



San Diego Unified School District

School: _____
Chemical Hygiene Officer
Name: _____
Phone: _____

***SCIENCE
DEPARTMENT
CHEMICAL HYGIENE
PLAN***

1.0 **Introduction**

The Chemical Hygiene Program provides the framework to conduct work in an educational laboratory safely. This program has been developed in accordance with the Cal/OSHA regulation Occupational Exposure to Hazardous Substances in Laboratories.

1.2 The provisions of the Chemical Hygiene Program are subject to review by Cal/OSHA. The Chemical Hygiene Officer is responsible for a variety of internal auditing mechanisms, but all science teachers and students are expected to maintain a safe working environment.

2.0 **Duties and Responsibilities**

2.1 Site administrators, science teachers, and students have certain duties and responsibilities for the implementation of the Chemical Hygiene Program. The duties and responsibilities throughout the school are outlined below.

2.2 **Site Administrators have the Responsibility to:**

- Appoint a Chemical Hygiene Officer (CHO).
- Implement the Chemical Hygiene Plan according to the procedures set forth in the Occupational Exposure to Hazardous Chemicals in Laboratories Standard, California Code of Regulations, Title 8 5191 using the District Safety Office for guidance.
- Provide information about the Chemical Hygiene Plan to all science teachers.

2.3 **Each science teacher has the responsibility to:**

- Know the safety hazards of the chemicals handled by students during each laboratory activity.
- Insure safety equipment (eyewash stations, fire blankets) is present and accessible in the laboratory and is in good working condition.
- Provide appropriate safety protection equipment to the students.
- Follow good laboratory hygiene practices.
- Ensure that all chemicals are correctly labeled.
- Report any accidents or unsafe working conditions to your principal or other appropriate administrator.
- Ensure prompt response and cleanup of chemical spills.
- Properly dispose of chemical waste according to District Administrative Procedure 5120.

2.4 **Students have the Responsibility to:**

- Understand the experimental procedure and the safety hazards before starting work in the laboratory.
- Ensure familiarity and knowledge of the chemicals that are being handled.
- Follow all safety rules and regulations.
- Clean your lab area after each experimental procedure.
- Report chemical spills to your teacher immediately.

2.4 **The Chemical Hygiene Officer (CHO) has the responsibility to:**

- Ensure the communication of the Chemical Hygiene Program teachers and students and assist in its implementation.
- Consult with teachers and students for the implementation of the Chemical Hygiene Program.
- Act as liaison with the District Safety Office regarding matters covered under the Chemical Hygiene Program.
- Chair the Chemical Hygiene Committee.

2.5 The Chemical Hygiene Officer (CHO) has the Responsibility to:

- Ensure the communication of the Chemical Hygiene Program to teachers and students and assist in its implementation.
- Consult with teachers and students for the implementation of the Chemical Hygiene Program.
- Act as liaison with the District Safety Office regarding matters covered under the Chemical Hygiene Program.
- Chair the Chemical Hygiene Committee.

3.0 **Personal Protective Equipment**

Proper personal protective equipment in protecting teachers from unwanted exposures to hazardous materials. A lab coat, safety glasses and gloves shall be used for all potentially hazardous laboratory activities.

3.1 **Safety Showers and Eye Washes**

Make sure safety showers are readily accessible for use when a chemical spill contaminates large sections of clothing or skin. Be sure that eye wash stations are available within 100 feet of areas where chemicals that pose a severe threat to the eyes are used and/or stored.

3.2 **Eye Protection**

The following are minimum requirements for eye wear selection:

1. Wear eye protection while working with chemicals in the laboratory.
2. Do not wear contact lenses in the chemical laboratory because they may trap contaminants under the lenses. Contact lenses may reduce (or eliminate) the effectiveness of flushing with water. By capillary action, contact lenses may increase the amount of chemical trapped on the surface of the eye, which might normally be removed by tearing.
3. If contact lenses must be worn for medical reasons, wear chemical splash goggles while in the laboratory and under conditions of risk. Supplement this by wearing a face mask over the goggles.

