

General Safety Rules

1. The goggles provided by the university are to be properly worn at all times in the lab.
 2. You are to be properly dressed in the lab.
 - a. Close-toed shoes.
 - b. At least a short sleeve shirt.
 - c. Pants.
 3. No eating or drinking allowed in the lab at any time.
 4. The lab coats provided by the university are to be properly worn at all times in the lab.
 5. No horse play allowed in the lab at any time.
 6. Dispose of chemicals properly (see waste disposal standard operating procedure).
 7. Know where all the safety equipment is located (fire extinguisher, fire blanket, eyewash stations and shower).
 8. If an accident occurs, notify your TA as soon as possible.
 9. Follow the procedure of the lab. Do not attempt any experiments that have not been authorized.
 10. Clean your area after you have finished the lab.
 11. Wash your glassware properly and dispose of any broken glassware into the appropriate container (see glassware standard operating procedure).
 12. Do not run in the lab, walk calmly.
 13. Give people plenty of room when moving around the lab. Do not crowd around other people. Especially if they are carrying chemicals, chemicals or lab equipment such as syringes and needles.
 14. You should dedicate a pen as a lab pen and use it strictly for the lab. This will limit exposure of chemicals outside of lab. Also remember, never put this pen into your mouth and do not use this pen if you are wearing gloves.
 15. Treat everyone in the lab with respect and courtesy.
 16. Avoid contact of the chemicals on your skin. If you do come into contact with the chemicals, ensure that you wash the area properly. If it requires special procedures, follow them. (See chemical exposure standard operating procedure).
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Safety Equipment

It is important that you are aware of where the safety equipment is located in the lab. You will be shown the location of each of these at the beginning of the semester.

1. Emergency Shower
 2. Eye Wash Stations
 3. Fire Blankets
 4. Fire Extinguishers
 5. First Aid Kits
 6. Emergency Exits
 7. Dust Pans and Brooms
 8. Spill Kits
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Standard Operating Procedures

A: Needles and Syringes



1. Using needles and syringes properly is important to avoid getting accidentally stuck by the needle or exposed to chemicals.
2. Be careful taking the cap off the needle. Most people are stuck by needles at this point. Try to gently bend the needle at the base to break the seal.
3. If the plunger sticks at all, discard the syringe and needle immediately (See Waste Disposal)



B: Using Bromine



1. We use Bromine solutions several times in this lab during the semester. It is important to follow the safety protocols to avoid exposure to bromine.
2. The first rule is that you must wear gloves at all times when handling a container that has bromine in it. Make sure that you check your gloves after you handle that container to ensure that no bromine has gotten on them. If they have been exposed, change the gloves immediately.
3. If you have been exposed to bromine on your skin, rinse the area thoroughly with water for 15 minutes.
4. If you have a small bromine spill, you must rinse the area with sodium thiosulfate solution and refer to the spill EOS.



C: Waste Disposal

There are several different types of waste that is generated in the lab, and you need to dispose of all of it properly. If you are unsure about where to dispose of something, ask your TA.

Solid Chemical Waste

1. Solid waste is considered any solid chemicals that you no longer need. It does not include things like gloves, weigh boats or paper towels.
2. Solid waste is disposed in the solid waste container

Trash

1. Trash is considered things like weigh boats, gloves and paper towels.
2. Trash is disposed in the trash cans located throughout the lab.

Broken glass

1. Broken glass is disposed in the broken glass bins throughout the lab.
2. Be careful when handling the broken glass to ensure that you do not cut yourself.

Liquid Chemical Waste

1. Dispose of all liquid chemical waste into the appropriate container.
2. Be sure to lift the lid before emptying pouring the waste into the container.
3. If the container is full, inform your TA so that a new one can be obtained.
4. Ensure that all acids or bases are neutralized before they are disposed into the aqueous waste container

Sharps Waste (Needles, Syringes and Razors)

1. Dispose all sharps waste into the sharps container.
2. Never throw it into the trash. All needles will be accounted for and disposed of properly. If one is missing, then nobody will be allowed to leave until it is found.

