

UNIVERSITY OF SOUTH CAROLINA

RULES FOR STORING CHEMICALS SAFELY

1) Segregate all incompatible chemicals for proper storage of chemicals for hazard class codes. In other words, store like chemicals together and away from other groups of chemicals that might cause reactions if mixed. Do not simply store chemicals in alphabetical order (see #3 below).

2) Flammable materials should be stored in an approved, dedicated, flammable materials storage cabinet or room if the volume exceeds ten (10) gallons.

3) Chemicals shall be stored separately from non-compatible hazard classes. A suggested storage pattern is included on this page.

4) Liquids should be stored in unbreakable or double-contained packaging, or the storage cabinet should have the capacity to hold the contents if the container breaks.

5) Avoid floor chemical storage (even temporary).

6) Chemicals should be stored no higher than eye level and never on the top shelf of a storage unit.

7) Shelf assemblies should be firmly secured to the walls. Avoid island shelves.

8) Each shelf should have an anti-roll lip.

9) Store acids in a dedicated acid cabinet. Nitric acid may be stored there also, if it is kept isolated from the others.

10) Store severe poisons in a dedicated poison cabinet.

11) All chemicals should be labeled and dated.

12) Look for unusual conditions in chemical storage areas, such as:

- * improper storage of chemicals
- * leaking or deteriorating containers
- * spilled chemicals
- * temperature extremes (too hot or cold in storage area)
- * lack of or low lighting levels
- * blocked exits or aisles

- * doors blocked open, lack of security
- * trash accumulation
- * smoking or open lights or matches
- * fire equipment blocked, broken or missing
- * lack of information or warning signs ("No Smoking", "Flammable Liquids", "Acids", "Corrosives", "Poisons", "Chemical Storage")

Any of these conditions should be corrected immediately. Inspections of chemical storage areas on a routine basis will help to correct deficiencies and prevent accidents.

Suggested chemical storage pattern

INORGANIC	ORGANIC
Sulfur, Phosphorus, Arsenic, Phosphorus Pentoxide	Alcohols, Glycols, etc. (store flammables in dedicated cabinets)
Halides, Sulfates, Sulfites, Thiosulfates Phosphates, etc.	Hydrocarbons, Esters, etc. (store flammables in dedicated cabinet)
Amides, Nitrates (not ammonium nitrate), Nitrites, etc.	Ethers, Ketones, etc. (store flammables in dedicated cabinet)
Metals, Hydrides (store away from water)	Epoxy compounds, Isocyanates
Hydroxides, Oxides, Silicates, etc.	Sulfides, Polysulfides, etc.
Arsenates, Cyanides (store above acids)	Phenol, Cresols
Sulfides, Selenides, Phosphides, Carbides, Nitrides	Peroxides, Azides, etc.
Manganates, Chromates, Permanganates, Borates	Acids, Anhydrides, Peracids, etc.
Chlorates, Chlorites, Perchlorates, Peroxides, Perchloric acid	Miscellaneous
Acids. except nitric. (store acids in dedicated cabinets)	Miscellaneous (Nitric Acid)

Suggested storage time limits

For common peroxidizable compounds

MOST DANGEROUS: Discard after 3 months.

Peroxide formation hazard during storage.

isopropyl ether
divinyl acetylene
vinylidene chloride
potassium metal
sodium amide

DANGEROUS: Discard after one year.

Peroxide formation hazard during storage and on concentration (i.e. distillation) of compound.

Diethyl ether	Dicyclopentadiene
Tetrahydrofuran	Diacetylene
Dioxane	Methyl acetylene
Acetal	Cumene
Methyl isobutyl ketone	Tetrahydronaphthalene
Ethylene glycol dimethyl ether	Cyclohexene
Vinyl ethers	Methylcyclopentane

DANGEROUS: Discard after one year.

Peroxide formation causes initiation of hazardous polymerization.

Methyl methacrylate

Chlorotrifluoroethylene

Styrene

Vinyl acetylene

Acrylic acid

Vinyl acetate

Acrylonitrile

Vinyl chloride

Butadiene

Vinyl pyridine

Tetrafluoroethylene

Chloroprene

Safety Hints:

1. Do not purchase these compounds in quantities greater than can be used in the specified storage time period.
2. Ethers should be stored in the dark and under nitrogen if possible.
3. Always check for the presence of peroxides before distilling any peroxide former.
4. Consult safety references before working with peroxidizable compounds.

