

LABORATORY SAFETY

A laboratory should be a safe and comfortable place to work, but no environment is safe without the cooperation of its inhabitants. Although the experiments in this class do not involve extremely dangerous substances, the use of hazardous chemicals cannot be entirely eliminated. Before engaging in experimental work, read the following guidelines and observe them at all times in the laboratory. For more information about laboratory safety visit the site for the UCSC Environmental Health and Safety (EH&S; <http://ehs.ucsc.edu>).

“Safety First!”

*Negligent or repeated violation of any of the rules below may result in you being removed from the lab and/or you will receive ZERO for results portions of the lab (credit granted for preparation only – introduction & notebook). A second violation will result in you being dropped from the course. **No make-up labs for students who violate these rules.***

GENERAL SAFETY GUIDELINES

Attire

Wear safety goggles at all times no matter what you are doing or where you are in the lab. For maximum protection against splashes, safety goggles should not have open holes on the sides; the venting apertures, necessary to minimize fogging, should have splash guards.

Goggles with anti-fog lenses are commercially available. If fogging occurs, clean the lens with a piece of tissue paper and anti-fog lotion available in the laboratories. Repeat the cleaning as necessary. This operation should be performed outside the lab. If you need prescription glasses wear them beneath the safety goggles.

Lab coats are provided in the lab and must be worn over appropriate lab attire (see below). *You will lose points every time you are told to put on or button your lab coat.*

Clothing is only a first line of defense against chemical exposure. Any clothing worn tightly to the skin acts as a sponge to directly deliver chemicals to your skin. Consider this in choosing your wardrobe for the day, along with the following specifics. Students that are not dressed properly cannot participate in lab, cannot go home to change, and will receive zero points for the day.

- **OK LAB ATTIRE:** Pants or long skirt, short or long-sleeve shirt, closed-toe shoes that cover the entire top of the foot. Long hair and loose clothing are confined or tied back.
- **NOT OK:** Shorts or short skirts (no exposed ankles), *leggings/tights*, cropped pants that expose ankles, ripped pants that expose skin, tank tops, sandals, ballet flats, or any other shoes that expose the tops of the feet (Crocs and Tom’s are NOT OK!). High heels, baggy clothing, and dangling jewelry are strongly discouraged.

Headphones cannot be used in the lab.

Cell phones cannot be used in the lab and must be turned off.

Bikes cannot be kept, locked or unlocked, inside the building. This includes hallways, labs, instrument rooms and stockroom.

Good Laboratory Habits

Use common sense.

Do not eat, drink, smoke, vape, or apply makeup.

Take a short break if necessary and please let someone know you're leaving. Wash your hands before you go outside or check out the greenhouse and breathe fresh air. A ten-minute break during a 4-hour lab period is refreshing!

Do not bring drinks or snacks into the lab, even if hidden in your backpack. Leave drinks and snacks on the designated table outside. Take off your lab coat and wash your hands before leaving the room and snacking.

Never use laboratory glassware for food or drink. Do not use the ice from the ice machine and the industrial water from the laboratory faucet for a drink.

Never leave an on-going experiment unattended. If you have to leave the lab for a few minutes, notify your TA. Overnight reactions must be in secondary containment

Do not keep your books, backpacks, and coats on the bench-top. Instead, keep them in the designated area.

Do not obstruct the aisles with belongings, stools, or open drawers.

Do not sit on the benches!

Keep exits and aisles free of obstructions at all times.

Do not keep personal electronic devices (laptops, cell phones, etc) on the lab bench, with the exception of dry lab days. If there is a spill they may get damaged and you may lose important data.

Keep your bench space clean and tidy at all times. Make sure to clean it before you leave.

Do not perform unauthorized experiments. Such experiments are strictly prohibited.

Do not invite or receive visitors in the laboratory.

Do not rush. Do not run. Do not push.

Do not engage in horseplay and practical jokes in the lab.

Precautions

Before each experiment, familiarize yourself with the hazards (flammability, reactivity, stability, and toxicity) of the compounds involved. Such information can be found in the Material Safety Data Sheets (MSDS) provided by the manufacturer. They are kept in the stockroom (Thimann 281) and are also available online. Consult also the Merck Index for additional information. Record this information in your lab book.

Be aware of your surroundings. Know what your neighbors are doing. If somebody in the lab appears to be performing an unsafe operation, point out the hazard immediately. Prevention is always the best medicine.

Never use open flames in the laboratory without your instructor's permission.

In case of an emergency evacuation of the building, all the students and instructors should meet outside the building at a spot designated in advance by the instructor. The meeting place for Thimann Labs occupants is the grove between Thimann Labs and Kerr Hall.

If you are pregnant or planning a pregnancy while taking the organic chemistry laboratory, contact your instructor and your doctor. They will provide you with information regarding potential risks to you and the embryo.

If you have to wear crutches or a sling, contact the instructor immediately, before going to your next lab section. Also contact the Disability Resource Center (DRC) (<http://drc.ucsc.edu>; phone: (831) 459-2089). If contacted with enough time they can arrange for a scribe and/or a lab assistant to help you.

Before Leaving the Lab...

...Clean the bench tops and fume hoods. Other students will appreciate a spotless work area as much as you. First wipe the bench with a wet sponge using elbow grease, then dry with a paper towel. Repeat if necessary. If streaks are left on the bench, you will lose points (the streaks are likely contaminants).

...Perform your community task and initial the table on the door.

...Turn off gas, water, air, steam and vacuum valves at or near your bench space.

...Unplug all electrical appliances (hot plates, heating mantles, water pumps, etc.). Never unplug or turn off GCs, IR instruments, GC carrier gas.)

