



## 40 SUGGESTIONS FOR A SAFER LAB

### Steps Requiring Minimal Expense

1. Have a written health, safety and environmental affairs (HS&E) policy statement.
2. Organize a departmental HS&E committee of employees, management, faculty, staff and students that will meet regularly to discuss HS&E issues.
3. Develop an HS&E orientation for all new employees and students.
4. Encourage employees and students to care about their health and safety and that of others.
5. Involve every employee and student in some aspect of the safety program and give each specific responsibility.
6. Provide incentives to employees and students for safety performance.
7. Require all employees to read the appropriate safety manual. Require students to read the institution's laboratory safety rules. Have both groups sign a statement that they have done so, understand the contents, and agree to follow the procedures and practices. Keep these statements on file in the department office.
8. Conduct periodic, unannounced laboratory inspections to identify and correct hazardous conditions and unsafe practices. Involve students and employees in simulated OSHA inspections.
9. Make learning how to be safe an integral and important part of science education, your work, and your life.
10. Schedule regular departmental safety meetings for all students and employees to discuss the results of inspections and aspects of laboratory safety.
11. When conducting experiments with hazards or potential hazards, ask yourself these questions:

*What are the hazards?*

*What are the worst possible things that could go wrong?*

*How will I deal with them?*

*What are the prudent practices, protective facilities and equipment necessary to minimize the risk of exposure to the hazards?*

12. Require that all accidents (incidents) be reported, evaluated by the departmental safety committee, and discussed at departmental safety meetings.

13. Require every pre-lab/pre-experiment discussion to include consideration of the health and safety aspects.
14. Don't allow experiments to run unattended unless they are failsafe.
15. Forbid working alone in any laboratory and working without prior knowledge of a staff member.
16. Extend the safety program beyond the laboratory to the automobile and the home.
17. Allow only minimum amounts of flammable liquids in each laboratory.
18. Forbid smoking, eating and drinking in the laboratory.
19. Do not allow food to be stored in chemical refrigerators.
20. Develop plans and conduct drills for dealing with emergencies such as fire, explosion, poisoning, chemical spill or vapor release, electric shock, bleeding and personal contamination.
21. Require good housekeeping practices in all work areas.
22. Display the phone numbers of the fire department, police department, and local ambulance either on or immediately next to every phone.
23. Store acids and bases separately; Store fuels and oxidizers separately.
24. Maintain a chemical inventory to avoid purchasing unnecessary quantities of chemicals.
25. Use warning signs to designate particular hazards.
26. Develop specific work practices for individual experiments, such as those that should be conducted only in a ventilated hood or involve particularly hazardous. When possible most hazardous experiments should be done in a hood.

### Steps Requiring Moderate Expense

27. Allocate a portion of the departmental budget to safety.
28. Require the use of appropriate eye protection at all times in laboratories and areas where chemicals are transported.
29. Provide adequate supplies of personal protective equipment - safety glasses, goggles, face shields, gloves, lab coats, and bench top shields.
30. Provide fire extinguishers, safety showers, eye wash fountains, first aid kits, fire blankets and fume hoods in each laboratory and test or check monthly.

31. Provide guards on all vacuum pumps and secure all compressed gas cylinders.
32. Provide an appropriate supply of first aid equipment and instruction on its proper use.
33. Provide fireproof cabinets for storage of flammable chemicals.
34. Maintain a centrally located departmental safety library:

\* Mercier, P. (2005) *Laboratory Safety Pocket Handbook*. Amsterdam, NY: Genium Group, Inc.

\* ACS Committee on Chemical Safety. (2003) *Safety in Academic Chemistry Laboratories 7<sup>th</sup> Edition: Volume 1 & 2*. Washington, DC: ACS

\* Furr, A. K. (2000) *CRC Handbook of Laboratory Safety, 5<sup>th</sup> Edition*. Boca Raton, FL: CRC Press

\* National Fire Protection Association (2010) *Fire Protection Guide on Hazardous Materials, 10<sup>th</sup> Edition*. Quincy, MA: NFPA

\* National Research Council (2011) *Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards, Updated Edition*. Washington, DC: The National Academies Press

\* U.S. Dept. of Health and Human Services (2009) *Biosafety in Microbiological and Biomedical Laboratories, 5<sup>th</sup> Edition*. Lexington, KY: Createspace

\* Department of Health and Human Services (2007) *Niosh Pocket Guide to Chemical Hazards*. Cincinnati, OH: NIOSH Publications

\* The Laboratory Safety Institute (2005) *Learning By Accident, Three Volume Series*. Natick, MA: The Laboratory Safety Institute

(The publications above are all available from The Laboratory Safety Institute.)

35. Remove all electrical connections from inside chemical refrigerators and require magnetic closures.
36. Require grounded plugs on all electrical equipment and install ground fault interrupters (GFI's) where appropriate.
37. Label all chemicals to show the name of the material, the nature and degree of hazard, the appropriate precautions, and the name of the person responsible for the container.
38. Develop a program for dating stored chemicals and for recertifying or discarding them after predetermined maximum periods of storage.
39. Develop a system for the legal, safe and ecologically acceptable disposal of chemical wastes.
40. Provide secure, adequately spaced, well-ventilated storage of chemicals.