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Safety in the Chemistry Laboratory

General

- All students must pass the Safety Quiz and sign a Safety Agreement before working in the lab.
- State and Federal law require the use of splash proof safety goggles by anyone working in a chemical lab. No student will be allowed to work in the lab or weighing room without wearing the department approved splash-proof safety goggles with side shield, lab apron/coat, and closed toe shoes. There will be no exception to this rule.
- You will be doing lab experiments that require hazardous chemicals. To ensure a safe chemistry lab you need to follow :
    - all safety rules given ,
    - the safety DVD, and
    - all written and verbal instructions given for each experiment.
- All safety rules will be strictly enforced. Ignoring or failing to follow any safety rule or instruction will result in your being dismissed from the lab.

Safety Equipment

Know the locations/operations and use of the following emergency equipments:

1. ***Fire extinguisher*** is stored in a compartment attached to the wall.
2. ***Red fire alarm*** is on the wall at eyelevel next to the fire extinguisher
3. ***Fire blanket*** is stored inside a labeled red box attached to the wall next to the fire extinguisher. The blanket is to be used on clothing that caught fire. The blanket can also be used to cover a shock victim.
4. ***Safety shower*** is located next to the lab entrance. When the handle is pulled down, a supply of water will be falling down to flush off the entire body and clothing in case of large serious chemical splashes.
5. ***Drench hose*** is located on several of the sinks in the lab. This can be used on spills of chemicals that are localized on smaller areas of the body. It can also be used as an eyewash.
6. ***Eye wash station*** is located below the safety shower. Also, there are at least two other eyewash stations at different locations in the lab. Each is connected to a length of pull- out hose. When in operation, small fountains of water are directed upward.
7. **Fume Hoods** are located around the perimiter of the room. These are used to exhaust toxic or nauseous gases from the room.
8. ***Emergency phone***. This is found close to the safety shower and is attached to the wall for intramural calls and for connecting to campus police by dialing 911.
9. ***First aid kit*** on the lab bench next to the exit doors
10. ***Baking soda*** (sodium bicarbonate) This is for neutralizing acid spills and is found on the lab bench next to the exit door.
11. ***Spill kit*** is in a labeled cabinet in the lab. It is to be used for large chemical spills on counter top or floor.
12. ***Emergency Exits*** Know what to do in case of emergency. Be familiar of all lab and building exits to use in case of emergency evacuation.
13. ***Emergency Intercom*** In each hallway across from the lab entrances is an intercom with a button and picture of a phone on it. This is a direct line to the Cerritos College campus safety.

Getting Ready for The Chemistry Lab

1. You should prepare in advance for the lab by reading and understanding the assigned experiment to avoid accidents due to lack of comprehension of the procedure, techniques, or equipment involved in the experiment and be familiar with all safety precautions. If you have any questions about the lab procedure, ask your instructor before proceeding.

2. Make a note of what you do not understand so it can be discussed at the beginning of the lab session. Pay close attention to safety instructions and other possible hazards associated with the particular experiment.

3. If you do not understand the instructions or part of the procedure, or if you are not sure of which chemical to use, ask the instructor (not your classmate).

4. Conduct yourself in a responsible manner at all times. You must assume responsibility of the safety for yourself and for your neighbors. The lab is a community where students are watching out for each other safety as well as for themselves.

5. If you are pregnant or have a medical condition, check with your physician prior to working in lab.

6. Know what to do if there is a fire drill or earthquake or other emergency during a lab period; containers must be closed, gas valves and electrical equipments are turned off.

General Rules of Conduct

1. Students are not permitted in the chemistry lab without the presence of the instructor. No student may work in the lab without the instructor's supervision.

2. Only the authorized scheduled experiment can be performed in the lab. No unauthorized experiment is allowed.

3. You are not allowed to alter the procedure of the lab experiment. Carefully follow all instructions.

4. Eating, drinking, and chewing gum are not allowed in the lab. No food or drink is allowed in the lab to avoid possible contamination. Chewing gum may absorb chemicals from the laboratory.

5. Keep your work area neat and clean. During the lab period, store your books and bags under your bench. Keep the area around your chair clear. Do not store belongings on top of the lab bench.

6. Keep shared areas of the laboratory clean. This includes areas such as the balance room and the supply bench where the stock bottles are kept. It is especially important to keep the balance clean and free of chemical spills.

