Section VIII

Chemical Storage

General Considerations for Chemical Storage
Carefully read the label before storing a hazardous chemical. The MSDS will also provide any special storage information and incompatibilities.

Do Not Store Chemicals Alphabetically, except within a hazard class. Hazard classes that should be stored separately include:

- radioactive materials
- pyrophoric materials
- flammable materials
- oxidizing materials
- water reactive substances
- oxidizing acids
- inorganic acids
- organic acids
- caustics (bases)
- poisons (general laboratory reagents separated into organic and inorganic groups)

Provide physical segregation (sills, curbs, trays) or separation between hazard classes.

Keep flammable materials by themselves in approved storage cans, cabinets, or rooms. Store oxidizers well away from flammable materials.

Please refer to Appendix E for an example Chemical Compatibility Chart

Segregation

Do not store unsegregated chemicals in alphabetical order or incompatible chemicals in close proximity to each other. The amount of space that can be placed between different chemical classes depends on the amount of storage area available in the lab suite. Do not segregate chemical classes into separate rooms unless they will only be used in that room. Segregation that disrupts normal work flow or requires more frequent transport of chemicals between labs will increase the probability of a chemical spill. Use common sense in planning chemical storage areas.

Store dry reagents, liquids reagents and solutions and compressed gases in separate areas. Within each of these chemical forms segregate into hazard classes.

Segregate dry reagents as follows:

- oxidizing solids
- flammable solids
- water reactive solids
- all others solids

Segregate liquid reagents and solutions as follows:

- acid liquids
- caustic liquids

- oxidizing liquids
- perchloric acid solutions
- flammable or combustible liquids
- all other liquids

Segregate compressed gases as follows:

- toxic gases
- flammable gases
- oxidizing and inert gases

Once separated into hazard classes, chemicals may be stored alphabetically.

Use approved storage containers and safety cans for flammable liquids. Use spill trays under containers of strong corrosive reagents. Do not store liquids above eye level.

Dispose of old chemicals promptly. See waste disposal section of this Handbook.

Ensure that all containers are properly labeled. For more information on chemical storage, contact your supervisor, instructor, or EH&S. A Chemical Compatibility Chart is attached as Appendix E

Flammable and Combustible Liquid Storage

The storage of flammable and combustible liquids in a laboratory, shop, or building area must be kept to the minimum needed for research and operations. When large quantities of flammable liquids are present in a lab they must be stored in a flammable-liquids storage cabinet. Flammable-liquids storage cabinets are not intended for the storage of highly toxic materials, acids, bases, compressed gases or pyrolytic chemicals.

Chemical Stability

Stability refers to the susceptibility of the chemical to dangerously decompose. Ethers and olefins form peroxides upon exposure to air and light. Since these chemicals are packaged in an air atmosphere, peroxides can form even though the containers have not been opened. Write the date received and date opened on all containers of ether.

Unless an inhibitor was added by the manufacturer, closed containers of ether should be discarded after 1 year.

The label and MSDS will indicate if a chemical is unstable.

The following are examples of materials that may form explosive peroxides:

acetal	cyclohexene
decahydronaphthalene	diacetylene
dicyclopentadiene	diethyl ether
diethylene glycol	dimethyl ether
dioxane	divinyl acetylene
ethyl ether	terahydronaphthalene
isopropyl ether	methyl acetylene
tetrahydrofuran	vinylidene chloride
vinyl ether	ethylene glycoldimethylether (glyme)

For additional information on chemical stability, contact your supervisor, instructor or EH&S.

Shock Sensitive Chemicals

Shock sensitive refers to the susceptibility of the chemical to rapidly decompose or explode when struck, vibrated or otherwise agitated.

Some chemicals become increasingly shock sensitive with age. Write the date received and date opened on all containers of shock sensitive chemicals. Unless an inhibitor was added by the manufacturer, closed containers of shock sensitive materials should be discarded after 1 year. Open containers of shock sensitive materials should be discarded within 6 months of opening.

The label and MSDS will indicate if a chemical is shock sensitive. Wear appropriate personal protective equipment when handling shock sensitive chemicals.

Table 1 lists materials that can be shock sensitive.

Table 1 Shock Sensitive Chemicals*

acetylides of heavy metals ammonium perchlorate copper acetylide dinitroglycerine dipicryl sulfone fulminate of silver germane hexite hyrazoic acid lead salts mercury tartrate nitrated polyhydric alcohol nitroglycol organic amine nitrates picratol potassium nitroaminotetrazole sodatol syphnic acid trinitroanisole trinitronaphthalene tritonal	aluminum ophorite explosive ammonium picrate cyanuric triazide dinitrophenol dipicylamine fulminating gold guanyl nitrosamino guanyltetrazene hexanitrodiphenyl-amine lead azide lead styphnate mononitrotoluene nitrogen trichloride nitroguanidine organic nitramines picric acid silver acetylide sodium amatol tetrazene trintrobenzene trinitrophenetol urea nitrate	amatol ammonium salt lattice cyclotrimethylenetrinitramine dinitrophenolates erythritol tetranitrates fulminating mercury guanyl nitrosamino guanylidene hydrazine hexanitrostilbene lead mannite magnesium ophorite nitroaminotetrozole nitrogen tri-iodide nitroparaffins organic peroxides picryl chloride silver azide sodium dinitro-ortho-cresolate tetranitrocarbazole trinitrobenzoic acid trinitrophloro-glucinol
ammonal butyl tetryl cyclotetramethylenetranitramine dinitrophenyl hydrazine explosive mixtures fulminating platinum guanylidene hexogen lead mononitro-resorcinate mannitol hexanitrate nitrated carbohydrate nitroglycerin nitronium perchlorate picramic acid picryl fluoride silver styphnate sodium nitrate-potassium explosive mixtures tetrytol trinitrocresol trinitrotoluene	ammonium nitrate calcium nitrate dinitroethyleneurea dinitrotoluene fulminate of mercury compounds gelatinized nitrocellulose heavy metal azides hydrazinium nitrate lead picrate mercury oxalate nitrated glucoside nitroglycide nitrourea picramide polynitro aliphatic compounds silver tetrazene sodium picramate trimonite trimethylolethane	

	trinitroresorcinol	

* This list is not all inclusive. Review the material safety data sheet for reactivity information concerning the chemicals you use.

Compressed Gases

Carefully read the label before using or storing compressed gas. The MSDS will provide any special hazard information. Always use the minimum size cylinder required to perform the work.

Cylinders of compressed gases must be handled as high energy sources. When storing or moving a cylinder, have the cap securely in place to protect the stem. Use suitable racks, straps, chains or stands to support cylinders. Compressed gas cylinders pose a crush hazard to hands and feet.

Do not expose cylinders to temperature extremes.

Do not store cylinders or lecture bottles with the regulator in place. If the regulator fails, the entire contents of the gas cylinder may be discharged.

Always use the correct regulator. Do not use a regulator adapter. Oil or grease on the high pressure side of an oxygen cylinder can cause an explosion. Do not lubricate an oxygen regulator.

Cylinders of toxic, flammable or reactive gases should be stored and used in a fume hood or with local ventilation.

Never bleed a cylinder completely empty. Leave a slight pressure to keep contaminants out.

Always wear safety glasses when handling compressed gases.

For more information, contact your supervisor, instructor, or EH&S.