Safety Dozen for Common Lab Problems!

The Next Generation Science Standards or NGSS emphasize the doing of science through investigations to better learn science.

Look at Practice 3: Planning and Carrying Out Investigations Students should have opportunities to plan and carry out several different kinds of investigations during their K-12 years. At all levels, they should engage in investigations that range from those structured by the teacher—in order to expose an issue or question that they would be unlikely to explore on their own (e.g., measuring specific properties of materials)—to those that emerge from students’ own questions. (NRC Framework, 2012, p. 61)

The number one focus for these investigations or hands-on lab work needs to be planning for a safer teaching/learning experience for students and teachers. So where should one start in order to address this issue? There are a variety of resources on the Internet, journal articles, books and more.

WHERE TO START?
One such resource is The University of Texas at Austin Environmental Health & Safety site has a page titled “Avoid the 12 most common laboratory safety problems.” The dozen are listed as follows:

1. Eyewashes should be flushed weekly and documented on eyewash tags.
2. Label chemical waste with specific contents. Keep waste tag attached to the container at all times.
3. Maintain labels on chemical containers received from manufacturers and label secondary containers. Replace old and deteriorated labels.
4. Segregate chemicals properly using the EHS lab safety manual. Store acids in an acid cabinet or in a plastic container (tub). Store nitric acid separately.
5. Dispose of unwanted chemicals through the EHS waste disposal program.
6. Keep chemical waste containers closed (do not forget to remove the funnel).
7. Chemical fume hood sashes should be kept closed whenever possible. Maintain the minimum possible opening when working. Limit storage in hoods to essential items only.
8. Do not store or consume food or drinks in labs where hazardous materials are present.
9. Secure gas cylinders properly and keep safety caps on cylinders when not in use.
10. Do not wear shorts or open-toed shoes (e.g. sandals) in labs. Wear appropriate personal protective equipment (PPE) when working in labs where hazardous materials are present.
11. Have appropriate spill supplies available and follow response procedures.

What is impressive about this list is that it clearly addresses the three main criteria for a safer lab site—Engineering controls, Administrative Standards (Standard Operating Procedures) and Personal Protective Equipment or PPE. It is a good starting point on which to build a safer laboratory.

Another resource for general safety rules in the lab is “Lab Safety Rules for Students” by the United Federation of Teachers or UFT. The rules are listed as follows:

1. Report all accidents, injuries, and breakage of glass or equipment to instructor immediately.
2. Keep pathways clear by placing extra items (books, bags, etc.) on the shelves or under the work tables. If under the tables, make sure that these items can not be stepped on.
3. Long hair (chin-length or longer) must be tied back to avoid catching fire.
4. Wear sensible clothing including footwear. Loose clothing should be secured so they do not get caught in a flame or chemicals.

5. Work quietly—know what you are doing by reading the assigned experiment before you start to work. Pay close attention to any cautions described in the laboratory exercises.

6. Do not taste or smell chemicals.

7. Wear safety goggles to protect your eyes when heating substances, dissecting, etc.

8. Do not attempt to change the position of glass tubing in a stopper.

9. Never point a test tube being heated at another student or yourself. Never look into a test tube while you are heating it.

10. Unauthorized experiments or procedures must not be attempted.

11. Keep solids out of the sink.

12. Leave your work station clean and in good order before leaving the laboratory.

13. Do not lean, hang over or sit on the laboratory tables.

14. Do not leave your assigned laboratory station without permission of the teacher.

15. Learn the location of the fire extinguisher, eye wash station, first aid kit and safety shower.

16. Fooling around or "horse play" in the laboratory is absolutely forbidden. Students found in violation of this safety rule will be barred from participating in future labs and could result in suspension.

17. Anyone wearing acrylic nails will not be allowed to work with matches, lighted splints, bunsen burners, etc.

18. Do not lift any solutions, glassware or other types of apparatus above eye level.

19. Follow all instructions given by your teacher.

20. Learn how to transport all materials and equipment safely.

21. No eating or drinking in the lab at any time!

BOTTOM-LINE!

Again—there are many resources available by both legal safety standards (OSHA, NFPA, etc.) and better professional practices (NSTA, NSELA, etc.) to help make for safer lab experiences/investigations. Additional resources can be found at the NSTA Safety Portal.

Science teachers have a legal responsibility under “Duty of Care” to make sure they follow the “AAA” approach to safer science explorations: Be Aware of potential safety issues, Assess the appropriateness of the activity/exploration and its associated hazards and, to take appropriate Action BEFORE investigations are undertaken.