Chemical Splash Goggles

Make sure splash goggles fit snugly and comfortably around the eyes. They should “breathe” and teachers should not overheat under them and perspire. They should provide good peripheral vision. If teachers or students need to wear prescription glasses, they should be easy to clean. Keep them clean. The splash goggles must provide eye protection and be comfortable and acceptable to teachers. Verify the vendor’s claims on performance under actual conditions. They must fit close to the face and the strap around the head should provide good stability against lateral impacts.

Teachers or students should use a face shield over the splash goggles if they will be working with vigorous reactions or the materials involved in the work are very corrosive to tissue. If there is risk of minor explosions, place a wraparound explosion shield between the employee and the reaction vessel.

4.0 **Universal Precautions for Laboratory Work**

- Know the hazards of chemicals being used (e.g., corrosiveness, flammability, reactivity, stability, and toxicity.) Check the MSDS or other information sources.
- Eating, drinking, and smoking are not allowed in the laboratory.
- Wear appropriate clothing including a protective apron or laboratory coat. Confine long hair and loose clothing. Do not wear open-toed shoes or sandals in the laboratory. Do not wear jewelry that interferes with protective equipment.
- Do not use mouth suction to start siphons or to fill pipettes.
- Conduct an annual chemical inventory under the direction of the CHO. Dispose of outdated and obsolete chemicals.
- Maintain a current MSDS file for chemicals used in the laboratory. Make the file accessible to the teachers and students in the laboratory. Train students in the interpretation of the MSDS information.

- Label containers of hazardous materials properly. Teachers do not have to label materials transferred from larger containers if students use the materials immediately.
- Notify the District Safety Office whenever chemical wastes are stored for disposal the store the wastes in appropriate and properly identified. Dispose of sharps in a sharps container located in the school's nurse's office or contact the District Safety Office for guidance. Broken glass in waste containers labeled "Broken Glass" or equivalent warning.
- Post the telephone numbers of the CHO and the other safety officers, administrators, and alternates on site.
- Work with materials which have safety and health ratings of three (3) or greater in any category inside a functioning fume hood.
- Work with substantial amounts of materials with hazard ratings of one (1) or two (2) in a hood or in an assembly designed to be safe in the event of a worst-case failure.
- Wear appropriate personal protective equipment in the work area. Wear chemical splash goggles whenever the work involved offers any possibility of eye injury. Avoid wearing contact lenses, but if teachers must wear them for medical reasons, wear chemical splash goggles in the laboratory.
- Know the location and proper use of the emergency equipment. Know the locations of exits, evacuation routes and assemble areas.
- Store chemicals in appropriate chemical storage areas. Store chemicals according to their chemical compatibility.
- Transport hazardous materials in a secondary container. The secondary container should be large enough to safely contain the volume of the primary container in the event of breakage.
- Avoid conducting hazardous operations alone in the laboratory.
- Keep the laboratory work area orderly. Do not use bench work areas and hoods for storage.
- Keep aisles, halls, exits and walkways clean, dry and free of obstructions.
- Do not obstruct emergency showers and eye stations, fire extinguishers, electrical panels, utility controls, other emergency response equipment.

5.0 Labeling

Chemical Labeling

- Identify the hazardous substance
- Provide appropriate hazard warning

Hazardous Waste Labeling

The California Environmental Protection Agency and the Hazardous materials Management Division of the County of San Diego require containers that hold hazardous waste to be appropriately labeled. The following information must be included on the label:

- The words "HAZARDOUS WASTE "
- Composition and physical state of the waste
- Statement or statements, which call attention to the particular hazardous properties of the waste (e.g. flammable, reactive, corrosive, toxic, etc.)
- The accumulation start date
- The name and address of the school

6.0 Chemical Hazard classification and Safety Precautions Flammables and Combustibles

Common examples of flammables and combustibles used in High School Laboratories include Acetone, Alcohol, Toluene, Hexane, and Petroleum Ether.

