



Safer Science

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Chemical Storage

Imagine that you are a high school chemistry teacher starting a new job. You have just met a veteran chemistry teacher of 35 years who is about to retire and has offered to take you on a tour of the chemical storeroom. As the teacher begins the tour, he removes a wooden wedge holding the storeroom door open. He points out with pride that his system is alphabetical so that chemicals can be easily found. You notice that concentrated hydrochloric acid is on the top shelf with the rest of the “H” chemicals. You ask about the age of the chemicals, and he tells you that the information is all in his head, so dates on the bottles are unnecessary—and the same goes for the inventory. When the tour is over, you thank him for taking the time to show you around, but are left wondering if this is how every school stores its chemicals. This must be OK, you think, since he has been teaching here for 35 years.

This story, unfortunately, is true and happens often. The attitude that “it has always been done this way, so it must be OK” is very much alive, but be forewarned—just because things have been done a certain way does not mean they are acceptable from a safety standpoint. The examples in this story—and others like it—are in fact very unsafe and dangerous!

Using chemicals safely requires a number of things, including current inventory control, appropriate labeling and storage segregation, ongoing inspections, and more. How can a science teacher find the appropriate storage information? There are many sources available, but the best resource is the Material Safety Data Sheet (MSDS). This Occupational Safety and Health Administration (OSHA)—required form includes, among other things, physical and chemical properties and toxicological information for a particular chemical and procedures for handling that substance in a safe manner. Other information can be secured from the manufacturers’ labels.

OSHA’s 29 CFR 1910.1200 standard—the Hazard Communication Standard—requires that MSDSs for all hazardous chemicals be readily accessible to employees. There are a number of useful MSDS sources on the internet that can be accessed for chemical information (see “On the web”).

The Centers for Disease Control and Prevention (CDC)’s website provides the following basic guidelines for proper chemical storage (2000):

- ◆ Ensure all hazardous chemical containers are properly labeled and display the appropriate hazard warnings.
- ◆ Segregate all incompatible chemicals for proper storage by hazard class. In other words, store like chemicals together and away from other groups of chemicals that might cause reactions if mixed.
- ◆ Do not store chemicals alphabetically, except within a grouping of compatible chemicals.
- ◆ Store flammable materials in an approved, dedicated flammable-materials storage cabinet or storage room if the volume exceeds 38 liters (10 gallons). Keep cabinet doors closed.
- ◆ Store chemicals no higher than eye level and never on the top shelf of a storage unit. Do not overcrowd shelves—each of which should have an anti-roll lip.
- ◆ Avoid storing chemicals on the floor (even temporarily) or in traffic aisles.
- ◆ Store liquids in unbreakable or double-contained packaging, or in a storage cabinet that has the capacity to hold the container’s contents if it breaks.
- ◆ Store acids in a dedicated acid cabinet. Nitric acid may be stored here also, but only if isolated from other acids.
- ◆ Store highly toxic or controlled materials in a locked, dedicated poison cabinet.
- ◆ Store volatile or highly odorous chemicals in a ventilated cabinet. Do not use chemical fume hoods for storage.
- ◆ Label and date all chemicals upon receipt in the lab and upon opening. This is especially important for peroxide-forming chemicals such as ethers and isopropanol. Solutions should be labeled and dated when prepared.
- ◆ Look for unusual conditions in chemical storage areas, such as leaking or deteriorating containers and blocked aisles or doors, which contribute to a lack of security.
- ◆ Have readily available first-aid supplies, emergency phone numbers, eyewash and emergency shower equipment, fire extinguishers, spill cleanup supplies, and personal protective equipment and be sure personnel are trained in their use.
- ◆ Seal and label chemicals stored in explosion-proof refrigerators or cold rooms with the name of the person who stored the material and all other required hazard warnings.
- ◆ Keep only compressed gas cylinders that are in use and secured in place in the laboratory. Send all others, including empties, to the compressed gas cylinder storage area for the particular facility.
- ◆ Keep all stored chemicals, especially flammable liquids,

away from heat and direct sunlight.

- ◆ Maintain an up-to-date inventory of all stored chemicals, along with MSDS. Keep a copy of these documents off-site, in case of a fire or other emergency.

The CDC website also includes helpful information about common incompatible materials, hazard classes for chemicals, and storage limits for peroxidizable compounds (2000).

Be wary of what someone leaves you when starting a new position. It will take time to correct years of poor chemical management, but your colleagues will appreciate it since their lives may literally depend on your actions.

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NSTA's science safety consultant. If you have questions or an issue dealing with safety that a future column might help address, send an e-mail to royk@glastonburyus.org.

On the web

OSHA Hazard Communication Standard: www.osha.gov

MSDS Resources:

- ◆ Kansas State University: <http://jrm.phys.ksu.edu/Safety/msds.html>
- ◆ MSDS Search: www.msdssearch.com
- ◆ Oklahoma State University—Environmental Health and Safety: <http://ehs.okstate.edu/links/msds.htm>
- ◆ Safety Information Resources MSDS Index: <http://hazard.com/msds>

Reference

Centers for Disease Control and Prevention (CDC). 2000. Chemical storage guidelines. www.cdc.gov/od/ohs/ENVIRONM/khemstore.htm

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