

Safer Seven Science

- Science teachers have a unique, added classroom management responsibility
- We encourage students to purposely use and manipulate scientific equipment, living specimens, and chemicals in order to do science

SAFE SCIENCE: Be Protected!

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Science in the news is not always a good thing. For example, over the past few years it has been



reported in the press that middle school students have gotten seriously cut by using scalpels in dissecting flowers, high school students have gotten severely burned in methanol explosion by teacher demonstrations of flame tests and several

university level students and employees became fatalities resulting from explosions and use of power tools. Academic science laboratories can be unsafe places to work and learn! The myriad of accidents over the years has proved that statement to be true, be it biological, chemical or physical in nature. It also does not matter at what grade level -primary, intermediate, secondary or tertiary levels. So how can the odds be improved and make it safer in the laboratory?

Strategies For Safer Science!

The following "Safer Seven" is a recommended checklist of strategies as a starting point for science teachers, supervisors and administrators to help improve the odds of having safer laboratory experiences:

1. Know the Rules/Practices!

No matter where you teach, there are legal safety standards which must be followed. These may be local, state/regional or central government based. Before working in the laboratory, make sure the legal safety standards have been researched, reviewed, adopted and enforced. This may include building codes, fire codes, environmental codes,

occupational codes etc. Another area which needs to be addressed is the better professional practices. These practices are often more far reaching across territories, borders, countries, and more. Organizations like the National Science Teachers Association (USA), the Australian Science Teachers Association (Australia), the Association for Science Education (UK), and others have position papers, professional practices and more. It is important to follow legal standards and better professional practices for the safety of students and also protection of the science teachers from legal entanglements including negligence charges.

2. Rules of the Home Base!

The employer, with the help of science teacher employees needs to have a written safety plan which includes standard operating laboratory procedures. In the States, this is required by schools

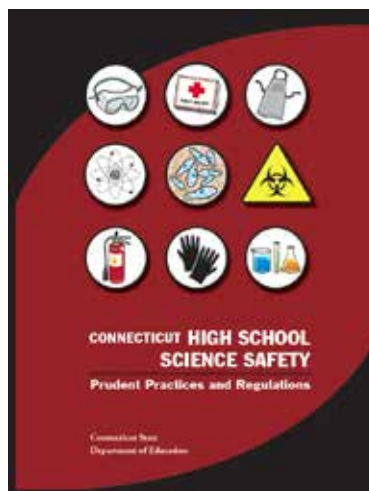
under the jurisdiction of the Occupational Safety and Health Administration or OSHA. They require under OSHA's Occupational exposure to hazardous chemicals in laboratories or the Laboratory Standard, a written safety plan called the Chemical Hygiene Plan and also one or more Chemical Hygiene Officers to make sure the plan is applied, amongst other duties. (https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=10106&p_table=STANDARDS) Supervision and progressive discipline for students and employees is also a critical piece to securing and maintaining a safer working environment.

3. Safety Committee!

Every school should have a safety committee with representation from both the employer and employees. The safety committee should be trained to conduct or have outside safety consultants perform periodic safety inspections of science laboratories including engineering controls, administrative procedures (standard operating procedures), personal protective equipment, storage facilities and more.

4. Student Safety Training!

To not only make it safer for students but also science teachers working in the laboratory, students also need to have safety training relative to biological, chemical and physical hazards. This should include laboratory safety procedures, assessments for understanding and skills relative to safety and also review of a safety acknowledgement form.



(See National Science Teachers Association's *Safety in the Science Classroom, Laboratory or Field Sites* - <http://www.nsta.org/docs/SafetyInTheScienceClassroomLabAndField.pdf>.) The acknowledgement form should be signed by both students and parents/guardians. Safety training should not be just a "drive-by" experience but an ongoing activity throughout the school year.

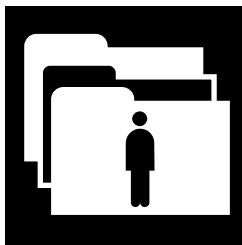
5. Emergency Response!

The safety plan/training should also include emergency procedures. What should students and teachers do when there is a chemical spill? A fire? An explosion? This should include first aid, evacuation routes, spill control, etc. Also – practice, practice, practice! Teachers should make sure they have a written record in lesson plans relative to safety precautions taken and safety training for each hands-on activity.

6. Appropriate Storage and Disposal of Hazardous Materials!

Microscale and/or green chemistry are critical to helping secure a safer working environment. Hazardous chemicals in inventories need to be stored appropriately, in appropriate containers, in labeled containers, in secured areas. Also before purchasing, review the chemicals from cradle to grave. Know how to safely use, store and dispose of them. Use of Safety Data Sheets can be helpful in this area.

7. The History! Always have procedures set up which leave a paper trail of accidents in the form of inspection reports, accident reports, signed safety acknowledgement forms, etc. Provide written rationales for safety equipment in budget



requests and keep those as records. This again will help make for a safer working environment and also help keep the science teacher out of harm's way legally!

In The End!

Students learn science best by doing it. Science teachers need to help make sure it is a safer working and learning environment for both students and themselves!

