

Not Reinventing the Wheel: Using Published Safety Materials Throughout the Curriculum

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Reference Mentioned in the Talk

National Research Council, *Prudent Practices in the Laboratory: Handling and Disposal of Chemicals*, Washington, DC: National Academy Press, 1995.

This is a must-read for anyone working in a chemistry laboratory. It contains a comprehensive discussion of all matters pertaining to chemical hygiene, laboratory safety, and waste disposal, including introductions to major federal regulations. The entire text of the book is available online <http://www.nap.edu/catalog.php?record_id=4911>, and a new edition is in production.

Safety in Academic Chemistry Laboratories, Vol. 1, 7th ed. American Chemical Society

This small paperback is an inexpensive addition to any book list for a chemistry course. It contains basic safety rules useful to most laboratory operations in a variety of undergraduate level courses. It also covers basic principles of toxicology and interpretation of MSDSs. The second volume has additional material for instructors and administrators. Available through the ACS and online at:
<http://portal.acs.org/portal/acs/corg/content?_nfpb=true&_pageLabel=PP_SUPERARTICLE&node_id=2230&use_sec=false&sec_url_var=region1&__uuid=a1fd64ab-cf6c-4094-b944-1cb4cf29bc88>

T. Helsler, "A Lab Safety 'Scavenger Hunt'" *J. Chem. Ed.* **1999**, v. 76, pg. 68.

This paper describes an orientation exercise in which students are required to fill in a diagram of the laboratory with labels for a variety of equipment found in the lab room.

G. J. Miller, S. A. Heideman and T. J. Greenbowe, "Introducing Proper Chemical Hygiene and Safety in the General Chemistry Curriculum", *J. Chem. Ed.*, **2000**, v. 77, pg. 1185-1187.

This paper discusses a series of safety assignments used in the freshmen labs at Iowa State University. The supplementary information contains the full text of the assignments.

T. Wimpfheimer, "Peer-Evaluated Poster Sessions: An Alternative Method to Grading General Chemistry Laboratory Work" *J. Chem. Ed.* **2004**, v. 81, pg. 1775-1776.

This paper is a general paper about using posters in labs, but describes how peer reviewed posters can serve in the lab setting.

B. Hanson, "120 Questions That Could Save Your Life": <<http://www.stolaf.edu/depts/chemistry/safety/>>

This is an online, interactive quiz that covers the content of *Safety In Academic Chemistry Laboratories*.

Building Student Safety Habits for the Workplace, M. Sarquis, ed. Terrific Science Press, 2000. ISBN 1-883822-24-6 (Inst. Ed.) Review by C. Fictorie: *J. Chem. Educ.*, **2003**, v. 80, p. 1384.

This is a textbook of chemical hygiene and laboratory safety, written for an audience of chemical technicians, but applicable to any laboratory scientist. It contains short readings, examples, activities, and demonstrations. The chapters and sections are largely independent and could be covered in any order and over different courses. An instructor's manual is available, but my main criticism of the book is that the instructor's edition assumes the instructor is comfortable with all the safety rules and procedures, and that such procedures are already in place, so it does not describe the very safety procedures it attempts to teach.

Additional References

The following are resources which were not discussed directly in the presentation, but which serve as reference materials beyond the cited resources. Several of the activities suggest these materials as sources for additional research.

Lab Safety

- *Journal of Chemical Health and Safety*. Published by the ACS Division of Chemical Health and Safety (<http://www.dchas.org/>), this journal includes articles, columns, news, and ideas relating to issues and advances in chemical health and safety. It's real-world information that chemical hygiene officers and others responsible for the safety of their workplaces can put to use right away.
- F. Mojtabai and J. A. Kaufman. *Learning by Accident, Vol. 1 & 2*. Natick, MA: The Laboratory Safety Institute, 1997 & 2000. Hundreds of short stories regarding laboratory accidents.
- Young, Jay A. *Improving safety in the chemical laboratory: a practical guide*. New York : Wiley, 1991. Improving Safety in the Chemical Laboratory is an accident prevention handbook for the professional in the lab that shows how to detect and eliminate the causes of dangerous mishaps-and virtually "hazard proof" any lab environment.
- Geller, E. Scott, *The psychology of safety handbook*. Boca Raton, FL : Lewis Publishers, 2001. Shows how to apply psychology to improve safety and health in any organization.
- Furr, A. Keith. *CRC handbook of laboratory safety, 5th ed.* Boca Raton : CRC Press, 2000. It provides the tools to organize safety efforts that adhere to the latest regulations and use the newest technology. Thoroughly revised, it includes new OSHA laboratory safety standards, radiation safety standards, guidelines for X-ray use in hospitals, enforcement of standards for dealing with blood-borne pathogens, OSHA actions covering hazardous waste operations and emergency response, and the new CDC guidelines for research with microbial hazards.
- Matheson Guide to Safe Handling of Compressed Gases
<<http://www.mathesonrigas.com/pdfs/products/Guide-to-Safe-Handling-of-Compressed-Gases-PUBL-03.pdf>> An older and shorter version is also available
<<http://www.mathesongas.com/pdfs/litCenter/SpecGas&EquipmentBrochures/Safe%20Handling%20of%20Compressed%20Gases.pdf>>

Chemical Hazards

- Budavari, Susan. *The Merck index : an encyclopedia of chemicals, drugs, and biological, 12th ed.*; Whitehouse Station, NJ : Merck, 1996. An excellent reference on various organic, pharmaceutical, reagent, and natural chemicals; includes information on structure, sources, common names, and biological activity.
- Sax, N. Irving. *Hazardous chemicals desk reference*. New York : Van Nostrand Reinhold, 1987.
- Urben, Peter G. *Bretherick's handbook of reactive chemical hazards, 7th ed.*, Boston : Academic, 2007.
- Woodside, Gayle. *Hazardous materials and hazardous waste management: a technical guide*. New York : Wiley, 1993. A complete treatment regarding all aspects of hazardous materials & hazardous waste management.
- MSDSs and Toxicology information at Vermont SIRI: <<http://www.hazard.com/>>. The easiest place to find MSDSs on the Internet. Do note that these may not be the most up to date, and not all manufacturers MSDSs are available.
- MSDS information at ILPI: <<http://www.ilpi.com/msds/>>. This is a good resource explaining the structure and content of MSDSs.
- U. S. Chemical Safety Board: <<http://www.csb.gov/investigations/default.aspx>>. This is the federal agency responsible for investigating chemical accidents, and they have reports on chemical incidents in the US.