

Lab Safety

In the laboratory or in the field, you can engage in hands-on explorations, test your scientific hypotheses, and build practical lab skills. However, while you are working, it is your responsibility to protect yourself and your classmates by conducting yourself in a safe manner. You will avoid accidents by following directions, handling materials carefully, and taking your work seriously. Read the following safety guidelines before working in the lab or field. Make sure that you understand all safety guidelines before entering the lab or field.

Before You Begin

- **Read the entire activity before entering the lab.** Be familiar with the instructions before beginning an activity. Do not start an activity until you have asked your teacher to explain any parts of the activity that you do not understand.
- **Student-designed procedures or inquiry activities must be approved by your teacher before you attempt the procedures or activities.**
- **Wear the right clothing for lab work.** Before beginning work, tie back long hair, roll up loose sleeves, and put on any required personal protective equipment as directed by your teacher. Remove all jewelry, and confine all clothing that could knock things over, catch on fire, contact electrical connections, or absorb chemical solutions. Wear pants rather than shorts or skirts. Protect your feet from chemical spills and falling objects. Do not wear open-toed shoes, sandals, or canvas shoes in the lab. In addition, chemical fumes may react with and ruin some jewelry, such as pearl jewelry. Do not apply cosmetics in the lab. Some hair care products and nail polish are highly flammable.
- **Do not wear contact lenses in the lab.** Even though you will be wearing safety goggles, chemicals could get between contact lenses and your eyes and could cause irreparable eye damage. If your doctor requires that you wear contact lenses instead of glasses, then you should wear eye-cup safety goggles—similar to goggles worn for underwater swimming—in the lab. Ask your doctor or your teacher how to use eye-cup safety goggles to protect your eyes.

- **Know the location of all safety and emergency equipment used in the lab.** Know proper fire-drill procedures and the location of all fire exits. Ask your teacher where the nearest eyewash stations, safety blankets, safety shower, fire extinguisher, first-aid kit, and chemical spill kit are located. Be sure that you know how to operate the equipment safely.

While You Are Working

- **Always wear a lab apron and safety goggles.** Wear these items while in the lab, even if you are not working on an activity. Labs contain chemicals that can damage your clothing, skin, and eyes. Aprons and goggles also protect against many physical hazards. If your safety goggles cloud up or are uncomfortable, ask your teacher for help. Lengthening the strap slightly, washing the goggles with soap and warm water, or using an anti-fog spray may help the problem.
- **NEVER work alone in the lab.** Work in the lab only when supervised by your teacher.
- **NEVER leave equipment unattended while it is in operation.**
- **Perform only activities specifically assigned by your teacher.** Do not attempt any procedure without your teacher's direction. Use only materials and equipment listed in the activity or authorized by your teacher. Steps in a procedure should be performed only as described in the activity or as approved by your teacher.
- **Keep your work area neat and uncluttered.** Have only books and other materials that are needed to conduct the activity in the lab. Keep backpacks, purses, and other items in your desk, your locker, or other designated storage areas.
- **Always heed safety symbols and cautions listed in activities, listed on handouts, posted in the room, provided on equipment or chemical labels (whether provided by the manufacturer or added later), and given verbally by your teacher.** Be aware of the potential hazards of the required materials and procedures, and follow all precautions indicated.
- **Be alert, and walk with care in the lab.** Be aware of others near you and your equipment, and be aware of what they are doing.

