropriate safety practices mandated by the Department of Chemistry. As a research assistant, your attitude towards safety should include: value safety, work safely, prevent at-risk behavior, promote safety, and accept responsibility for safety¹. Research assistants (RAs) have responsibilities for operating and managing chemicals and equipment in their research laboratory. A list of minimal expectations that encompass the Department's commitment is described below².

- Understand the organizing principles of safety (**RAMP**). **R**ecognize the hazards, **A**ssess the risk of hazards, **M**inimize the risk of the hazards, **P**repare for emergencies from uncontrolled hazards and how these apply to each experiment.
- Read and sign the Safety Agreement for research assistants.
- Participate in safety training programs as required by the Department of Chemistry policies and by their supervisors and instructors.
- Know the location of the Safety Data Sheets (SDS) and Chemical Hygiene Plan (CHP) for their assigned laboratories.
- Be able to create or develop Safety Operating Procedures (SOP) for hazardous materials.
- Be able to assess the risk and decrease the likelihood of an injury by using proper Personal Protective Equipment (PPE) and engineering controls in each project or experiment.
- Follow appropriate safety and PPE protocols during any laboratory activity.
- Maintain good housekeeping in assigned laboratories.
- Know, follow, and enforce the institutional policies and procedures for the following:
 1. Appropriate use of PPE and laboratory attire
 2. Generation and disposal of hazardous waste
 3. Proper chemical storage
- Know, follow, and enforce institutional procedures and reporting protocols for emergencies, including:
 1. Lab chemical spills
 2. Building evacuation
 3. Near misses
 4. Injury and non-injury incidents
 5. Fire and fire alarms

Student's name

Signature

Date