D: Wearing Gloves



The most common exposure to chemicals is on the hands. The best way to avoid it is by wearing gloves. These are provided and should be worn properly. To wear gloves properly do the following:

1. First wear the proper size. Do not wear a pair of gloves that is too small or too big.
2. Second, wear gloves only when handling chemicals. Also, do not touch yourself when you are wearing gloves.
3. Third, inspect the gloves while you are wearing them. If they have any rips or tears in them, dispose of them properly and obtain new ones. If they have been exposed to chemicals, dispose of them properly and obtain new ones.
4. Fourth, after you are done handling chemicals, you no longer need to wear gloves, therefore, take them off.
5. Fifth, if you need to exit the lab for anything, you must remove the gloves and dispose of them properly.



E: Acids and Bases

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1. Acids and Bases (especially when they are concentrated) are dangerous chemicals and need to be handled properly to ensure that an accident not occur.
 2. If you are making an acid or base dilution (in water for instance) from a concentrated solution, always add the concentrated solution to the water. Make sure that you add the concentrated solution slowly. It often will still be exothermic, meaning the addition needs to be done carefully and may require an ice water bath (especially if the solvent has a lower boiling point like methanol).
 3. If you are adding a strong acid to a strong base, this must be done slowly and often in an ice water bath because the reaction is exothermic.
 4. Reacting acids with sodium bicarbonate or sodium carbonate will release carbon dioxide, so the addition needs to be done slowly, or the solution will fizz over. If you are doing an extraction in a separatory funnel, vent more frequently to release the carbon dioxide.
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F: Pressure



1. We avoid pressure at all cost in this lab.
2. Never heat a system that is closed.
3. When using a separatory funnel, ensure that you vent it several times.
4. If you have a situation where pressure has built up, let your TA know to ensure that the pressure is released safely.



G: Using Organic Chemicals

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1. When using organic chemicals, be careful to not get exposed to them because many are toxic.
 2. Wear gloves when handling the chemicals to avoid getting them onto your hands. Always inspect the gloves to ensure that the chemical has not gotten onto the gloves. If the gloves have been exposed, then take them off, dispose them and get a new pair while you are still working with the chemicals. When you are done working with the chemicals, you no longer need the gloves.
 3. When handling a liquid organic chemical, transfer it inside the hood and then quickly move it to your own hood to avoid inhaling its vapors.
 4. When working with solids, be sure to carefully weigh out the appropriate amounts into the weigh boats and never put any chemical back into the original. If you spill any, clean up the mess properly. Transfer the solid to the hood carefully.
 5. Be sure to have the msds on hand for all the chemicals you will be using so that if you need any information, you can get it quickly.
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H: Glassware

1. When using glassware in the lab, it is important to use it properly to ensure that you avoid spills or breakages.
2. Always inspect the glassware before using it to ensure that it doesn't have any cracks.
3. Be sure to clean your glassware at the end of the lab thoroughly. Be careful when cleaning the glassware. Most cuts occur when students are cleaning their glassware.
4. When assembling a glassware setup for a reaction, be sure to clamp the glassware properly. Do not use too many clamps because too many makes the setup inflexible and do not use too few clamps will usually result in a demonstration of gravity. Also use a Keck clamp wherever you have two pieces of glassware connected by a glass joint.
5. Be sure to grease all joints properly when instructed to do so.
6. Be sure when using the thermometer adapter that it is inserted properly.
7. If you are using a rubber-septa, be sure that it is inserted properly.
8. If you break any glassware, let your TA know immediately. Then clean up the mess if it is small enough for you to handle it. Be sure to be careful not to cut yourself and place the broken glass into the proper container.
9. Be sure to use the correct size of container when getting a chemical. If you need 50 mL, do not use the 50 mL beaker (use a larger one to avoid spills).

I: Heating Reactions



1. Most organic compounds can catch fire, (especially the solvents) so it is important to be careful when handling them (especially when heating them).
2. When you are heating a reaction, ensure that it is not a closed system because this will build up pressure very quickly and become a very dangerous situation very quickly.
3. **Never leave a reaction that is being heated unattended.**
4. If a reaction is exothermic, such as an acid-base reaction, it often needs to be done slowly to ensure that it does not get out of control (pay attention to the directions for catch phrases like “add dropwise” or “slowly add”).