- **Do not take food, drinks, chewing gum, or tobacco products into the lab.** Do not store or eat food in the lab. Either finish these items or discard them before coming into the lab or beginning work in the field.
- **NEVER taste chemicals or allow them to contact your skin.** Keep your hands away from your face and mouth, even if you are wearing gloves. Only smell vapors as instructed by your teacher and only in the manner indicated.
- **Exercise caution when working with electrical equipment.** Do not use electrical equipment with frayed or twisted wires. Check that insulation on wiring is intact. Be sure that your hands are dry before using electrical equipment. Do not let electrical cords dangle from work stations. Dangling cords can catch on apparatus on tables, can cause you to trip, and can cause an electric shock. The area under and around electrical equipment should be dry; cords should not lie in puddles of spilled liquid, under sink spigots, or in sinks themselves.
- **Use extreme caution when working with hot plates and other heating devices.** Keep your head, hands, hair, and clothing away from the flame or heating area. Never leave a heating device unattended when it is in use. Metal, ceramic, and glass items do not necessarily look hot when they are hot. Allow all items to cool before storing them.
- **Guard against complacency.** Remember that it is human nature to become careless when doing routine things. As you become familiar with apparatus and procedures, remain alert and pay attention.
- **Do not fool around in the lab.** Take your lab work seriously, and behave appropriately in the lab. Lab equipment and apparatus are not toys; never use lab time or equipment for anything other than the intended purpose. Be considerate and be aware of the safety of your classmates as well as your safety at all times.
- **Report all spills to your teacher immediately.** Call your teacher rather than trying to clean a spill yourself. Your teacher will tell you whether it is safe for you to clean up the spill; if it is not safe, your teacher will know how to clean up the spill.
- **If you spill a chemical on your skin, wash the chemical off in the sink and call your teacher.** If you spill a solid chemical onto your clothing, using an appropriate container, brush it off carefully without scattering it onto somebody else and call your teacher. If you spill corrosive substances on your skin or clothing, use the safety shower or a faucet to rinse. Remove affected clothing while you are under the shower, and call to your teacher. (It may be temporarily embarrassing to remove clothing in front of your classmates, but failure to thoroughly rinse a chemical off your skin could result in permanent damage.)
- **If you get a chemical in your eyes, walk immediately to the eyewash station, turn it on, and lower your head so that your eyes are in the running water.** Hold your eyelids open with your thumbs and fingers, and roll your eyeballs around. You have to flush your eyes continuously for at least 15 minutes. Call your teacher while you are flushing your eyes.

When You Are Finished

- **Clean your work area at the conclusion of each lab period as directed by your teacher.** Broken glass, chemicals, and other waste products should be disposed of in separate, special containers. Dispose of waste materials as directed by your teacher. Put away all material and equipment according to your teacher's instructions. Report any damaged or missing equipment or materials to your teacher.
- **Even if you wore gloves, wash your hands with soap and hot water after each lab period.** To avoid contamination, wash your hands at the conclusion of each lab period and before you leave the lab.

Emergency Procedures

- **Follow standard fire-safety procedures.** If your clothing catches on fire, do not run; WALK to the safety shower, stand under it, and turn it on. While doing so, call to your teacher.
- **Report any accident, incident, or hazard—no matter how trivial—to your teacher immediately.** Any incident involving bleeding, burns, fainting, nausea, dizziness, chemical exposure, or ingestion should also be reported immediately to the school nurse or to a physician. If you have a close call, tell your teacher so that you and your teacher can find a way to prevent it from happening again.



Safety Symbols

Before you begin working on an activity, familiarize yourself with the following safety symbols, which are used throughout your textbook, and the guidelines that you should follow when you see these symbols.



Eye Protection

- **Wear approved safety goggles as directed.** Safety goggles should be worn in the lab at all times, especially when you are working with a chemical or solution, a heat source, or a mechanical device.
- **If chemicals get into your eyes, flush your eyes immediately.** Go to an eyewash station immediately, and flush your eyes (including under the eyelids) with running water for at least 15 minutes. Use your thumb and fingers to hold your eyelids open, and roll your eyeballs around. While doing so, call your teacher or ask another student to notify your teacher.
- **Do not wear contact lenses in the lab.** Chemicals can be drawn up under a contact lens and into the eye. If you must wear contacts prescribed by a physician, tell your teacher. In this case, you must also wear approved eye-cup safety goggles.
- **Do not look directly at the sun or any intense light source or laser.** Do not reflect direct sunlight to illuminate a microscope. Such action concentrates light rays to an intensity that can severely burn your retinas and cause blindness.



Clothing Protection

- **Wear an apron or lab coat at all times in the lab to prevent chemicals or chemical solutions from contacting skin or clothes.**
- **Tie back long hair, secure loose clothing, and remove loose jewelry so that they do not knock over equipment or come into contact with hazardous materials or electrical connections.**
- **Do not wear open-toed shoes, sandals, or canvas shoes in the lab.** Splashed chemicals directly contact skin or quickly soak through canvas. Hard shoes will not allow chemicals to soak through as quickly, and they provide more protection against dropped or falling objects.



Hand Safety

- **Wear appropriate protective gloves when working with a heat source, chemicals, solutions, or wild or unknown plants.** Your teacher will provide the type of gloves necessary for a given activity.