7. Be alert. Notify the instructor immediately if you notice unexpected chemical reaction of your experiment or any unsafe condition.

8. Experiments must be monitored while reactions are taking place or when heating. Do not leave a lit Bunsen burner unattended.

9. Absolutely, no noise or disruptive behavior in the lab. No fooling around.

10. Do not run or walk quickly through the lab. Before you back up, look behind you to make sure no student is behind you that you might bump into.

11. Do not get involved in social conversation in the lab; focus on your work and avoid distraction.

12. Damaged or exposed electric cords can cause electrocution if touched or fire if exposed to water. Follow the following when using electrical equipments:

    a. Avoid using any faulty equipment or damaged electric cords. Report it immediately to your instructor.

    b. Hands must be completely dry when handling electric plugs. Grasp the electrical plug (not the cord) when removing it from the socket.

    c. When using a hot plate make sure that the cord is not touching the hot surface of the hot plate. The cord will melt and expose electrical wires.

13. Wash your hands as often as possible, especially before leaving the lab. Be careful not to touch your eyes or other body areas without thoroughly washing your hands first.

14. Report all accidents (chemical spill, broken glass, etc.) or injuries (burn, cut, chemical splash etc.) no matter how minor to the instructor immediately.

15. Inform the instructor if you feel ill while working in the lab.

16. Before leaving the laboratory, see that:
    a. Your desktop and work area is thoroughly clean. Use a wet paper towel for cleaning.
    b. Floor area, fume hoods, and sink area are clean; pick up all solids from the floor and the sink even they are not yours
    c. All equipment in community drawer is complete and well organized.
    d. You wash your hands, and any other area of skin that has contacted lab equipment or lab benches such as your arms.
17. If you accidentally mix the wrong chemicals or do not follow the instructions, tell the instructor immediately.

Dress Code for the Lab

If you come to the lab dressed inappropriately you will be asked to leave .

1. At all times, students must wear safety goggles ANSI 78.1 with splash protection.

2. Contact lenses may not be worn in the lab. Vapors and toxic fumes may get trapped beneath the contact lenses and harm your eyes.

3. Wear clothes that provide maximum protection and cover most of the skin. Short clothes and sandals are not allowed. Wear clothes that cover your torso and your legs to the knees.

You must wear closed-toe shoes. Clothes should be made of natural materials, such as cotton, that do not catch fire as easily as synthetic materials.

4. You must wear lab apron or coat to protect your clothes.

5. Long hair, extremely loose clothing or clothes with long loose sleeves, and dangling jewelry can get caught and become a hazard. Avoid loose clothing and tie long hair back.

Working with Chemicals

Treat all chemicals in the laboratory as though they are hazardous

1. Do not touch, eat, or smell any chemical unless instructed to do so. When instructed to smell a chemical, you need to fan the air above the chemical toward your nose. Do not sniff the chemical directly by bringing it close to your nose. If you do so, the odor may badly irritate your nasal passage.

2. Do not touch your face, eyes, or mouth while in laboratory. If you must do so, first wash your hands.

3. Hold chemical containers away from your body.

4. Carefully check the label on the bottle before using its content. Make sure it is the correct chemical and correct concentration.

5. *Do not contaminate chemicals*
    a. Never put your spatula to remove solid chemicals from a bottle. If you do so, you will be contaminating the chemical. Instead, pour solid directly into your container by tilting the bottle and rotating it to control the amount dispensed.
    b. If the solid seems to be tightly packed and would not pour off, close the container and then gently tap the bottle with the palm of your hand to loosen up the caked solid.
    c. Never put your medicine dropper into a reagent bottle. If you do so, you will be contaminating the reagent. Instead, pour some liquid into your container, and then use your medicine dropper to take as much as you need from the container.
    d. Never return unused chemicals to their original containers. If you do so, you will be contaminating it. Dispose of the leftover in the proper "waste container". Check with your instructor if you are unsure on what to do with the leftover.

6. Do not waste chemicals; do not take more than what is required. Chemicals used in the laboratory are costly.

7. Never move a reagent bottle to your bench. Leave the bottle at its designated area on the supply bench. Take your own container to the reagent bench to dispense the necessary amount of reagent that you will take back to your lab bench.