Reduce the potential for a fire from flammable and combustible materials by:

- Limiting the amount of fuel in one area
- Limiting storage of flammables to the smallest amount needed (practice “just-in-time” chemical ordering)
- Using red/white safety cans, red self-closing oily rag containers, and flammable liquid cabinets.
- Avoiding the use of glass storage containers for hazardous waste
- Not storing ignitable hazardous wastes in glass bottles
- Segregating flammables from oxidizers. Common oxidizers are bleach, ammonium persulfate, potassium permanganate, nitric acid, and sulfuric acid, hydrogen peroxide and silver nitrate.

Corrosives

Corrosives are materials that can cause damage to living tissue, metal, or wood. Corrosives are divided into three categories: Alkalis, Acids and others. Common examples of each are listed below.

Alkalis:	Sodium and Potassium Hydroxide, etc.
Inorganic Acids	Hydrochloric Acid, Nitric Acid, Phosphoric Acid, Sulfuric Acid, etc.
Organic Acids	Acetic Acid
Corrosive	Iodine Crystals

Strong acids can instantly cause serious skin and eye burns and the damage is often irreversible. Alkaline materials on the skin may feel oily to the touch, but usually do not immediately cause pain or burning sensations. Consequently, injuries resulting from alkaline exposure are often not sensed until after the damage has occurred. First Aid: Rinse affected area with water for at least 20 minutes

ALWAYS
Add Acid to Water

Safe handling tips for Workings with Corrosives:

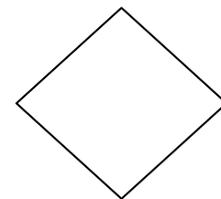
- Add acids to water [A →W] and not in the reverse order.
- Use neutralizers in the marked spill kits or baking soda (sodium bicarbonate) for neutralizing acid spills.
- Avoid accidental exposures by wearing personal protective equipment including chemical goggles (not safety glasses), face shields, acid/caustic gloves, and chemical aprons.
- Use secondary containment, like polypropylene (or similar material) spill trays, when working with corrosives.
- Store oxidizing acids separate from organic acids (e.g. do not store nitric acid together with acetic acid). Store nitric acid separately from all other acids.
- Do not store acid and bases, or acids and flammables/combustibles together.



Compresses Gas Cylinders

Examples of common compressed gases:

- Argon, Carbon Dioxide, Compressed Air, Helium, Nitrogen Oxygen, and Hydrogen.



NON-FLAMMABLE GAS

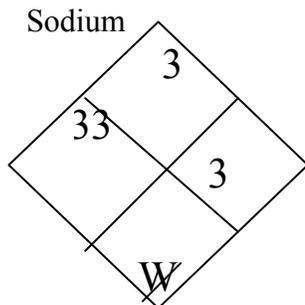
The following handling precautions are designed to prevent sudden or uncontrolled release of pressurized gases, which can cause serious injury and damage:

- Store away from sources of heat.
- Cylinders must be secured, whether they are full or empty.
- The proper way to open any cylinder valve is to first crack the valve, then open it slowly by turning the handle or stem counter-clockwise. This allows the equipment to adjust gradually to full pressure. Stop turning as soon as there is any resistance.
- Separate fuel gases (Methane, Hydrogen and Propane) from Oxygen cylinders by more than 20 feet.
- Before moving cylinders close the cylinder valve, remove the regulator, and install valve proctor cap.
- Leave the valve protector cap in place until the cylinder is used and replace it when not in use.
- Close the cylinder valve when work is complete.
- Use a cylinder cart to move cylinders.
- Avoid dropping or striking cylinders.
- Use gases only for their intended purpose (e.g. do not blow off your lab benches with Oxygen).
- Provide electrical grounding for all flammable gas systems using hydrogen, methane or propane.

