Chemical Storage Guidelines

Proper chemical storage is a key component in laboratory safety. The following guidelines are taken from *Prudent Practices in the Laboratory* (NRC) and C*hemical Storage Plan for Laboratories* (College of American Pathologists).

General Rules of Storage :

Do

- Make certain all chemicals are labeled clearly to identify contents.
- Physically separate incompatible chemicals.
- Segregate by hazard class: Health Hazards (Toxins, Poisons, Carcinogens, etc.) , Corrosives, Reactives/Oxidizers, Flammables, and General Storage (e.g. salts and other routine dry chemicals - relatively modest hazards).
- Date when received and again when opened. (Dating containers is especially important for chemicals with a short shelf life like ethyl ether which, because of its explosion hazard, should not be kept for more than 12 months after being opened and must never be kept past its expiration date)
- Keep exits, passageways, areas under benches and desks, and emergency equipment free of stored equipment and materials.

Do not:

- Store chemicals on benches.
- Store chemicals in fume hoods or under sinks.
- Expose to heat or direct sunlight.
- Store hazardous materials above shoulder height of shortest person in lab.

Hazard specific storage rules:

Health Hazards:

- Separate toxins and poisons from other chemicals in a location labeled AToxins≅ or APoisons≅.

Corrosives:

- Store large bottles on a low shelf or in a corrosives cabinet.
- Segregate acid oxidizers from organic acids, flammable and combustible materials.
- Segregate acids from bases and active metals.
- Segregate acids from chemicals which can generate toxic gases on contact (e.g. sodium cyanide)
- Segregate perchloric acid from reducing agents and organics .
- Store in chemical resistant trays.

Reactives/Oxidizers:

- Store water-reactive chemicals in a cool and dry place.
- Store oxidizers away from flammables, combustibles, and reducing agents (zinc, alkaline metals, etc.).
- Store peroxide forming chemicals in an airtight container in a cool, dry, dark place.
- Peroxide forming chemicals should be disposed of within 12 months of opening, or by expiration date.
- Shock sensitive and detonatable materials should be stored in a secondary container, large enough to hold entire contents in case of breakage
- Store liquid organic peroxides at the lowest possible temperature consistent with solubility and/or freezing points.

Flammables/Combustibles:

- Store flammable liquids in flammable storage cabinet.
- Do not store flammable liquids in domestic refrigerators or freezers.
- Store away from ignition and heat sources.
- Stay within NFPA rules for volume of flammables:
  -Maximum for any lab is 120 gallons.
  -With flammable safety cabinet - 10 gal/100 sq ft unsprinkled or 20 gal/100 sq ft of sprinkled area.
  -Without flammable safety cabinet - 10 gallons in original container & 25 gallons in 2.5 gallon or smaller safety cans.

Gas Cylinders:

- Strap or chain securely to bench top or wall.
- Cap cylinders not in use.
- Separate incompatibles.
- Segregate empty cylinders from full ones.

Chemical manufacturers include storage information on the label. This may be done with a color code or pictogram to indicate hazards.

Proper chemical storage can prevent many common laboratory accidents. The time and effort required to segregate and store chemicals according to their hazard classes is repaid by increasing the overall safety in any lab.

Submitted by Dita Jean Geary

COLOR CODES FOR CHEMICAL STORAGE

Hazard	Color Code
FLAMMABLES	RED
HEALTH HAZARDS / TOXINS	BLUE
REACTIVES / OXIDIZERS	YELLOW
CONTACT HAZARDS / CORROSIVES	WHITE
GENERAL STORAGE	GREEN, GRAY, OR ORANGE

NOTICE

CHEMICAL STORAGE AREA

STORE IN FLAMMABLE STORAGE CABINET OR FLAMMABLE STORAGE AREA.

SEPARATE FLAMMABLE SOLIDS FROM OTHER HAZARD CLASSES.

WHEN NECESSARY, SECURE POISON AREA OR SEPARATE FROM OTHER CHEMICAL STORAGE.

STORE CORROSIVES IN THIS GROUP IN CHEMICAL RESISTANT SECONDARY CONTAINERS OR IN CORROSION PROOF CABINETS.

STORE AWAY FROM ORGANIC MATERIAL, FLAMMABLES, OR OTHER INCOMPATIBLE MATERIALS.

STORE IN CHEMICAL RESISTANT CATCH TRAYS OR CORROSIVES CABINET.

STORE ACIDS SEPARATE FROM BASES.

GENERAL STORAGE CAN BE STORED ON HIGHER SHELVES.

STORE ACCORDING TO THE NATURE OF THE CHEMICAL.

PLEASE NOTE:

Chemicals with labels that are colored and striped may react with other chemicals in the same hazard class. See the Material Safety Data Sheet (MSDS) for more information.

Some chemical containers have labels already color coded for the hazard. Those that do not will have hazard information listed on the label. Read the label carefully and store accordingly. Look up information on the MSDS whenever necessary.

HMIS HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

HMIS HEALTH RATING

* Chronic (long-term) health effects may result from repeated overexposure.
0 No significant risk to health.
1 Irritation or minor reversible injury possible.
2 Temporary or minor injury may occur.
3 Major injury likely unless prompt action is taken and medical treatment is given.
4 Life-threatening, major, or permanent damage may result from single or repeated overexposures.

HAZARD CHART	
CHRONIC	*
MINIMAL	0
SLIGHT	1
MODERATE	2
SERIOUS	3
SEVERE	4

HMIS FLAMMABILITY RATING

0 Materials that will not burn.
1 Materials that must be preheated before ignition will occur. (Class IIIB).
2 Materials which must be moderately heated or exposed to high ambient temperatures before ignition will occur. (Classes II & IIIA).
3 Materials capable of ignition under almost all normal temperature conditions. (Classes IB & IC).
4 Flammable gases or very volatile flammable liquids with flash points below 73 °F and boiling points below 100 °F. Materials may ignite spontaneously with air. (Class IA).

HMIS PHYSICAL HAZARD RATING

0 Materials that are normally stable under fire conditions and will not react to water, polymerize, decompose, condense, or self-react.
1 Materials that are normally stable but can become unstable at high temperature and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.
2 Materials that are unstable and may undergo violent chemical change at normal temperature and pressure with low risk for explosion. Materials may react violently with water or form peroxides upon exposure to air.
3 Materials that may form explosive mixtures with water and are capable of detonation or explosive reaction in the presence of a strong initiating source. May undergo chemical change at normal temperature and pressure with moderate risk of explosion.
4 Materials that are readily capable of water reaction, detonation, or explosive decomposition at normal temperatures and pressures.