Short list of incompatible materials

DO NOT CONTACT

<p>ALKALI METALS such as calcium, potassium, and sodium</p> <p>with: water, carbon dioxide, carbon tetrachloride, and other chlorinated hydrocarbons.</p>	<p>ACETIC ACID</p> <p>with: chromic acid, nitric acid, hydroxyl containing compounds, ethylene glycol, perchloric acid, peroxides, and permanganates.</p>
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<p style="text-align: center;">ACETONE</p> <p>with: concentrated sulfuric acid and nitric acid mixtures.</p>	<p style="text-align: center;">ACETYLENE</p> <p>with: copper (tubing), fluorine, bromine, chlorine, iodine, silver, mercury, or their compounds.</p>
<p style="text-align: center;">AMMONIA, ANHYDROUS</p> <p>with: mercury, halogens, calcium hypochlorite, or hydrogen fluoride.</p>	<p style="text-align: center;">AMMONIUM NITRATE</p> <p>with: acids, metal powders, flammable liquids, chlorates, nitrates, sulfur, and finely divided organics or other combustibles.</p>
<p style="text-align: center;">ANILINE</p> <p>with: nitric acid, hydrogen peroxide, or other strong oxidizing substances.</p>	<p style="text-align: center;">BROMINE</p> <p>with: ammonia, acetylene, butadiene, butane, hydrogen, sodium carbide, turpentine, or finely divided metals.</p>
<p style="text-align: center;">CHLORATES</p> <p>with: ammonium salts, acids, metal powders, sulfur, carbon, finely divided organics or other combustibles.</p>	<p style="text-align: center;">CHROMIC ACID</p> <p>with: acetic acid, naphthalene, camphor, alcohol, glycerine, turpentine, and other flammable liquids.</p>
<p style="text-align: center;">CHLORINE</p> <p>with: ammonia, acetylene, butadiene, benzene and other petroleum fractions, hydrogen, sodium carbides, turpentine, and finely divided metals.</p>	<p style="text-align: center;">CYANIDES</p> <p>with: acids.</p>
<p style="text-align: center;">HYDROGEN PEROXIDE</p> <p>with: copper, chromium, iron, most metals or their respective salts, flammable liquids and other combustible materials, aniline, and nitromethane.</p>	<p style="text-align: center;">HYDROGEN SULFIDE</p> <p>with: nitric acid, oxidizing gases.</p>
<p style="text-align: center;">HYDROCARBONS</p> <p>generally, with: fluorine, chlorine, bromine, chromic acid, or sodium peroxide.</p>	<p style="text-align: center;">IODINE</p> <p>with: acetylene or ammonia.</p>

<p style="text-align: center;">MERCURY</p> <p>with: acetylene, fluminic acid, or hydrogen.</p>	<p style="text-align: center;">NITRIC ACID</p> <p>with: acetic, chromic, or hydrocyanic acids, aniline, carbon, hydrogen sulfide, flammable liquids or gases, or other substances which are readily nitrated.</p>
<p style="text-align: center;">OXYGEN</p> <p>with: oils greases, hydrogen, flammable liquids, solids, or gases.</p>	<p style="text-align: center;">OXALIC ACID</p> <p>with: silver or mercury</p>
<p style="text-align: center;">PERCHLORIC ACID</p> <p>with: acetic anhydride, bismuth and its alloys, alcohol, paper, wood, and other organic materials.</p>	<p style="text-align: center;">PHOSPHOROUS PENTOXIDE</p> <p>with: water.</p>
<p style="text-align: center;">POTASSIUM PERMANGANATE</p> <p>with: glycerine, ethylene glycol, benzaldehyde, or sulfuric acid.</p>	<p style="text-align: center;">SODIUM PEROXIDE</p> <p>with: any oxidizable substances, for instance: methanol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerine, ethylene glycol, ethyl acetate, furfural, etc.</p>
<p style="text-align: center;">SULFURIC ACID</p> <p style="text-align: center;">with: chlorates, perchlorates, permanganates, and water</p>	

NOTE: This list is not a complete list of incompatible materials. It contains some of the more common incompatible materials. Always research the materials you work with in order to be safe.