

General Lab Safety Rules

A variety of hazards exist in science laboratories. The risks associated with these hazards are greatly reduced or eliminated if proper precautions and practices are observed. To manage these risks, and in response to heightened concerns for safety in the workplace, general laboratory safety rules must be followed by everyone in the laboratory. This manual is intended to serve as a guide to basic laboratory safety practices.

Know the safety symbols

Several safety symbols appear during your lab activities. They remind you about possible dangers and help you work more carefully. Get familiar with as many symbols as possible. Some of the commonly used symbols are shown below.



Animal hazard



Sharp instrument hazard



Heat hazard



Glassware hazard



Chemical hazard



Electrical hazard



Eye & face hazard



Fire hazard



Biohazard



Laser radiation hazard



Radioactive hazard



Explosive hazard

Follow the instructions

Use your head and exercise caution. It is important to read lab instructions ahead of time and follow the procedures exactly while doing an experiment. Almost all lab equipment has an instruction/operation manual. Refer to the manual or have your instructor explained it to you before you use it.

Follow personal safety procedures

Eye safety: Wear safety goggles when working with chemicals, flames, lathes, heating devices, drills and flying debris. If a chemical goes into your eye, use the eyewash station immediately to flush. Keep flushing for about 15 minutes.

Proper attire: Put on foot wear that completely covers your foot. Closed - toe shoes are required to work in the laboratory. Keep all long hair tied back especially when you work with spinning devices such as lathes and drills. Do not wear loose clothing that could snag on tools or catch on fire. Use lab coats whenever necessary.

Hand safety: Use proper gloves while working with chemicals and hot objects. Wash hands after every lab. If a chemical spills on your skin, rinse with water immediately and for several minutes. If your hand gets burnt, rinse in cold water immediately and apply ice. Handle glassware, sharp tools and heated containers carefully.

Working with sharp objects

- Always cut away from fingers and body.
- Always carry sharp objects with points and tips facing down and away.
- Never try to catch falling sharp instruments.
- Grasp sharp instruments only by the handles.
- Broken glass and sharp objects do not go in trash cans. They should be collected in separate sharp container.

Electrical safety

- Only electrical plugs are to be placed into an electrical outlet.
- Unplug electrical equipment after use.
- Keep all electrical cords, wires, and appliances away from water and chemicals.
- Do not place a cord where someone can trip over it.
- No ungrounded electrical or electronic apparatus is to be used in the laboratory unless it is double insulated or battery operated.
- When disassembling a circuit, first remove the source of power.
- Always check to see that the power switch is OFF before plugging into the outlet. Also, turn instrument or equipment OFF before unplugging from the outlet.
- When unplugging a power cord, pull on the plug, not on the cable.
- Keep flammable materials away from electrical equipment. The equipment may serve as a source of ignition for flammable or explosive vapors.

Laser safety

Laser safety is a big topic. Separate laser safety training is recommended which provides reasonable and adequate guidance for the safe use of lasers and laser systems. Here some of the general safety rules are listed.

- Review your laser safety procedure prior to laser operation.
- Never aim the laser at a person's eye or stare at the laser from within the beam.
- Keep laser beam paths above or below normal seated or standing eye levels.
- Avoid the use of upwardly-directed beams.
- Mount the laser on a firm support to ensure the beam travels along its intended path.
- Laser safety eyewear may be needed if MPE (Maximum Permissible Exposure) is exceeded.
- Never defeat or bypass engineering control mechanisms of lasers.

- It is always best to enclose as much of the laser beam path as possible.
- Post laser hazard warning signs at entrances to laser use areas.
- Keep specular surfaces away from the vicinity of the laser beam path at all times, including during alignment. In some cases, the flat surfaces of tools such as screwdrivers and wrenches can reflect laser radiation in a specular manner!!!!
- Take special care when using optical systems such as lenses, telescopes and microscopes. These systems can focus laser radiation, leading to more hazardous conditions.
- Provide filters or interlocks to prevent ocular exposure.
- In many cases, it is useful to have a written set of alignment procedures--for example, as an integral part of your Laser Safety.
- If you have any doubts as to whether the level of laser radiation in areas of your laboratory is hazardous, ASSUME THAT IT IS, AND TAKE APPROPRIATE PRECAUTIONS!!!!

Heat safety

- Tie back hair and loose clothes when working with open flames.
- Never look into a container as you are heating it.
- Never point the end of a test tube being heated at yourself or others.
- Never heat in a closed container.
- Never leave a heat source (eg. hot plates) unattended.
- Heated metal and glass look cool. Use tongs or gloves before handling them.
- Do not place hot glassware directly on lab desk or in cold water.

Chemical safety

- Read all labels twice before removing a chemical from the container.
- It is recommended that you read the safety data sheet of the chemical you are going to use.

- Only use the type and amount of chemical instructed to use.
- Never touch, taste, or smell a chemical unless instructed to do so.
- Never mix chemicals unless instructed to do so.
- Transfer chemicals carefully!
- Keep lids on chemical containers when not in use.
- When diluting an acid, pour the acid into water (not water into acid).
- Waste chemicals usually do not go to regular sink. They should be collected and disposed properly. Report to your instructor when you have a chemical waste.
- Flammable chemicals should be stored in flammable cabinets.
- Consider **all** chemicals dangerous

Maintain lab environment

Good "housekeeping" habits should be maintained in the laboratory in order to minimize the potential for accidents of all types. Some of the general rules are:

- Conduct yourself in a responsible manner at all times in the laboratory.
- Maintain a clean work area.
- Read and follow all directions thoroughly before doing an experiment.
- Report any spills, accidents, or injury immediately to your instructor.
- Clean and put away all equipment at the end of the experiment.
- Dispose of waste products according to instruction.
- Keep aisles clear. Push your chair under the desk when not in use.
- Keep fluids, chemicals, and liquids away from instruments and circuits.

Never do the following in lab

- Eat food or drink beverages.
- Use lab glass-ware to eat or drink.
- Horseplay, practical jokes and pranks.
- Anything that is not mentioned in the procedure.

Locate emergency needs

Know the locations and operating procedures of all safety equipment including:

- Fire extinguisher
- Fire blanket
- Body shower
- Eyewash station

RESOURCES –

<http://web.princeton.edu/sites/ehs/labsafetymanual/sec7g.htm>

<http://ehs.research.uiowa.edu/electrical-safety-laboratory>

<http://www.ehs.uconn.edu/Word%20Docs/Electrical%20Safety%20in%20the%20Lab.pdf>

<http://ee.hawaii.edu/~sasaki/EE260/Labs/labRules.htm>

And Laser safety issues...

https://www.lia.org/subscriptions/safety_bulletin/laser_safety_information

http://en.wikipedia.org/wiki/Laser_safety