8. Always hold all reagent bottles at the labels. Wipe any drips that may take place on the other side of the bottle before putting it back. Be sure the bottle is dry before replacing it on the lab bench/shelf.

9. Handle corrosive chemicals with extreme care. When diluting a concentrated acid, you must ***always add the acid slowly to the water*** while stirring to avoid spattering and

releasing the heat all at once. In other words, ADD ACID. Never do the reverse for the result could be quite hazardous.

10. Never pipette by mouth.

11. Always store chemicals in labeled containers. The etched white part on beakers and flasks is good for applying labels and markings using pencil.

12. Handle toxic fumes produced by your experiment under the fume hood. Keep the fume hood sash down as far as possible.

13. Keep flammable liquids away from heat sources and open flames in the fume hood. If a flammable liquid is used in the laboratory, do not use an open flame at all.

14. Never remove chemicals from the laboratory unless under explicit direction of the lab instructor.

15. Alcohol used in lab is chemically denatured. It has been tainted with poison to make it unsuitable for drinking.

16. Fill wash bottle only with distilled/de-ionized water. Use distilled/de-ionized water when instructed to add water in an experiment or for a final rinsing of glassware. If you accidentally fill the distilled water bottle with tap water, tell the instructor immediately.

17. Place solids into a beaker or weighing paper before weighing on a balance. See that the balance is clean when finished. Brush off any spills. Take care in the use of the balances, they are expensive.

18. After dispensing chemical from a container, replace the stopper or lid immediately.

Disposal of Chemicals:

Carefully, follow instructions on disposal of waste chemicals. You will be instructed to dispose of chemicals into designated waste containers. Check labels of all waste containers. ***If no specific instructions given, you will do the following:***

a. You will dispose of liquids and solutions by pouring them down the sink one at a time accompanied by running water. Never mix chemicals in the sink; avoid unexpected reactions.

b. Solid chemicals, insoluble material, and filter paper are to be disposed of into the trash bin (not in the sink).

Handling Chemical Spills:

Notify your instructor of all chemical spills immediately.

1. For large chemical spills on the body, get under the safety shower and flush the affected area for at least 15 minutes. While under the falling water remove all contaminated clothing. Get instructors attention. If your classmate spills chemicals on his/her body direct him/her to the shower and notify the instructor immediately.
2. For smaller chemical spills on you, rinse with large amounts of water for at least 15 minutes. Get the instructors attention.
3. Mercury spills as that due to broken mercury thermometers should be reported immediately to your instructor. Mercury gives off toxic vapor. Students are not allowed to clean up mercury spills. The instructor may evacuate the lab until cleaning and ventilation is

complete. Most thermometers used in the lab are alcohol thermometers and not filled with mercury.

4. For a large chemical spill on the counter top or floor, immediately notify the instructor. Do not step on the spilled chemical. The instructor will advise you about what to do. Chemical spills must be cleaned up immediately. Dispose of the collected contaminated chemical as instructed. Let the instructor clean up chemical spills. For small spills that can be cleaned up with a small amount of paper towel, avoid letting the chemicals soak through the paper and touch your hands.

Working with Glassware

1. Do not use cracked or chipped glassware. Get replacement from the stockroom.

2. Most accidents in the chemistry labs are due to inserting and removing glass tubes and thermometers from rubber stoppers. Always lubricate the glass tube before inserting it in a rubber stopper and hold it close to the end near the stopper. Protect your hands with a towel when inserting glass tubing. Insert carefully with a gentle twisting motion. Do NOT force it. If not successful, ask for help from the instructor.

For Chem 111 and Chem 112: When inserting a pipette into a pipette suction bulb, hold the pipette near the bulb and gently insert the pipette.

3. Any broken glass must be cleaned up immediately. Follow the instructor's guideline. Do not touch broken glass and do not attempt to clean broken glassware yourself, unless instructed to do so. The instructor will clean up broken glass using dustpan and brush. Broken glass will be placed in a special bin labeled "Broken Glass". Search the floor and lab bench for any small pieces of broken glass.

4. If ground glass stopper is frozen (stuck), report it to your instructor for replacement. If you force the stopper off the bottle, you may experience chemical splash, burn and bodily injury.