...Wash your hands thoroughly with soap and water.

* Work together to clean the entire lab as you go along. Just because one person is assigned a community task, that does not leave you leave all the work to them! Ex. ask around if it looks like everyone's done with the rota-vap and shut it down.

Handling Chemicals

Consider all chemicals poisonous and minimize exposure.

Use the fume hood when handling organic solvents and volatile compounds.

Never use your mouth to carry out a chemical operation (fill a pipet, start a siphon, etc.).

Dispose of chemical waste in the containers provided for that purpose. They should be clearly labeled and are usually placed in the fume hood. Follow proper procedures as indicated by your instructor and this lab manual.

Do not contaminate reagents. Most organic chemicals are very expensive. Use clean and dry pipets to dispense them. Take just the amount you need, do not waste them. Never pour unused reagents back into stock bottles.

Keep stock bottles in their designated spots, so everybody can find them easily.

Label all containers. Do not use chemicals from unlabeled containers.

Read labels carefully.

Do not inhale, smell, or taste chemicals. Never touch your face without washing your hands.

Wearing Gloves

Wear gloves prudently. There are several types of gloves offering different levels of chemical protection. Always check their chemical resistance and recommended usage. If they are not worn properly, they will only give you a false sense of security.

In the labs we will provide you with nitrile gloves. Wear them when handling organic solvents and specific chemicals as indicated in the experiments.

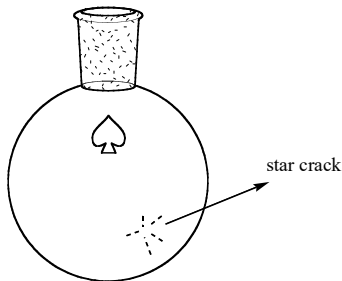
Do not wear them while washing glassware.

Remove them when you go outside the lab (even if it is only for a short trip to the stockroom).

Change them frequently: every time you work with a toxic compounds, especially strong solutions of acid or bases, and definitely when they get soiled or punctured.

Do not handle solid chemicals directly with your gloves, always use a spatula.

Do not reuse contaminated gloves.



Handling Glassware

Check your glassware before use. It is especially important to check round-bottom flasks and condensers carefully. "Star cracks" may cause glassware to break. Do not use any piece of glassware with a crack; bring it to the stockroom for an exchange.

When inserting (or removing) a piece of glass tubing or thermometer into a stopper or hose, wrap the tubing with paper towels or a cloth to avoid cutting yourself. Use water as lubricant. Hold the tubing as close to the insertion point as possible and apply a slow rotatory motion. Keep your hands far from your body and face.

Place broken clean glassware in the appropriate disposal container located in all three rooms. Do not place it in the trash.

Place broken or disposable contaminated glassware (including Pasteur pipets) in the appropriate solid hazardous waste container usually located in the fume hood. Do not place it in the trash. It may puncture the trash bag and cut the person who empties the trash.

If two ground-glass joints get "frozen" do not try to unlock them by applying a torque as they can break and hurt you. Notify your TA instead.

In Case of Accident

If you injure yourself, notify your instructor immediately. Check your local emergency number.

Small cuts can be treated by washing the wound, removing any pieces of glass and applying pressure with a sterile pad. The First Aid Kit is located in Thimann 322.

Do not move injured persons unless they are in further danger.

If chemicals get in your eyes, immediately flush them with water for at least 15 minutes using an eye-wash fountain or eye-wash cup. Seek prompt medical attention.

In case of ingestion of a hazardous chemical contact the local Poison Control Center immediately. The phone number should be posted by the emergency phone (Thimann 281). Meanwhile follow the first aid instructions shown in the MSDS. Never give anything by mouth to someone who is unconscious.

In case of small fire, get your instructor's attention immediately and follow instructions. In case of a large fire evacuate the building immediately. See instructions under In Case of Natural Disaster or Fire Alarm.

If your clothing is on fire, do not run. Use water, a blanket, or a coat to put out the fire. If necessary, the person should roll on the floor. Get prompt medical attention.

Spills

If you spill a chemical on your skin, remove all contaminated clothing and immediately flush with cold water for at least fifteen minutes. Notify your instructor. Check the MSDS for delayed effects. Check for a reaction during the next 24 hours. See a physician.

If you have a chemical spill on a large area of your body, use the safety-shower immediately as you remove any contaminated clothing. Avoid spreading the chemical on the skin. See a physician.

If you spill a nonhazardous solid or liquid, immediately wipe it up using spill mats. If the spill is large (> 100 mL) or if it poses a danger to you or someone else, notify your instructor. Do not attempt to clean up large spills.

If you spill a hazardous material notify your instructor immediately.

Dispose of material used to clean up a spill in the proper waste containers.

In Case of Natural Disaster or Fire Alarm

If the fire alarm goes off stabilize any ongoing experiment by turning off gas, water, vacuum, and any source of heat that you may be using (do this only if it does not pose further danger to you) and exit the building as soon as possible. Do not run.

Do not use the elevators to evacuate the building. Gather outside the building in the pre-arranged spot. For Thimann occupants the meeting place is in the grove between Thimann Labs and Kerr Hall (off the road).

In case of natural disaster such as an earthquake, if possible, find shelter under a desk or a door frame. Duck, cover (at least your head with your arms) and hold (to a sturdy piece of furniture or frame). When the tremor has subsided turn off gas, water, steam, vacuum and any source of heat that you may be using (do this only if it does not pose further danger to you) and exit the building as soon as possible. Always take your personal possessions with you if doing so does not pose further danger. Do not run. Never gather next to a building as falling debris may hurt you.