

## Storage Pattern for Chemicals Where Space is Limited

A proper chemical storage system separates materials according to chemical compatibility and hazard class. Many schools try to use the excellent chemical storage system found in Flinn Scientific's catalog. Unfortunately, many school stockrooms are too small to provide 23 separated locations for classes of chemicals.

Here are some tips for creating safer chemical storage rooms:

- Complete an inventory of the chemical compounds in each stockroom.
- Do not store chemical containers above eye level if possible.
- Separate inorganic compounds from organic compounds.
- Store solids above and liquids below.
- Storage cabinets for acids, bases and flammables are meant for liquids, not dry solids.
- Vent acid cabinets to prevent vapor build-up.
- Store concentrated sulfuric acid on one shelf of the acid cabinet and concentrated hydrochloric acid on another.
- Store nitric acid in a secondary container with other inorganic acids or a separate cabinet.
- Do not vent flammable liquid storage cabinets unless you're using an explosion-proof fan is carrying the vapors out of the building.
- Glacial acetic acid is a flammable liquid; store it in a dedicated organic acid cabinet or in the flammable liquids cabinet.
- Flammable liquids like alcohols must not be stored in conventional refrigerators.

The chart below combines categories of chemicals that have similar hazardous characteristics. By doing so, you will only need 12 separate storage locations.

<b>Inorganic Reactives &amp; Metals (I-1, I-10)</b> Sulfur, Phosphorus (double packaged), Arsenic, Solid Metals, Hydrides, Lithium, Sodium	<b>Organic Toxins (O-5, O-7)</b> Epoxy Compounds, Isocyanates, Sulfides, Polysulfides
<b>Inorganic Salts (I-2)</b> Chlorides, Iodides, Fluorides, Bromides, Sulfates, Sulfites, Thiosulfates, Phosphates.	<b>Organic Reactives #6</b> Peroxides, Azides, Hydroperoxides
<b>Inorganic Oxidizers (I-3, I-6, I-8)</b> Nitrates, Nitrites, Borates, Chromates, Manganates, Permanganates, Chlorates, Chlorites, Peroxides, Azides,	<b>Flammable Storage Cabinet (O-2, O-3, O-4, O-8 &amp; concentrated organic bases)</b> Alcohols, Glycols, Phenol, Hydrocarbons, Cresols, Esters, Ethers, Propionic Acid, Formic Acid, Glacial Acetic Acid, Lactic Acid
<b>Inorganic Corrosive Bases (O-4) (Dry Chemicals)</b> Dry Hydroxides, Oxides, Silicates, Carbonates, Carbon	<b>Dry and Dilute Organic Acids &amp; Anhydrides (O-1)</b> Citric Acid, Anhydrides, Peracids, etc.
<b>Inorganic #5 and #7 Toxins</b> Arsenates, Cyanides, Sulfides, Selenides, Phosphides, Carbides, Nitrides	<b>Miscellaneous</b> Household chemicals (vinegar, baking soda, vegetable oils), Dyes, Stains, Agars, Sugars, Gels
<b>Corrosive Base Storage Cabinet (I-4 Liquids)</b> >1.0 molar Ammonium Hydroxide, Sodium Hydroxide, Calcium Hydroxide (limewater), Potassium Hydroxide, Oxides, Silicates	<b>Non-metal Corrosive Acid Storage Cabinet (I-9 Liquids)</b> Hydrochloric Acid, Sulfuric Acid, Hydrobromic Acid, Phosphoric Acid, Perchloric Acid. Nitric acid separately stored in this or another cabinet. Limit Nitric Acid to a 5 year supply.
<i>Dilute solutions at or below 1.0 molar can be stored on shelves rather than in cabinets. Segregate inorganic and organic compounds. Check containers annually for condition of containers, labels and contents. Replace degraded lids, dropper tops and solutions.</i>	<i>To prevent release of corrosive vapors, avoid storing pipettes holding acids or bases in test tubes taped to the side of bottles. Wrap fritted glass stoppers on acid bottles in parafilm to reduce evaporation. Store iodine crystals in a sealed plastic bag to monitor degradation of the container's cap and reduce indoor air pollution.</i>