Safety Matters

New science teachers often inherit a less-than-ideal laboratory and storage area. And with all the demands of teaching science, it's probably safe to say that most K-12 science teachers bear all the responsibility for safety in their laboratories, yet receive little support and training for managing a lab. Every year, there are far too many school lab accidents that could have been prevented—many resulting in serious injuries. To see if your school is providing safe laboratory conditions for staff and students, take a moment to answer these questions about your lab.

Do you and other science teachers in your school have adequate support and training to:

- Maintain good chemical storage practices?
- Make sure that chemicals are properly labeled?
- Guarantee that fume hoods are routinely checked and operating properly?
- Ensure that personal protective equipment is readily available?
- Ensure that eyewash stations and showers work properly?
- Implement a chemical hygiene plan as mandated by the Occupational Safety and Health Administration?

If you answered no to any of these questions, you may be at risk of exposure to dangerous chemicals.

The list of recent incidents and accidents in school laboratories is distressingly long. Conditions commonly observed in school labs that increase the risk of accidents include:

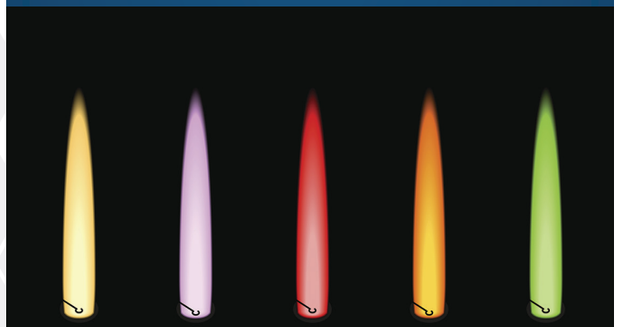
- Explosions and fires linked to leaking (and often unlabeled) hazardous chemicals;
- Chemicals and compounds stored alphabetically, instead of by chemical class, often beyond the chemicals' life span; and
- Crystallized picric acid that has become highly explosive, which requires a bomb squad to remove.

Getting over the rainbow

At first glance, the "rainbow experiment" is an exciting way to engage students in chemistry lab. When it goes smoothly, it illustrates how various chemical salts can create a rainbow of flames when heated in methanol.

This popular chemistry demonstration can also be very dangerous. In 2014, for example, the experiment went horribly wrong at a New York City public school. The demonstration was conducted in the open, without the benefit of an exhaust hood that may have controlled dangerous flame flashback. The teacher performed the experiment a first time without incident, and the enthralled students pleaded for a repeat of the demonstration. Unfortunately, the first experiment left a highly volatile concentration of alcohol in the room, which was ignited during the second demonstration. As a result, one student was severely injured with third-degree burns, and another with first-degree burns.

This was no freak accident. The U.S. Chemical Safety Board has identified a number of accidents as a result of this experiment, and has designed a campaign to alert science teachers to the dangers. Just days before the New York City accident, the CSB released a warning about the experiment, with a video that featured the story of a 15-year-old Ohio student who suffered burns on more than 40 percent of her body. Yet, in classrooms across the country, this experiment is still being conducted.



ANSWERS:

Chemical storage: Acids should be stored in an acid-resistant cabinet.

Mercury: Call a hazardous waste company to dispose of all mercury in your laboratory.

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Safety Matters

BEST PRACTICES FOR YOUR SCHOOL LAB

A problem waiting to happen

The improper storage of chemicals in school labs is a leading safety hazard. At one high school, for example, a wooden cabinet with wooden shelves and metal shelf supports served as the acid storage area. These shelves were packed with numerous acids in glass bottles, including sulfuric acid and hydrogen fluoride, and several of these bottles were sealed with rubber corks, which can degrade when exposed to acid.

Explanation of hazard: Improperly sealed acid containers can off-gas, resulting in corrosion of the metal shelf supports. All screws and supports for this cabinet appeared to be steel, which can readily corrode when exposed to acids, ultimately undermining the integrity of the shelf supports. With continued corrosion, an accidental bump to the shelves could cause them to fail, resulting in the breakage of the acid glass containers.

What's a good solution to this problem?
See the answer at the end of this brochure.

"Education is the most important aspect of safety. Explaining and demonstrating proper handling, disposal, and safety practices not only assures safety during an experiment, but also makes our students more likely to avoid danger when they enter the workforce.

—Carrie Merfeld
Norwich Technical High School

Chemical spill closes school for weeks

In October 2003, the Washington, D.C., Fire and EMS Department's hazmat unit responded to an emergency call unlike any call Ballou High School had ever had to make. What the hazmat unit found that afternoon proved to be the beginning of a long, exhausting search for, and clean up of, an elemental mercury spill. The spill happened after a student sold liquid elemental mercury obtained from a science laboratory to other students. Varying amounts of mercury were found in the classrooms, gymnasium and cafeteria. The U.S. Environmental Protection Agency responded by establishing a mobile command post, measuring mercury air concentrations and noting visual contamination of the science laboratory and other areas of the school.

Contamination did not stop there, however. Students unknowingly carried mercury on contaminated shoes and clothing through the streets, onto city and school buses, and into their homes. Eleven homes and one common area were found to be contaminated, and more than a dozen families were displaced for a month.

As a result of the spill, Ballou High School was closed for 35 days, more than 200 homes were tested for mercury contamination, and total cleanup costs were $1.5 million.

How can you avoid a similar incident at your school? See the answer at the end of this brochure.

Providing safe laboratory conditions for staff and students

The Occupational Safety and Health Administration requires schools in covered districts* to be in compliance with the occupational exposure to hazardous chemicals in laboratories standard (1910.1450). A part of that standard requires that each school have a comprehensive Chemical Hygiene Plan in place.

A CHP is a written plan describing all policies, procedures and responsibilities required to protect staff engaged in the laboratory use of hazardous chemicals. The CHP must address virtually every aspect of the procurement, storage, handling and disposal of chemicals in use at your school. Each school should make a copy available in its laboratory space and ensure that all science teachers have the necessary support to implement the CHP in their labs.

Do you know your chemical hygiene officer?

A chemical hygiene officer, responsible for implementing the CHP, is required under the standard. Typically, a science department chair or chemistry teacher is appointed to this position.

Key components of a Chemical Hygiene Plan

- Minimizing exposure to chemicals by:
  - Establishing standard operating procedures that address all aspects of regular lab activities; and
  - Developing hazard control protocols, including engineering controls (e.g., chemical fume hoods, air handlers, etc.), administrative/ work practice controls and personal protective equipment).
- Providing all staff working with hazardous substance with information and training on:
  - Chemical exposure signs and symptoms;
  - Permissible or recommended exposure limits;
  - Guidelines on the safe handling, storage and disposal of hazardous chemicals; and
  - Safety data sheets (SDSs).
- Ensuring a mandated medical consultation when a worker develops symptoms that might be related to chemical exposure.

Reclaiming the promise of public education

Safer workplaces for teachers, paraprofessionals and school-related personnel lead to safer and more productive learning environments for students. Chemical Hygiene Plans allow educators to make curriculum more engaging while ensuring safety is a priority.

For more information, please contact AFTs health and safety team at healthandsafety3@aft.org.

*This standard applies to public workers in 22 states and jurisdictions (Alaska, Arizona, California, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Washington and Wyoming) operating complete OSHA state plans (covering both the private sector and state and local government employees), and five states and jurisdictions (Connecticut, Illinois, New Jersey, New York and the Virgin Islands) with state plans that cover public employees only.

King County photos by Dave Waddell