Cryogenic gases (e.g. N₂, He) can cause tissue freezing (frostbite). Wear insulated mitts, an apron without pockets, and a face shield while transferring and handling. Ensure adequate ventilation when working with cryogenics to avoid oxygen depletion. Use special glassware or plastics that will withstand the transition from very low temperatures to room temperature.

Water Reactive Materials

Water reactive chemicals form potentially explosive mixtures with water. They react with water to generate hydrogen gas, and include alkali Metals. include Lithium, Sodium and Potassium. These alkali metals are usually stored under a layer of mineral oil to protect them from moisture in air.



KEEP DRY

Examples of some water reactive compounds are:

- Alkali metals (e.g. Sodium, Lithium)
- Organometallic compounds
- Halides
- Hydrides
- Peroxides (e.g. Sodium peroxide)
- Carbides (e.g. Calcium carbide)
- Oxides (e.g. Sodium oxide)
- Phosphides (e.g. Aluminum phosphide)
- Anhydrides (e.g. Acetic anhydride)
- Hydroxides (e.g. Sodium hydroxide pellets)

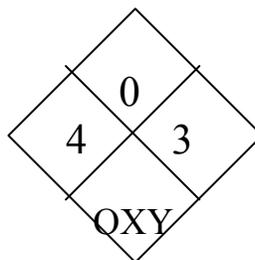
Highly Reactive Chemicals

Reactive and unstable chemicals are those that are normally stable but can become unstable or undergo violent chemical change when stored improperly or exposed to incompatible substances. Examples of reactive and unstable chemicals include Azides (e.g. Sodium Azide), Silane Compounds, Hydrazine, Fuming Nitric Acid, Sulfuric Acid, Tetrahydrofuran and Nitromethane. Fire or high temperatures may cause explosive decomposition of Hydrazine.

**WARNING THESE CHEMICALS ARE NOT ACCEPTABLE FOR CLASSROOM USE
CONTACT THE DISTRICT SAFETY OFFICE FOR GUIDANCE.**

Oxidizers

Oxidizing materials are chemicals that spontaneously evolve oxygen and promote combustion at room temperature or with slight heating. This class of chemicals include peroxides, chlorates, nitrates and permanganates. Strong oxidizers can form explosive mixtures when mixed with combustible, organic or easily oxidizable materials.



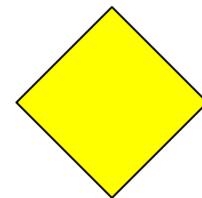
Example of some oxidizers are:

- Ammonium permanganate
- Ammonium persulfate
- Calcium hypochlorite
- Potassium permanganate
- Sodium peroxide
- Nitric Acid
- Oxygen gas
- Potassium chlorate
- Silver nitrate

7.0 Peroxidizable Compounds

WARNING THESE CHEMICALS ARE NOT ACCEPTABLE FOR CLASSROOM USE CONTACT THE DISTRICT SAFETY OFFICE FOR GUIDANCE

Under normal storage conditions, peroxides can form and accumulate in peroxidizable compounds. Peroxides may then explode violently when chemicals are subject to thermal or mechanical shock. To prevent accidents, peroxidizable compounds should be identified, dated (when received and when opened), inventoried, and evaluated for safe use after six months. (e.g. testing for peroxides).



There are several classes of chemical compounds that form peroxides under normal storage conditions, if allowed access to air. The list of peroxidizable compounds is long. Some broad classes of problem chemicals include ethers, vinyl monomers, alkali metals and dienes. Specifically, isopropyl ether, ethyl ether, dioxane, vinyl ether, and tetrahydrofuran are commonly found in chemistry laboratories.

8.0 Chemical Spills

Each laboratory should have an emergency response plan in place. Each student, teacher, and other staff members should know what to do and where to go in the event of an emergency.

Act immediately on students, students, teachers, and other staff that appear to come into contact with the spilled chemical and address their needs immediately.

Evacuate when necessary until you are certain that the spill area is no longer hazardous.

