

# Lab Safety



You should be aware Science Labs can be dangerous. It's important to understand there are possibilities of accidents. Please exercise caution and good judgment and THINK before you do something.

Be sure to consult with your physician before enrolling in the course if you are pregnant or suffer from any allergies, diseases, or medical conditions. It is recommended you check with your physician about tetanus boosters before attending lab.

## Tetanus

The following is a statement by the National Foundation for Infectious Diseases about tetanus.

“Tetanus, commonly called lockjaw, is a bacterial disease that affects the nervous system. It is contracted through a cut or wound that becomes contaminated with tetanus bacteria. The bacteria can get in through even a tiny pin prick or scratch, but deep puncture wounds or cuts like those made by nails or knives are especially susceptible to infection with tetanus. Tetanus bacteria are present worldwide and are commonly found in soil, dust and manure. Infection with tetanus causes severe muscle spasms, leading to “locking” of the jaw so the patient cannot open his/her mouth or swallow, and may even lead to death by suffocation. Tetanus is not transmitted from person to person.

Vaccination is the best way to protect against tetanus. Due to widespread immunization, tetanus is now a rare disease in the U.S. A combination shot, called the Td vaccine, protects against both tetanus and diphtheria. A Td booster shot is recommended every 10 years. Adults who have never received immunization against tetanus should start with a 3-dose primary series given over 7-12 months.”

## Safety Glasses or Goggles

Protective eye wear will be worn at all times when performing an experiment or handling chemicals. There are two types of protection you can use in laboratory: (1) safety glasses and (2) safety goggles.

If you currently wear glasses, they are not safety glasses unless specifically purchased as such. Safety glasses are composed of impact resistant plastic and wrap around the face to protect the sides of the eyes from exposure.

Goggles are impact resistant plastic which cover more of the face and can actually fit over a pair of regular glasses. If you normally wear glasses, you will need to purchase safety goggles.



*Safety glasses (or goggles) must be worn at all times in the lab.*

**Contacts are not allowed in laboratory.** Find an old pair of eyeglasses and use them in conjunction with the safety goggles. Acids used in lab may cause the contacts to corrode to the surface of the cornea.

## What to Wear (and Not to Wear) in Lab

The type of clothing you wear in lab is important. You should wear cotton, tropical wools, linen or other natural fibers. **DO NOT WEAR POLYESTERS OR POLYESTER BLENDS** such as nylon, rayon, orlon, or others. Polyester blends melt to your skin when they burn and tear away skin layers as the melted clothing is removed. Cotton and other natural fibers burn also, but they fall away from your skin without sticking as badly.

Shorts, beach shoes, sandals and other unprotective clothing will not be permitted. Lab coats are mandatory for every lab. Lab coats must either be cotton or the paper variety sold in the book store. The paper lab coats have been impregnated with a fire retardant chemical. Regardless, the lab coat need to be a full length lab coat that covers you to below the knees. Short lab coats are not allowed.



*All lab coats must be full length.*

If you wear your hair long, tie it back out of the way. This prevents it from accidentally getting caught in flames of the Bunsen Burner. Hair burns quite well. In addition, you want to keep it out of the way of any chemicals used in lab.

## Lab Etiquette

Be attentive to any special instructions given in the lab. Sometimes experiments must be modified from the text of the lab manual and there may be substitutions of chemicals.

Be considerate of others and try to maintain a businesslike atmosphere. Don't tolerate horseplay in the lab. You are encouraged to see what other students are doing in the lab and how their experiments are proceeding. You will need to exchange data with other students in lab. You may also wish to exchange email addresses or phone numbers in order to correspond about the lab.

No food or drink is allowed in the lab. Do not use chewing gum. Do not apply makeup while in lab. Keep any objects out of your mouth.

Do not pick up hot glassware or hand glassware to anyone. Other than the heat being given off, there is no indication glassware may be hot. Always place the glassware in a rack or directly on the table when showing the results to another student.

## Safety Features in the Lab

Note the fire exits, extinguishers and safety features in the lab. Learn their location and how to operate them.

√ A fire extinguisher is provided in every lab. Know the location and how to use it. See the end of this lab (page 5) on how to use the fire extinguisher.

√ Note the emergency shut off systems. There is an emergency shut off valve for gas and water.

Know the location. There's also an emergency shut off system for the electricity. This button shuts down all electrical systems in the entire building and automatically begins an exhaust fan to evacuate the room of noxious fumes.

√ The Eyewash Fountain is to be used if you get anything in your eyes. If you get anything in your eyes, hold your eye open over the fountain and depress the handle. Your eye will be gently washed with two aerated sprays of water. Always flush for 15 minutes. If you get something in both eyes, you will need to hold both your eyes open and a lab partner will have to depress the handle for you.

√ The Emergency Shower is to be used in case you spill any caustic substances on yourself or if you catch your clothes on fire. If you catch your clothes on fire, the natural tendency is to run. Your lab partner may have to grab you and pull you under the shower and pull the handle. If you spill caustic substances on you, strip out of your lab coat and clothes and stand under the shower and pull the handle. Again, the rule of thumb is to stay under the shower for 15 minutes.

√ Immediately notify the instructor of any spills or broken glassware. There are designated spill kits. There are kits for (1) acids (2) caustic substances as bases (3) solvents as ethers and petroleum products. Learn the location of the spill kits and know how to use them. If you spill some chemical, your instructor will direct you to clean up the spill. Most kits include a packaged chemical (referred to as a pillow). This package is opened and the chemical is scattered over the spill to absorb it. The next step is to allow the chemical to be absorbed then simply sweep it up and dispose of it in the garbage. Mercury spills are more hazardous. If there is a mercury spill (usually through a broken thermometer) notify the instructor. **Never pick up a broken thermometer** – the mercury will simply



*Water and Gas shut off valve and emergency shower and eyewash.*



*Hazardous spill clean up kits.*

run out the broken end. The lab will be evacuated and a hazmat team will be called.

