

D6 Science Safety Guidelines

Risk Assessment

Making Your Laboratory a Safe Place to Work and Learn

Concern for safety must begin before any activity in the classroom and before students enter the lab. A careful review of the facilities should be a basic part of preparation for each school term. You should investigate the physical environment, identify any safety risks, and inspect your work areas for compliance with safety regulations.

The review of the lab should be thorough and all safety issues must be addressed immediately. Keep a file of your review, and add to the list each year. This will allow you to continue to raise the standard of safety in your lab and classroom.

Many classroom experiments, demonstrations, and other activities are classics that have been used for years. This familiarity may lead to a comfort that can obscure inherent safety concerns. Review all experiments, demonstrations, and activities for safety concerns before presenting them to the class. Identify and eliminate potential safety hazards.

Identify the Risks

Before introducing any activity, demonstration, or experiment to the class, analyze it and consider what could possibly go wrong. Carefully review the list of materials to make sure they are safe. Inspect the equipment in your lab or classroom to make sure it is in good working order. Read the procedures to make sure they are safe. Record any hazards or concerns you identify.

Evaluate the Risks

Minimize the risks you identified without sacrificing learning. Remember that no activity you can perform in the lab or classroom is worth risking injury. Thus, extremely hazardous activities, or those that violate your school's policies, must be eliminated. For activities that present smaller risks, analyze each risk carefully to determine its likelihood. If the pedagogical value of the activity does not outweigh the risks, the activity must be eliminated.

General Safety Guidelines

1. Post laboratory rules in a conspicuous place in the laboratory.
2. Before the class begins an experiment, review safety rules and demonstrate proper procedures.
3. Never permit students to work in your laboratory without your supervision. No unauthorized investigations should ever be conducted, nor should unauthorized materials be in the laboratory.
4. Lock your laboratory (and storeroom) when you are not present.
5. Clearly mark locations of eye-wash stations, safety showers, fire extinguishers, and fire blankets in the laboratory and storeroom. Check this safety equipment prior to conducting each investigation. Teachers should be familiar with how to operate eye wash stations, showers, and gas line valves.
6. Post an evacuation diagram and procedure.
7. Provide labeled disposal containers for glass, sharps, and waste chemical reagents. Any biological media and reagents should be autoclaved before disposal to include, but not limited to:
 - Petri dishes
 - Agar & broth media
 - Forceps, scissors, & scalpels
 - Containers that held any biological media
 - Cultural tubes & bottles
8. Allow no food or beverages in the laboratory. Caution students to keep their hands away from their face and to wash hands with soap and water before leaving the laboratory.
9. Instruct students to tie back or tuck in loose clothing, long hair, and dangling jewelry. Do not allow open-toed shoes to be worn in the laboratory.
10. Ensure that lab ventilation and hood performance and use conforms with ANSI standards.
11. Never leave a heat source such as a Bunsen burner or a hot plate unattended.
12. Follow prescribed procedures for any safety incident, including full documentation. Remind students that any safety incident, no matter how trivial, must be reported directly to you.

Personal Protective Equipment

- Chemical goggles: These should be worn with any chemical or chemical solution other than water, when heating substances, using any mechanical device, or observing physical processes that could eject an object.
- Contact lenses: The wearing of contact lenses for cosmetic reasons should be prohibited in the laboratory. If a student must wear contact lenses prescribed by a physician, that student should be instructed to wear eye-cup safety goggles
- Eye-wash station: It must be within a 30-second walking distance from any spot in the room. Students should be instructed in the use of the eye-wash station in the event of chemicals in contact with their eyes.
- Safety shower: Location should be within a 30-second walking distance from any spot in the room. Students should be instructed in the use of the safety shower in the event of a fire or chemical splash on their body that cannot simply be washed off.
- Gloves: Polyethylene, neoprene rubber, or disposable plastic may be used. Nitrile or butyl rubber gloves are recommended when dissecting or handling corrosives.
- Apron: A rubber-coated cloth or vinyl (nylon-coated) halter is recommended.