Identify the substance by referring to the material safety data sheets.

Remove unnecessary personnel from the spill area. Contact the District Safety Office for guidance.

THIS SECTION IS CURRENTLY BEING REVISED.

(f) Training

- (1) The District Safety Office will provide staff with initial science safety training to ensure that they are apprised of the hazards of chemicals present in their work area. Information and training may relate to hazardous substances to the extent appropriate.

- (2) Such information shall be provided at the time of the teachers' initial assignment to a school site where science chemicals are handled and stored. The frequency of refresher information and training should be conducted annually. The content of the information and training should include recognition of hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including.

THIS SECTION IS CURRENTLY BEING REVISED.

- (3) The location and availability of the site Chemical Hygiene Plan;

THIS SECTION IS CURRENTLY BEING REVISED.

HAZARDOUS WASTE NOTIFICATION FORM

SDUSD Administrative Procedure 5120 requires notification to the District Safety Office whenever hazardous wastes are collected.

Date:	
Your Name:	Department:
Telephone Number:	
Site Name:	
Room Number:	
Describe the type of hazardous waste that is being stored	
Environmental regulations require that Hazardous wastes are managed properly at District sites. Compliance inspections are routinely conducted by the County of San Diego, Hazardous Materials Division (HMD). In order to continue to manage hazardous wastes at site, you will need to agree to the following requirements.	<p>Hazardous Waste Requirements: Identify what types of wastes to be Collected by keeping a record or list. (type of waste, type of container, amount) Submit this list when you make a request for disposal. Hazardous waste storage area must be kept clean at all times. Keep containers closed when not in use, always properly labeled. Make sure containers area always in good condition; report any unsafe conditions or chemical spills to the Safety Office.</p>
I agree to follow the above hazardous waste requirements.	Signature:
Return this form to the District Safety Office	Approved By: EPA#

HAZARDOUS WASTE

STATE AND FEDERAL LAW PROHIBIT IMPROPER DISPOSAL
IF FOUND, CONTACT THE NEAREST POLICE SAFETY
AUTHORITY, THE US. ENVIRONMENTAL PROTECTION
AGENCY OR THE CALIFORNIA DEPARTMENT OF HEALTH
SERVICES.

GENERATOR INFORMATION:

NAME _____
ADDRESS _____ PHONE _____
CITY _____ STATE _____ ZIP _____

EPA / MANIFEST.
ID NO/DOCUMENT NO. _____ / _____

EPA CA ACCUMULATION
WASTE NO. _____ WASTE NO. START DATE _____

CONTENTS COMPOSITION: _____

PHYSICAL STATE: SOLID LIQUID | HAZARDOUS PROPERTIES: FLAMMABLE TOXIC
 CORROSIVE REACTIVITY OTHER

D.O.T. PROPER SHIPPING NAME AND UN OR NA NO. FWITH PREFIX

HANDLE WITH CARE!

SUGGESTED CHEMICAL STORAGE PATTERN

Storage of laboratory chemicals present 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 incompatible neighbors. For example, storing strong oxidizing materials next to organic and inorganic families and then to further divide the material 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 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
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, PERCHLORIC ACID, PEROXIDES, HYDROGEN PEROXIDE.
7. ARSENATES, CYANIDES, CYANATES
8. BORATES, CHROMATES, MANGANATES, PERMANGANATES
9. ACIDS (EXCEPT NITRIC)
10. SULFUR, PHOSPHORUS, ARSENIC, PHOSPHORUS PENTOXIDE