Emergency Operating Procedures

A: Exposure to Chemicals

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1. Hopefully you will not be exposed to a chemical in the lab. However, it is possible. Care must be taken when handling chemicals to avoid exposure even when wearing safety equipment.
 2. It is highly unlikely that you will be exposed in the eyes because you will always be wearing your goggles in the lab. However, if it does happen, go to the eye wash station and rinse your eyes out for a minimum of 15 minutes.
 3. If your face is exposed to a chemical that requires to be rinsed with water, then you will also be using the eye wash station for a minimum of 15 minutes. If it requires some different type of treatment, use the specific treatment required by the chemicals msds sheet.
 4. Since you will be wearing proper clothing and a lab coat, exposure to the rest of your body is unlikely, but it still might occur. If you spill a chemical on your lab coat, remove the coat immediately and obtain a new one.
 5. If the exposure is in a large area of your body, we may have to place you in the shower for a minimum of 15 minutes. If it is in a small area, it may only require to be rinsed in the sink.
 6. Avoid inhalation of any chemical. To avoid exposure to the vapors of organic compounds, transfer all liquids inside the designated chemical hood. As quickly as possible, transfer them to your own hood and get them inside. If you have been overcome with the vapors of a chemical, let your TA know as soon as possible, and get some fresh air (also follow the instructions dictated by the msds for that chemical).
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B: Fire



1. It is possible that a fire will happen. We are using flammable materials in this lab. The most important thing to remember in a fire is to remain calm.
2. The first thing to do is shout as loud as you can FIRE.
3. If it is small, they can usually be put out with the fire extinguisher.
4. If your cloths have caught on fire, it is important that you get the flames smothered as quickly as possible by the fire blanket.
5. If the fire is too large to put out, then it is important to evacuate. Pull the fire alarm and follow the evacuation protocols.



C: Spills

1. If you have a spill, it is important to first let your TA know about it immediately. You and your TA will then assess if you can clean up the mess or, if it will require the stockroom.
2. If it is to be you, and it requires the spill kit, go get it (it is located by the waste containers) Normally spills that will require spill kits will be handled by the stockroom, so this is not something that a student will usually have to do.
3. If it does not require a spill kit, then make sure that you clean the entire area thoroughly. Make sure that you are wearing gloves when cleaning up the area. If there is broken glass involved, ensure that you are careful so that you do not cut yourself.
4. If there is any waste, be sure to put the waste into the appropriate containers.

D: Evacuation

In the event of an evacuation, do the following:

1. First, turn off all f your equipment (hotplates, stir plates, water hoses etc...).
2. Second, follow your classmates and TA out of the lab to the assigned evacuation point.
3. Third, stay as a group and do not leave unless instructed to by the TA or the lab instructor.
4. Fourth, only re-enter the lab once you have been instructed to by the TA or the lab instructor.

E: Accidents

1. Accidents are events that occur in lab that result in injuries, fires, chemical spills, burns or damage of equipment.
2. If you have an accident, notify your TA immediately.
3. If you are hurt, such as a cut or a burn, we will assess it and determine if it can be taken care of at the lab or if you will need to go to the have medical assistance. You will always be given the option for medical assistance if that is your wish.
4. An accident form will be filled out.

F: Electrical

1. Exposure to an electrical hazard can lead to a serious injury or death. These hazards can come from several sources, such as faulty wiring or faulty equipment.
2. Avoid electrical hazards by using the electrical equipment appropriately. Do not use them for something they are not designed to do. Check the power cables to ensure that they are not damaged before turning on a piece of equipment. Plug all equipment into a Ground-Fault Circuit Interrupter if it is near a water source (our labs have these).
3. If you see someone being electrocuted, the most important thing to remember is to NOT TOUCH THEM to avoid getting electrocuted yourself. Call 911 immediately and if possible, try to turn off the equipment or trip the breaker (DO NOT ATTEMPT THIS IF IT IS NOT SAFE).