Emergency Preparedness

1. Post the phone number of your regional poison control center, fire department, police, ambulance, and hospital on your telephone.
2. Practice fire and evacuation drills. Also have drills on what students **MUST** do if they are on fire or have chemical contact.
3. Ensure that all personal and other safety equipment is available and tested frequently.
4. Compile an MSDS file for all chemicals in your laboratory or storeroom. This reference resource should be readily available in case of a spill or other accident.
5. Provide for spill control procedures. Handle only those incidents that you feel comfortable in handling. Situations of greater severity should be handled by trained hazardous materials professionals.
6. Students should never fight fires or handle spills.
7. Be trained in first aid and basic life support (CPR) procedures. Have first-aid kits and spill kits readily available.
8. Fully document **ANY INCIDENT** that occurs.
9. Ensure that supervision personnel are trained in the correct use of safety equipment.

Safety in Handling Preserved Materials

The following practices are recommended when handling or dissecting any preserved specimen:

1. **NEVER** dissect road-kills or non preserved slaughterhouse materials.
2. Wear protective gloves and splash-proof safety goggles at all times when handling preserving fluids and preserved specimens and during dissection.
3. Wear lab aprons. Use of an old shirt or smock under the lab apron is recommended.
4. Conduct dissection activities in a well-ventilated area.
5. Do not allow preservation or body-cavity fluids to contact skin. Fixatives do not distinguish between living or dead tissues.

Safety with Microbes

Pathogenic (disease-causing) microorganisms are not appropriate investigational tools in the school laboratory and should never be used.

- Ensure that inoculated agar plates and other growth-media containers are sealed with tape to avoid spills or accidental contamination.
- Never allow students to take any specimens or culture media out of the lab without supervision.

Safety with Chemicals

Label student reagent containers with the substance's name and hazard class(es) (flammable, reactive, etc.).

Dispose of hazardous waste chemicals according to federal, state, and local regulations. Refer to the Material Safety Data Sheet for recommended disposal procedures.

Remove all sources of flames, sparks, and heat from the laboratory when any flammable material is being used.

- Never mouth pipet any liquids, even water.
- Secure all gas cylinders when in use, and transport them secured on a hand truck.
- Use a fume hood when working with volatile chemicals.
- Buy chemicals in class-size quantities. Do not purchase more than one year's supply of chemicals.

Material Safety Data Sheets

The purpose of a Material Safety Data Sheet (MSDS) is to provide readily accessible information on chemical substances commonly used in the science laboratory or in industry. There should be 3 copies of the MSDS: one on file in the storage chemical area, one at the main office where the school nurse has access, and one at the local fire department.

The MSDS should be kept on file and referred to BEFORE handling ANY chemical. The MSDS can also be used to instruct students on chemical hazards, to evaluate spill and disposal procedures, and to warn of incompatibility with other chemicals or mixtures.

Storing Chemicals

Never store chemicals alphabetically, as this greatly increases the risk of promoting a violent reaction.

Storage Suggestions:

1. Always lock the storeroom and all its cabinets when not in use.
2. Students should not be allowed in the storeroom and preparation area.
3. Avoid storing chemicals on the floor of the storeroom.
4. Do not store chemicals above eye level or on the top shelf in the storeroom.
5. Be sure shelf assemblies are firmly secured to the walls. Avoid metal, adjustable shelf supports and clips. They can corrode, causing shelves to collapse.
6. Provide anti-roll lips on all shelves.
7. Shelving should be constructed out of wood. Metal cabinets and shelves are easily corroded.
8. Acids, flammables, poisons, and oxidizers should each be stored in their own locking storage cabinet.
9. Keep an up-to-date inventory of chemicals on hand.
10. When not sure of the compatibility of chemicals, always refer to the MSDS.
11. Do not store chemicals on laboratory shelves.
12. Store chemicals that are incompatible with water (such as alkali metals) or carbon dioxide (such as alkali and alkaline-earth metals) under conditions that would not expose them to such compounds in the event of a fire.
13. Cover both terminals of drycell and rechargeable batteries with insulating tape when storing them.