5. Do not shake a thermometer. Lay thermometer on a towel to cool, away from the edge of the lab bench.

Stoppers:

To remove a cork, stopper, or lid, do the following:

After picking up the stopper, turn it upside down before placing it on the counter top. This will help avoid contaminating the chemical when the stopper is replaced.

Working with Hot Glassware/ Equipment

1. Heated metals, glassware and cermaics stay hot for a long time. Allow plenty of time for a hot metal to cool before touching it. Since you cannot tell from the appearance of the

metal, glass, or ceramics that it is still hot, you should test it by cautiously bringing the back of your hand close to the metal to feel if heat is radiating from it.

2. Handle hot objects like a beaker, evaporating dish, and crucible with the proper pair of tongs. Use the beaker tongs, evaporating dish tongs, and crucible tongs, respectively.

3. Keep your hair, clothing, and hands at a safe distance from the gas burner.

4. Evaporating dishes and crucibles can be heated to very high temperatures. They will crack and shatter if placed hot on the lab bench or come into contact with water. Therefore, they should be placed on wire gauze to cool. Do not place hot evaporating dishes or crucibles on your lab manual.

5. When heating liquid in test tube,

    a. hold the test tube with the test tube holder such that it is pointing along the length of the lab bench. The open end of the test tube should point away from yourself and your neighbors.

    b. move the test tube back and forth through the flame at an angle. Do not heat above the liquid level. A test tube may shatter if the liquid splashes over that hot glass.

6. Do not heat a closed container. Pressure build up may cause the container to explode.

7. Do not allow hot glassware to come in contact with cold water. It will shatter.

Use of Bunsen Burners

1. If you are not sure how to light a Bunsen burner, ask your instructor.

2. Before using the gas burner, check its gas hose for cracks. Notify the instructor if cracks are found.

3. Stand back while lighting a gas burner.

4. Never reach over a Bunsen burner to turn on/off the gas valve. Move the burner to the side so you can reach the valve to turn on/off the gas.

5. If the flame goes out or if you smell gas, turn the gas off. If you continue to smell gas, notify students around you. Their hose or burner might be the one leaking. If the smell persists, notify the instructor.

6. To turn off the gas burner, you need to turn off the gas outlet valve.

7. Never leave a lit Bunsen burner unattended. If you need to step away from your bench, turn off the gas.

8. Turn the Bunsen burner off immediately when not in use.

WHAT TO DO IN CASE OF ACCIDENT?

- Any accident or injury to you or another person must be reported to the lab instructor immediately, no matter how small it may seem.
- Help others

1. *Burns*

Small burns from touching hot objects should be placed under running cold water for at least 20 minutes. Major burns need immediate medical attention.

2. *Chemicals that come in contact with eyes or face*

The eyewash station should be used if chemicals come in contact with eyes or face. Immediately, flush your eyes with running water from an eyewash station for at least 15 minutes. Open the eyelids with fingers to force the eyes to stay open while flushing. If wearing contact lens, wash the eyes once, remove the contacts, then continue washing for at least 15 minutes. Immediately seek medical attention.

3. Chemical Splash on Clothes or Body

a. For large chemical spills on the body, get under the safety shower immediately, remove clothes and continue to shower for at least 15 minutes. Get the instructors attention. Further medical treatment may be needed.
b. For smaller chemical spills on you, rinse with large amounts of water for at least 15 minutes. Get the instructors attention immediately.

Do not forget water can also be obtained from drench hoses.

4. *Cuts*

Small cut should be rinsed. Bandages are available in First -Aid Kit. If bleeding is extensive, apply pressure on the wound. Seek medical help immediately.

5. *Fires*

a. When clothing catches fire, STOP, do not run as this enhances a supply of air and increases the flames. DROP to the floor and ROLL on the floor to smother the flames. Do not run to the fire blanket. People around you may wrap you with a Fire Blanket to smother the flames and keep it away from face and neck. Never use a fire extinguisher on a person!

b. Let the instructor handle the Fire Extinguisher. Be prepared to leave the building if situation escalates. Turn off and secure all lab equipment.

c. Use a cover plate or a watch glass to cover small contained fires; for example, if chemical inside a beaker is catching fire.

6. *Earthquake*

Turn off the gas valve, stay away from falling objects. Assess the situation. Drop and cover in a safe area. Follow the instructions from your instructor. Do not run or panic. Prepare to leave the building, if necessary.