√ Broken glassware is discarded in a specially designated container. Only broken glassware goes into that container. Never discard broken glassware in regular garbage cans. Notify your instructor in the case of a broken needle or scalpel.

√ A First Aid Kit is found in every lab. If for some reason you are injured, we will immediately call the paramedics. The only reason for the first aid kit is for extreme emergencies which may arise before the paramedics can arrive. In addition, we often keep band-aids in the kit to replace those of yours which have come off while washing your hands.

√ Biohazard Bags are provided for discard of any nonsharp biological hazard such as sealed bacterial plates or bacterial tubes, or dissection specimens. The college has a contract with a special service who comes weekly to remove any hazardous material and properly dispose of it according to State of Florida and EPA standards.

√ Sharps Containers are for the discard of sharp material which may be contaminated with a biohazard. Sharp objects include used or broken scalpels, razor blades, broken glassware, and needles. They are handled in the same way as biohazard bags.



*Broken glassware container.*



**biohazard bag**



**sharps container**

## Do's and Don't's.

- NEVER taste anything in lab unless specifically told to do so by the instructor – an then think about it first. To smell any substance, you need to use proper technique. When smelling any substance, first loosen the lid of the container. Never quickly remove any lid or stopper in lab. Pressure sometimes builds up inside the container and the contents can explode from the container. If the lid is designed to be placed on the table, place the lid upside down on the table to prevent contamination to the lid and the table. Some lids or fasteners are designed to never place on the table and must be held in the hand at all times. Hold the container away from you at arm's length with one hand and with the other gently waft the air over the container towards you. If you cannot smell the substance, then move the container slightly closer and continue to waft the air toward you until you do smell the substance.
- Proper disposal of liquids and solids in laboratory is essential. Some liquids may be safely poured down the drain. Others may not. Check the material safety data sheet to determine the toxicity of the chemical and whether it may be safely poured down the drain. Solids must be disposed of in the garbage can. If a vessel contains both liquids and solids, and they do not require special handling, decant the liquid into the sink and discard the solid in the garbage can. Always check the lab set up for any containers designed for special handling of chemicals. For example, in the chromatography experiments, there will always be a chromatography solvent waste container clearly marked.
- Never force a glass rod, glass tube, or thermometer through a hole in a stopper. Always lubricate the hole in the stopper with either water or glycerine (glycerol). Also lubricate the

glass rod, tube or thermometer. **Grab the glass rod at the point of insertion.** Push and twist into the hole. Never force it if it does not easily glide into the hole. When finished with the experiment, always remove the rod, tube or thermometer, otherwise, it will set up like concrete and cannot be safely removed. To remove, simply grab the glass at the point of insertion and pull and twist until it comes free.

- Keep your work areas neat and clean. If there's too much clutter on the work table, you are asking for trouble.
- Do not return excess reagents to the reagent container. The trick is to try to only remove the amount needed. If you do end up with excess chemical, don't return it to the container. Instead, dispose of it properly. Returning excess reagent to the reagent container runs the risk of contamination of the reagent. Always begin with a clean spatulas.
- Always pour acid into water, never the other way around. If you add water to acid, it can cause an explosion. Students often get confused when lab instructions ask them to dilute the acid. To dilute, you usually add water. This can be quite hazardous with acids. To dilute an acid, first add water to a separate container and then add the acid slowly to that container until the proper dilution is reached.
- Follow proper procedures when dispensing liquids in lab. Most students make the mistake of adding drops to a container by placing the end of the dropper below the rim of the container to receive the drops. Instead, always hold the dropper end above the mouth of the container to receive the drops. Always wash and rinse pipettes in between uses, particularly before changing solutions.
- Read the material safety data sheets for the chemicals used in that days lab.
- Make sure you clean your position and place your chair under the lab table prior to leaving lab. Wash your hands thoroughly with soap and water prior to leaving the lab.

## Fires, Fire Extinguishers, and How to Use A Fire Extinguisher

Your first role in case of a fire is to evacuate the lab. You don't fight fires – the fire department does. If a fire does occur in the lab, evacuate the lab in an orderly manner through the nearest fire exit. If you pass the fire alarm on the way out of the lab, please activate the alarm to notify the rest of the building. The same goes for any emergency button which will shut off all electricity in the building and automatically start exhaust fans.



There are three requirements for a fire: fuel, oxygen and kindling temperature. Remove any one of the three and the fire will go out. For example, when fire fighters put water on a fire, they are lowering the kindling temperature below that of the fuel source.

There are several classes of fires:

- Class A fires are combustible materials such as wood, cloth and paper.
- Class B fires are flammable liquids, such as oil and gasoline, including kitchen grease. Never use water on this type of fire.
- Class C fires are fires involving energized electrical equipment.
- Class D fires involve exotic metals such as magnesium sodium, titanium and certain organometallic compounds such as alkyllithium and



Grignard reagents.

Fire extinguishers are rated on their ability to extinguish a particular class of fire. For example, a Class A extinguisher usually contains water. This will work well with wood, cloth and paper. However, never use a Class A extinguisher on a Class B or Class C fire. Today, most extinguishers are Class ABC. In other words, they will extinguish all three classes without danger to the user of the extinguishers. Class D fires are a special category. Most institutions do not have Class D extinguishers.

To use a fire extinguisher, first pull the pin associated with the nozzle release. Point the extinguisher nozzle at the base of the flames and depress the handle. Do not point the nozzle at the flames. That is not what is burning. Aim for the fuel source.