What are the Teacher's Responsibilities?

Teachers and teacher-aides should lead by example and wear personal protective equipment; follow and enforce safety rules, procedures, and practices; and demonstrate safety behavior and promote a culture of safety. They should be proactive in every aspect of laboratory safety, making safety a priority. The following is a checklist for teachers highlighting essential information for working in the high school laboratory. This is a general safety checklist and should be periodically re-evaluated for updates.

Upkeep of Laboratory and Equipment

- Conduct regular inspections of safety and first aid equipment as often as requested by the administration. Record the inspection date and the inspector's initials on the attached equipment inspection tag.
- Notify the administration in writing if a hazardous or possibly hazardous condition (e.g., malfunctioning safety equipment or chemical hazard) is identified in the laboratory and follow through on the status.
- Never use defective equipment.

Recordkeeping

- Keep organized records on safety training of staff for as long as required by the school system.
- Keep records of all laboratory incidents for as long as required by the school system.

Safety and Emergency Procedures

- Educate students on the location and use of all safety and emergency equipment prior to laboratory activity.
- Identify safety procedures to follow in the event of an emergency/accident.
- Provide students with verbal and written safety procedures to follow in the event of an emergency/accident.
- Know the location of and how to use the cut-off switches and valves for the water, gas, and electricity in the laboratory.

- Know the location of and how to use all safety and emergency equipment (i.e., safety shower, eyewash, first-aid kit, fire blanket, fire extinguishers and mercury spill kits).
- Keep a list of emergency phone numbers near the phone.
- Conduct appropriate safety and evacuation drills on a regular basis.
- Explain in detail to students the consequences of violating safety rules and procedures.

Maintenance of Chemicals

- Perform regular inventory inspections of chemicals.
- Update the chemical inventory at least annually, or as requested by the administration.
- Provide a copy of the chemical inventory to the local emergency responders (i.e., fire department).
- Do not store food and drink with any chemicals.
- If possible, keep all chemicals in their original containers.
- Make sure all chemicals and reagents are labeled.
- Do not store chemicals on the lab bench, on the floor, or in the laboratory chemical hood.
- Ensure chemicals not in use are stored in a locked facility with limited access.
- Know the storage, handling, and disposal requirements for each chemical used.
- Make certain chemicals are disposed of properly. Consult the label and the Material Safety Data Sheet for disposal information and always follow appropriate chemical disposal regulations.

Preparing for Laboratory Activities

- Before each activity in the laboratory, weigh the potential risk factors against the educational value.
- Have an understanding of all the potential hazards of the materials, the process, and the equipment involved in every laboratory activity.
- Inspect all equipment/apparatus in the laboratory before use.
- Before entering the laboratory, instruct students on all laboratory procedures that will be conducted.
- Discuss all safety concerns and potential hazards related to the laboratory work that students will be performing before starting the work. Document in lesson plan book.

Ensuring Appropriate Laboratory Conduct

- Be a model for good safety conduct for students to follow.
- Make sure students are wearing the appropriate personal protective equipment (i.e., chemical splash goggles, laboratory aprons or coats, and gloves).
- Enforce all safety rules and procedures at all times.
- Never leave students unsupervised in the laboratory.
- Never allow unauthorized visitors to enter the laboratory.
- Never allow students to take chemicals out of the laboratory.
- Never permit smoking, food, beverages, or gum in the laboratory.

Appendix F. Recommended Safety and Emergency Equipment for the Laboratory

The following are checklists for safety and emergency equipment for the laboratory:

Personal Protective Equipment

- ✔ Chemical splash goggles
- ✔ Face shields
- ✔ Lab coat
- ✔ Lab apron
- ✔ Gloves (selected based on the material being handled and the particular hazard involved)

Safety and Emergency Equipment

- ✔ Hand-free eye-wash stations (not eye-wash bottles) that conform to ANSI Z358.1–2004
- ✔ Deluge safety showers that conform to ANSI Z358.1–2004
- ✔ Safety shields with heavy base
- ✔ Fire extinguishers (dry chemical and carbon dioxide extinguishers)
- ✔ Sand bucket
- ✔ Fire blankets
- ✔ Emergency lights
- ✔ Emergency signs and placards
- ✔ Fire detection or alarm system with pull stations
- ✔ First-aid kits
- ✔ Spill control kit (absorbent and neutralizing agents)
- ✔ Chemical storage cabinets (preferably with an explosion proof ventilation system)
- ✔ Gallon-size carrying buckets for chemical bottles
- ✔ Laboratory chemical hood (60–100 ft/minute capture velocity, vented outside)
- ✔ Ground-fault interrupter electrical outlets
- ✔ Container for broken glass and sharps
- ✔ Material Safety Data Sheets (MSDSs)
- ✔ Emergency Action Plan for the institution

Appendix I. General Guidelines to Follow in the Event of a Chemical Accident or Spill

- Assess the overall situation.
- Determine the appropriate action to resolve the situation.
- Follow the pre-existing, approved local emergency plan.
- Act swiftly and decisively.

