SUGGESTED SEQUENCE OF STEPS TO MORE SAFELY ORGANIZE YOUR SCHOOL'S CHEMICAL STORES AREA

1 Take an inventory of all the chemicals in your school. You will never know the extent of your problem until you know exactly what you have. Record the inventory. You may want to consider the purchase of the FLINN CHEMICAL INVENTORY SYSTEM to facilitate this task.

2 Decide what products you will need for the next year (at best, two years). Ruthlessly rid yourselves of the remainder of the accumulated materials.

3 Reorganize the remaining products into their compatible chemical families (see our Suggested Chemical Storage Pattern on page 1263). The actual sequence of compatible families on your shelves is not critical. What is important is to keep the compatible families separate and to keep the organic and inorganic families as far apart as possible. The Suggested Shelf Storage Pattern shown on pages 1264–1265 is only one suggested sequence you can use. If shelf space is a problem, you are permitted to place more than one compatible family on a shelf. Make sure you either have a physical divider or leave a 3" space between each family.

Hundreds of teachers who have reorganized their shelves, using these patterns, tell us products are easier to find versus the alphabetical system previously used. When you reorganize, you may need some estimate of the percentage of shelf space each family might occupy. If yours is a "typical" high school, the following profile may be a helpful guide:

Inorganic Families

Families	Percentage of Shelf Space Occupied
Acids (Inorganic 9)	Store away from all other items. Store in a dedicated acid cabinet. Store nitric acid away from all other materials.
Metals, etc. (Inorganic 1)	Less than 5%
Halides, Sulfates, Phosphates, Acetates, etc. (Inorganic 2)	Could be 35–40% of available space. This is usually the largest family.
Nitrates, etc. (Inorganic 3)	Approximately 8–10%
Hydroxides, Oxides, etc. (Inorganic 4)	Approximately 10%

Families	Percentage of Shelf Space Occupied
Sulfides, etc. (Inorganic 5)	Less than 1%
Chlorates, Perchlorates, etc. (Inorganic 6)	5+%
Arsenates, etc. (Inorganic 7)	Less than 1%
Borates, Chromates, etc. (Inorganic 8)	Less than 1%
Sulfur, Phosphorus, etc. (Inorganic 10)	Approximately 3%

4 ## And Organic Families

Organic acids (Organic 1) will probably occupy about 5+% of your organic shelf space except for acetic acid which should be stored with the inorganic acids (hydrochloric, etc.) in a dedicated acid cabinet. Keep acetic acid *away* from nitric acid. If your school is "typical," the remainder of your organic materials may occupy about 15–20% of your total shelf space. You should store all flammable organics in a dedicated flammables cabinet.

5 ## And Other Materials

There may be some very large space consumers in 2-kilogram (5-lb.) containers; i.e., calcium chloride, calcium hydroxide, etc. Certainly you may wish to extend family storage in a separate location for such large volumes of large packages.

6 Congratulations! You have now reorganized your chemical stores facility to:

- store compatible products together
- separate acids into dedicated storage
- separate flammables into dedicated storage
- lock up all poisons
- record all inventory
- rid yourselves of excess materials

YOU NOW HAVE A SAFER FACILITY

SUGGESTED CHEMICAL STORAGE PATTERN

Storage of laboratory chemicals presents an ongoing safety hazard for school science departments. There are many chemicals that are incompatible with each other. The common method of storing these products in alphabetical order sometimes results in incompatible neighbors. For example, storing strong oxidizing materials next to organic chemicals can present a hazard.

A possible solution is to separate chemicals into their organic and inorganic families and then to further divide the materials into related and compatible families. Below is a list of compatible families. On the next page you will find this family arrangement pictured as shelf areas in your chemical stores area. The pictured shelf arrangement will easily enable you to rearrange your inventory into a safer and more compatible environment.

Inorganic

1. **Metals, Hydrides**
2. **Acetates, Halides, Iodides, Sulfates, Sulfites, Thiosulfates, Phosphates, Halogens, Oxalates, Phthalates, Oleates**
3. **Amides, Nitrates (except Ammonium Nitrate), Nitrites, Azides**
4. **Hydroxides, Oxides, Silicates, Carbonates, Carbon**
5. **Sulfides, Selenides, Phosphides, Carbides, Nitrides**
6. **Chlorates, Bromates, Iodates, Chlorites, Hypochlorites, Perchlorates, Perchloric Acid, Peroxides, Hydrogen Peroxide**
7. **Arsenates, Cyanides, Cyanates**
8. **Borates, Chromates, Manganates, Permanganates, Molybdates, Vanadates**
9. **Acids (except Nitric) (Nitric Acid is isolated and stored by itself.)**
10. **Sulfur, Phosphorus, Arsenic, Phosphorus Pentoxide**
11. **Inorganic miscellaneous**

Organic

1. **Acids, Amino Acids, Anhydrides, Peracids**
2. **Alcohols, Glycols, Sugars, Amines, Amides, Imines, Imides**
3. **Hydrocarbons, Esters, Aldehydes, Oils**
4. **Ethers, Ketones, Halogenated Hydrocarbons**
5. **Epoxy Compounds, Isocyanates**
6. **Peroxides, Hydroperoxides**
7. **Sulfides, Polysulfides, Sulfoxides, Nitriles**
8. **Phenols, Cresols**
9. **Dyes, Stains, Indicators**
10. **Organic miscellaneous**

NOTE: If you store volatile materials (ether, hydrocarbons, etc.) in a refrigerator, the refrigerator must be explosion-proof. The thermostat switch or light switch in a standard refrigerator may spark and set off the volatile fumes inside and thus cause an explosion.

This list is not complete and is intended only to cover the materials possibly found in an average school situation. This is not the only method of arranging these materials and is only offered as a suggestion.

See the next three pages for detailed inventory and storage steps you might follow to vastly improve the safety profile of your chemical storage.