ORGANIC

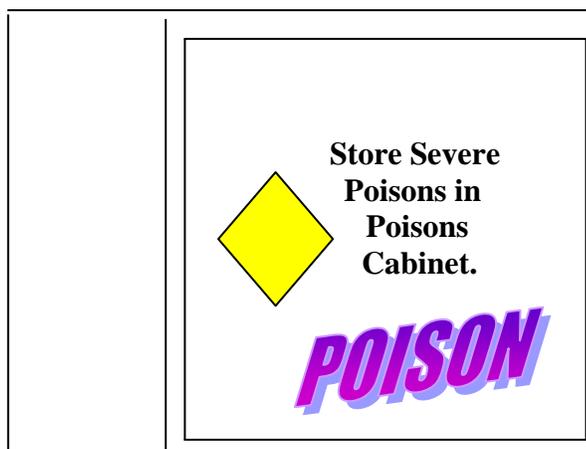
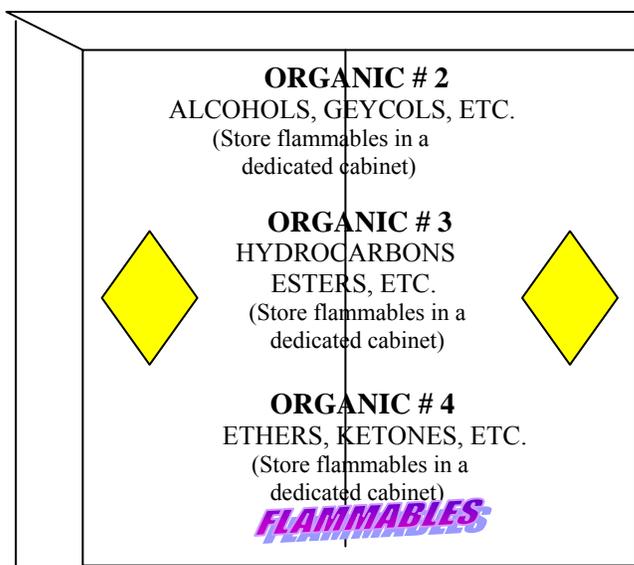
1. ACIDS, AMINO ACIDS, ANHYDRIDES PERACIDS
 2. ALCOHOLS, GLYCOLS, SUGARS, AMINES, AMIDES, IMINES, IMIDES
 3. HYDROCARBONS, ESTERS, ALDEHYDES, OILS
 4. ETHERS, KETONES, KETENES, HALOGENATED HYDROCARBONS, ETHYLENE OXIDE
 5. EPOXY COMPOUNDS, ISOCYANATES
 6. PEROXIDES, HYDROPEROXIDES, AZIDES
 7. SULFIDES, POLYSULFIDES, SULFOXIDES NITRILES
 8. PHENOLS, RESINS
 9. DYES, STAINS, INDICATORS
- See next page for detailed inventory and storage steps you might follow to vastly improve the Safety profile of your chemical storage.

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.

Surely 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 purely offered as a suggestion.

SUGGESTED SHELF STORAGE PATTERN-ORGANIC

<p style="text-align: center;">ORGANIC # 2 ALCOHOLS, GLYCOOLS SUGARS AMINES, AMIDES, IMINES, IMIDES (Store flammable liquids in a dedicated cabinet)</p>	
<p style="text-align: center;">ORGANIC # 3 HYDROCARBONS, OILS ESTERS, ALDEHYDES (Store flammable liquids in a dedicated cabinet)</p>	
<p style="text-align: center;">ORGANIC # 4 ETHERS, KETONES, KETENES HALOGENATED HYDROCARBONS ETHYLENE OXIDE (Store flammables in a dedicated cabinet)</p>	
<p style="text-align: center;">ORGANIC # 5 EPOXY COMPOUNDS, ISOCYANATES</p>	
<p style="text-align: center;">ORGANIC # 7 SULFIDES, POLYSULFIDES, ETC.</p>	<p>If possible avoid using the floor.</p>
	<p style="text-align: center;">ORGANIC # 8 PHENOLS, CRESOLS</p>
	<p style="text-align: center;">ORGANIC # 6 PEROXIDES, AZIDS HYDROPEROXIDES</p>
	<p style="text-align: center;">ORGANIC # 1 ACIDS, AMINO ACIDS, ANHYDRIDES, PERACIDS (Store certain organic acids in acid cabinet)</p>
	<p style="text-align: center;">ORGANIC # 9 DYES, STAINS, INDICATORS</p>
	<p style="text-align: center;">MISCELLANEOUS</p>