Below are some recommended actions for specific emergencies. Some of the actions have been proposed by the Council of State Science Supervisors in Science & Safety: Making the Connection.

Chemical in the Eye

- Flush the eye immediately with water while holding the eye open with fingers.
- If wearing contact lens, remove and continue to rinse the eye with water.
- Continue to flush the eye and seek immediate medical attention.

Acid/Base Spill

For a spill not directly on human skin, do the following:

- Neutralize acids with powdered sodium hydrogen carbonate (sodium bicarbonate/baking soda), or bases with vinegar (5% acetic acid solution).
- Avoid inhaling vapors.
- Spread diatomaceous earth to absorb the neutralized chemical.
- Sweep up and dispose of as hazardous waste.

For spills directly on human skin, do the following:

- Flush area with copious amounts of cold water from the faucet or drench shower for at least 5 minutes.
- If spill is on clothing, first remove clothing from the skin and soak the area with water as soon as possible.
- Arrange treatment by medical personnel.

Mercury Spill

- Evacuate the affected area.

- Close off interior doors and windows, and heating and air conditioning vents in the incident room.
- Open exterior doors and windows to move the inside air outside.
- Follow specific cleanup instructions detailed by the EPA (www.epa.gov/epaoswer/hazwaste/mercury/spills.htm) or by your state.

SAFE LAB

SUPERVISION	Never work in the lab without the supervision of a teacher
ATTENTION	Always pay attention to the work—don't fool around in the lab
FOLLOW INSTRUCTIONS	Always perform experiments precisely as directed by the teacher
EMERGENCY PREPAREDNESS	Know what to do in the event of an emergency
LABELING	Check labels to verify substances before using them. Label Containers
APPAREL	Always wear appropriate protective equipment and apparel
BRAINS	Use them—Safety begins with you

SAFETY DO'S AND DON'TS FOR STUDENTS

SAFE LAB

How Should Chemicals Be Stored?

First, identify any specific requirements regarding the storage of chemicals from (1) local, State, and Federal regulations and (2) insurance carriers.

General Rules for Chemical Storage

Criteria for Storage Area

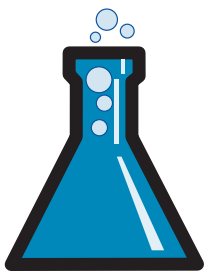
- Store chemicals inside a closeable cabinet or on a sturdy shelf with a front-edge lip to prevent accidents and chemical spills; a ¾-inch front edge lip is recommended.
- Secure shelving to the wall or floor.
- Ensure that all storage areas have doors with locks.
- Keep chemical storage areas off limits to all students.
- Ventilate storage areas adequately.

Organization

- Organize chemicals first by COMPATIBILITY—not alphabetic succession (refer to section titled *Suggested Shelf Storage Pattern*—next page).
- Store alphabetically within compatible groups.

Chemical Segregation

- Store acids in a dedicated acid cabinet. Nitric acid should be stored alone unless the cabinet provides a separate compartment for nitric acid storage.
- Store highly toxic chemicals in a dedicated, lockable poison cabinet that has been labeled with a highly visible sign.
- Store volatile and odoriferous chemicals in a ventilated cabinet.
- Store flammables in an approved flammable liquid storage cabinet (refer to section titled *Suggested Shelf Storage Pattern*).
- Store water sensitive chemicals in a watertight cabinet in a cool and dry location segregated from all other chemicals in the laboratory.



SAFE LAB

Storage Don'ts

- Do not place heavy materials, liquid chemicals, and large containers on high shelves.
- Do not store chemicals on tops of cabinets.
- Do not store chemicals on the floor, even temporarily.
- Do not store items on bench tops and in laboratory chemical hoods, except when in use.
- Do not store chemicals on shelves above eye level.
- Do not store chemicals with food and drink.
- Do not store chemicals in personal staff refrigerators, even temporarily.
- Do not expose stored chemicals to direct heat or sunlight, or highly variable temperatures.

Proper Use of Chemical Storage Containers

- Never use food containers for chemical storage.
- Make sure all containers are properly closed.
- After each use, carefully wipe down the outside of the container with a paper towel before returning it to the storage area. Properly dispose of the paper towel after use.