Sharp-Object Safety

- **Use extreme care when handling all sharp and pointed instruments, such as scalpels, sharp probes, and knives.**
- **Do not cut an object while holding the object in your hand.** Cut objects on a suitable work surface. Always cut in a direction away from your body.
- **Do not use double-edged razor blades in the lab.**



Glassware Safety

- **Inspect glassware before use; do not use chipped or cracked glassware.** Use heat-resistant glassware for heating materials or storing hot liquids, and use appropriate tongs or a heat-resistant mitt to handle this equipment.
- **Notify your teacher immediately if a piece of glassware or a light bulb breaks.** Do not attempt to clean up broken glass or remove broken bulbs unless your teacher directs you to do so.



Chemical Safety

- **Always wear safety goggles, gloves, and a lab apron or coat to protect your eyes and skin when you are working with any chemical or chemical solution.**
- **Do not taste, touch, or smell any chemicals or bring them close to your eyes unless specifically instructed to do so by your teacher.**
- **Know where the emergency lab shower and eyewash stations are and how to use them.** If you get a chemical on your skin or clothing, wash it off while calling to your teacher.
- **Handle chemicals or chemical solutions with care.** Check the labels on bottles, and observe safety procedures. Label beakers, flasks, test tubes, or other temporary storage vessels containing chemicals.
- **For all chemicals, take only what you need.** Do not return unused chemicals or solutions to their original containers.

- **NEVER take any chemicals out of the lab.**
- **Do not mix any chemicals unless specifically instructed to do so by your teacher.** Check the labels to make sure that you picked up the correct chemicals before you mix the chemicals. Otherwise harmless chemicals can be poisonous or explosive if combined.
- **Report all spills to your teacher immediately.** Clean up spills promptly as directed by your teacher.



Electrical Safety

- **Do not use equipment with frayed electrical cords or loose plugs.** Do not attempt to remove a plug tine if it breaks off in the socket. Notify your teacher, and stay away from the outlet.
- **Fasten electrical cords to work surfaces by using tape.** Doing so will prevent tripping and will ensure that equipment will not fall or be pulled off the table.
- **Do not use electrical equipment near water or when your clothing or hands are wet.**
- **Hold the plug housing when you plug in or unplug equipment.** Do not touch the metal prongs of the plug, and do not pull on the cord.



Heating Safety

- **Avoid using open flames.** If possible, work only with hot plates that have an on/off switch and an indicator light. Turn off hot plates and open flames when they are not in use.
- **Never leave a hot plate unattended while it is turned on or while it is cooling off.**
- **Know the location of lab fire extinguishers and fire-safety blankets.**
- **Use tongs or appropriate insulated holders when handling heated objects.** Heated objects often do not appear to be hot. Do not pick up an object with your hand if the object could be warm.
- **Keep flammable substances away from heat, flames, and other ignition sources.**
- **Allow all equipment to cool before storing it.**



Animal Care and Safety

- **Handle animals only as directed by your teacher.** Mishandling or abusing animals will not be tolerated.
- **Always get your teacher's permission before bringing any animal (including pets) into the school building.**

- **Do not approach or touch any wild animals.** When working outdoors, be aware of poisonous or dangerous animals in the area.
- **Dispose of specimens only as instructed by your teacher.**



Plant Safety

- **Do not ingest any plant part used in the laboratory (especially commercially sold seeds).** Do not touch any sap or plant juice directly. Always wear gloves.
- **Wear disposable polyethylene gloves when handling any wild plant.**
- **Wash hands thoroughly after handling any plant or plant part (particularly seeds).** Avoid touching your face and eyes.
- **Do not pick wildflowers or other plants unless instructed to do so by your teacher.**



Hygienic Care

- **Keep your hands away from your face, hair, and mouth while you are working on any activity.**
- **Wash your hands thoroughly before you leave the lab or when you finish any activity.**
- **Remove contaminated clothing immediately.** If you spill corrosive substances on your skin or clothing, use the safety shower or a faucet to rinse. Remove affected clothing while you are under the shower, and call to your teacher. (It may be temporarily embarrassing to remove clothing in front of your classmates, but failure to thoroughly rinse a chemical off your skin could result in permanent damage.)
- **Use the proper technique demonstrated by your teacher when you are handling bacteria or other microorganisms.** Treat all microorganisms as if they are pathogens. Do not open Petri dishes to observe or count bacterial colonies.



Proper Waste Disposal

- **Clean and sanitize all work surfaces and personal protective equipment after each lab period as directed by your teacher.**
- **Dispose of contaminated materials (biological or chemical) in special containers only as directed by your teacher.** Never put these materials into a regular waste container or down the drain.
- **Dispose of sharp objects (such as broken glass) in the appropriate sharps or broken glass container as directed by your teacher.**