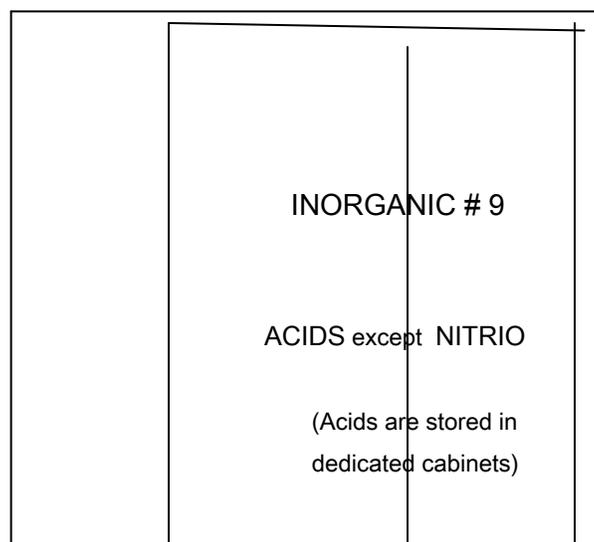


SUGGESTED SHELF STORAGE PATTERN-INORGANIC

<p>INORGANIC #10 SULFUR, PHOSPHORUS ARSENIC, PHOSPHORUS PENTOXIDE</p>	<p>If possible Avoid using the floor</p>	<p>INORGANIC # 7 ARSENATES, CYANIDES, CYANATES (Store away from any water.)</p>
<p>INORGANIC # 2 HALIDES, SULFATES, SULFITES THIOSULFATES, PHOSPHATES, HALOGENS, ACETATES</p>		<p>INORGANIC # 5 SULFIDES, SELENIDES, PHOSPHIDES, CARBIDES, NITRIDES</p>
<p>INORGANIC # 3 AMIDES, NITRATES, (Not AMMONIUM NITRATE). NITRITES, AZIDES (Store Ammonium Nitrate away from all other substances –<i>ISOLATE IT!</i>)</p>		<p>INORGANIC # 8 BORATES, CHROMATES, MANGANATES, PERMANGANATES</p>
<p>INORGANIC # 1 METALS & HYDRIDES (Store away from any water.) (Store flammable solids in flammables cabinet.)</p>		<p>INORGANIC # 6 CHLORATES, BROMATES, IODATES, CHLORITES, HYPOCHLORITES, PERCHLORATES, PERCHLORIC ACID, PEROXIDES, HYDROGEN PEROXIDE</p>
<p>INORGANIC # 4 HYDROXIDES, OXIDES, SILICATES, CARBONATES, CARBON</p>		<p>MISCELLANEOUS</p>

STORAGE SUGGESTIONS

1. Avoid floor chemical storage (even temporary)
 2. No top shelf chemical storage
 3. No chemicals storage above eye level
 4. Shelf assemblies are firmly secured to walls
Avoid island shelf assemblies.
 5. Provide anti-roll-off lips on all shelves.
 6. Ideally, shelving assemblies would be of wood construction.
 7. Avoid metal, adjustable shelf supports and clips.
Better to use fixed wooden supports.
 8. Store acids in dedicated acid cabinet. Store nitric Acid in that same cabinet only if isolated from other Acids. Store both inorganic and some organic acids in the acid cabinet.
 9. Store flammables in a dedicated flammables cabinet.
- OTHER STORAGE SUGGESTIONS ARE CONTAINED
THIS CHEMICAL CATALOG/REFERENCE MANUAL.



Store severe poisons in a dedicated poisons cabinet.
Store nitric acid away from other acids unless your acid Cabinet provides a separate compartment for nitric acid.