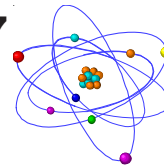


# LABORATORY SAFETY FACT SHEET #7



## SAFE STORAGE OF CHEMICALS



**INTRODUCTION:** If incompatible chemicals are inadvertently mixed a fire, explosion, or toxic release can easily occur. In earthquake-prone areas like Santa Barbara, it is particularly vital that chemicals be stored safely. Take steps now to prevent damage to your facility, or harm to lab personnel.

Below are some basic guidelines for chemical storage. Note however, that chemicals can often fall into more than one hazard category and therefore the chemical label and/or Material Data Safety Sheet (MSDS-see *below*) should be reviewed for specific storage requirements. Separate chemicals by adequate distance, or preferably by using physical barriers (e.g. storage cabinets). Avoid using the fume hood for chemical storage - this practice may interfere with the proper air flow of the hood. For especially dangerous materials, use a secondary container (e.g. plastic tub) large enough to contain a spill of the largest container.

Chemicals should be disposed based on - but not limited to - the following criteria: material has exceeded it's shelf life; the cap is deteriorating or the container is leaking; the container has inadequate hazard information; material is waste (by law all chemical wastes must be disposed of within one year).

### BASIC HAZARD GROUPS



*Flammables*

*Corrosives*

*Oxidizers*

*Carcinogens*

*Water Reactives*

*Toxics*

*Pyrophorics*

With the wide variety of chemicals used in laboratories, the list below is prioritized for materials that are **COMMONLY** used in a research laboratory. This chart indicates the most obvious chemical incompatibilities, and provides a segregation plan. For more specific chemical incompatibility information, please consult the manufacturer's MSDS, available at <http://www.ehs.ucsb.edu/units/labsfty/labsc/chemistry/lchemmsds.htm> or contact EH&S at X8243.

#### ACIDS

Acetic Acid

- Chromic Acid
- Hydrochloric Acid
- Hydrofluoric Acid
- Nitric Acid
- Phosphoric Acid
- Sulfuric Acid

●Indicates strong oxidizing acids, store per oxidizers section

#### Storage Precautions:

- ⇒Store bottles on low shelf areas, or in acid cabinets.
- ⇒Segregate oxidizing acids from organic acids, **AND** flammable materials.
- ⇒Segregate acids from bases, **AND** from active metals such as sodium, potassium, etc.
- ⇒Segregate acids from chemicals which could generate toxic gases such as sodium cyanide, iron sulfide, etc.

#### BASES

Ammonium Hydroxide  
Potassium Hydroxide  
Sodium Hydroxide

#### Storage Precautions:

- ⇒Separate bases from acids.
- ⇒Store bottles on low shelf areas, or in acid cabinets.

## FLAMMABLES-fuels are reducing agents

|             |               |                   |         |
|-------------|---------------|-------------------|---------|
| Acetone     | Ethyl Acetate | Isopropyl Alcohol | Toluene |
| Benzene     | Ethyl Ether   | Methanol          | Xylene  |
| Cyclohexane | Gasoline      | Propanol          |         |
| Ethanol     | Hexane        | Tetrahydrofuran   |         |

### Storage Precautions:

- ⇒ Store in approved flammable storage cabinet(s) (required if there is more than 10 gallons in the lab).
- ⇒ Separate from oxidizing acids and oxidizers.
- ⇒ Keep away from any source of ignition (flames, localized heat or sparks).
- ⇒ Use only "flammable storage" (desparked) refrigerators or freezers.

## OXIDIZERS-react violently with organics.

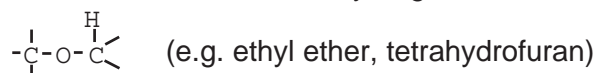
| <u>Solids</u>          | <u>Liquids</u>    |
|------------------------|-------------------|
| Calcium Hypochlorite   | Bromine           |
| Ferric Chloride        | Hydrogen Peroxide |
| Iodine                 | Nitric Acid       |
| Nitrates, Salts of     | Perchloric Acid   |
| Peroxides, Salts of    | Chromic Acid      |
| Potassium Ferricyanide |                   |
| Sodium Nitrite         |                   |

### Storage Precautions:

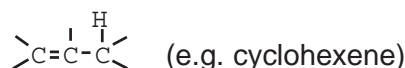
- ⇒ Keep away from flammables, organic solvents, and other combustible materials (i.e. paper, wood, etc.).
- ⇒ Keep away from reducing agents.
- ⇒ Store in a cool, dry place.

## PEROXIDE-FORMING CHEMICALS-peroxides can be explosive and shock-sensitive.

Ethers and acetals with  $\alpha$ -hydrogen



Alkenes with allylic hydrogen



For a more complete list of these materials visit our website at <http://www.ehs.ucsb.edu/units/labsfty/labrsc/lflamable.htm#formers>

### Storage Precautions:

- ⇒ Dispose before expected date of initial peroxide formation.
- ⇒ Label containers with receiving, opening, and disposal dates.
- ⇒ Store in airtight containers in a dark, cool, and dry place.

## PYROPHORIC SUBSTANCES-spontaneously ignite in air.

- Some finely divided metals
- Some organoaluminum compounds ( $\text{LiAlH}_4$ ,  $\text{Al}(\text{CH}_3)_3$ )
- Silane
- Phosphorus, Yellow
  - Phosphorus, yellow should be stored and cut under water

### Storage Precautions:

- ⇒ Rigorously exclude air and water from container.
- ⇒ Store away from flammables.
- ⇒ Store in a cool, dry place.

## WATER REACTIVE CHEMICALS-reacts violently with water to yield flammable or toxic gases.

| <u>Solids</u>   | <u>Liquids</u>         |
|-----------------|------------------------|
| Calcium Carbide | Phosphorus Trichloride |
| ● Lithium       | Thionyl Chloride       |
| Magnesium       |                        |
| ● Potassium     |                        |
| ● Sodium        |                        |

- Lithium, Potassium, and Sodium should be stored under Kerosene or Mineral Oil

### Storage Precautions:

- ⇒ Rigorously avoid exposure to water and air.
- ⇒ Store away from flammables
- ⇒ Store in a cool, dry place.

## HIGHLY TOXICS, CARCINOGENS, REPRODUCTIVE TOXINS

These chemicals can be very hazardous by themselves, or in combination with other chemicals. If they are easily inhaled, (gases and volatile liquids) then they are particularly hazardous. Suspected human carcinogens should also be stored as highly toxic. Lists of these materials are provided on our website:

<http://www.ehs.ucsb.edu/units/labsfty/labrsc/chemistry/lchem.htm>

Liquids - Seal tightly and store in a ventilated cabinet apart from incompatibles. Use secondary containment (e.g. plastic tub) to contain any spills.

|                 |                   |         |
|-----------------|-------------------|---------|
| Formaldehyde    | Carbon disulfide  | Mercury |
| Nickel carbonyl | Cyanide solutions |         |

Gases - Store in a gas cabinet or other ventilated cabinet

|                   |              |
|-------------------|--------------|
| Chlorine          | Fluorine     |
| Hydrogen chloride | Nitric Oxide |

Solids - Store away from incompatibles (usually acids) that would release toxic gas upon contact.

|                    |
|--------------------|
| Cyanides, Salts of |
| Sulfides, Salts of |