

Chemical Segregation

Class of Chemicals	Common Chemical Examples	Additional Concerns and Storage Recommendations	Common Incompatible Chemical Types	Possible Reaction if Mixed/Health Concerns
Corrosive Acids-Organic 	- Acetic acid - Butyric acid - Trifluoroacetic acid - Propionic acid - Formic acid - Carbonic acid - Benzoic acid	- Store in ventilated corrosives cabinet on protected shelving using secondary containment, Keep away from incompatible chemicals - Do not store under the sink - Do not store acids on metal shelving - See compatibility chart for storage	- Flammable liquids - Flammable solids - Bases - Oxidizers - Inorganic acids - Cyanides - Sulfides - Poisons/toxins	- Heat - Gas generation - Violent reaction - DO NOT POUR WATER INTO ACID - Causes skin burns - Respiratory distress - Use NIOSH approved gloves, eye protection, face shield and apron
Corrosive Acids-Inorganic 	- Nitric acid - Sulfuric acid - Phosphoric acid - Hydrochloric acid - Hydrofluoric acid	- Store concentrated nitric acid ($\geq 68\%$) and sulfuric acid ($\geq 93\%$) in a secondary container. Store in a corrosive cabinet labeled "Acid" or on shelving using a secondary containment - Do not store under the sink - Do not store acids on metal shelving - Hydrofluoric acid (HF) should only be handled by trained personnel as it requires extra handling precautions. Store in a secondary container. HF is a bone decalcifier.	- Flammable liquids - Flammable solids - Bases - Oxidizers - Organic acids - Cyanides - Sulfides - Poisons/Toxins	- Heat - Gas generation - Violent reaction - DO NOT POUR WATER INTO ACID - Hydrofluoric acid can result in skin irritation and causes burns - Respiratory distress - Use NIOSH approved gloves, eye protection, face shield and apron
Corrosive Bases-Organic / Caustic 	- Hydroxylamine - Tetramethylethylamine - Diamine - Triethylamine - Propylenediamine - Cupriethylenediamine solution - Dicyclohexylamine	Store in separate cabinet preferably with ventilation, corrosive cabinet or storage area with a spill tray, away from potential water sources (DO NOT store under sink)	- Acids - Oxidizers - Flammable liquids/solids - Inorganic bases - Poisons/Toxins - Amines are generally incompatible with isocyanates, halogenated organics, peroxides, acidic phenols, epoxides, anhydrides, and halides	- Heat - Gas generation - Violent reaction - Skin burn and irritation - Respiratory distress - Foul odor - Use NIOSH approved gloves, eye protection, face shield and apron
Corrosive Bases-Inorganic / Caustic 	- Ammonium hydroxide - Potassium hydroxide - Sodium hydroxide - Calcium hydroxide - Sodium hypochlorite solution (bleach) - Magnesium hydroxide	- Store in separate cabinet preferably with ventilation, corrosive cabinet or storage area with a spill tray, away from potential water sources (DO NOT store under the sink) - Store solutions of inorganic hydroxides in labeled polyethylene containers	- Acids - Oxidizers - Flammable liquids - Flammable solids - Organic bases - Poisons/Toxins	- Heat - Gas generation - Violent reaction - Skin burn and irritation - Respiratory distress - Use NIOSH approved gloves, eye protection, face shield and apron
Flammable Solids 	- Paraformaldehyde - Phosphorus - Magnesium - Sulfur - Potassium sulphide - Naphthalene - Camphor	- Keep in a dry, cool area away from oxidizers and corrosives - Follow specific safety procedures - Conduct work on small scale if possible - Keep amounts on - hand to a minimum - Keep away from other flammables	- Acids - Bases - Oxidizers - Poisons/toxins	- Fire hazard - Violent reaction - Generates toxic fumes - Respiratory distress - Keep away from ignition & sparks - Ignites readily, burns fiercely - Use NIOSH approved glove's, eye protection, face shield and apron

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Flammable Liquids 	- Ethanol - Ethyl acetate - Methanol - Acetone - Benzene - Xylene - Toluene - Diethyl ether - Tetrahydrofuran - Acetonitrile - Propanol - Gasoline	- Flammable storage cabinet or refrigerator rated for flammable/ hazardous storage/explosion proof - Peroxide-forming chemicals must be dated upon delivery and opening (two dates) i.e., di-ethyl ether, tetrahydrofuran, furan, methyl butanol, methyl acetylene, heptanol, dioxanes, diglyme - Please consult NIH Chemical Hygiene Plan Peroxide Formers	- Oxidizers - Acids - Bases - Reactive - Poisons/toxins	- Fire hazard - Heat - Violent reaction - Watch for vapor mist - Causes eye and skin irritation - Keep away from ignition or sparks - Use NIOSH approved gloves, eye protection, face shield and apron
Toxic 	- Chloroform - Cyanides - Heavy metal compounds (e.g. Cadmium, Mercury, Osmium, Arsenic, Barium) - Formamide - Phenol - Carbon tetrachloride 2-Mercaptoethanol - Acrylamide - Ethidium bromide - Sodium azide solution	- Store in a dark, dry, ventilated, cool area in an unbreakable chemically resistant secondary container (polyethylene) - Store volatile toxic materials with evaporation rate above 1.0 (ether = 1.0) in flammable cabinet - Store non-volatile Liquid poisons in a refrigerator or cabinet; amounts less than 1 liter can be stored in a cabinet above bench level, ONLY if the cabinet has sliding doors (not swinging) - Sodium azide, must be kept refrigerated	- Flammable Liquids - Acids - Bases - Reactive - Oxidizers - Corrosives	- Generation of toxic and flammable gas - Combustible - Heat - Fire hazard - Explosion hazard - Violent reaction - Chloroform explosively reacts with chemically-reactive metals (e.g., aluminum or magnesium powder, sodium, and lithium), strong oxidizers, strong caustics (e.g., alkalis), and decomposes in sunlight - Some toxins are mutagenic and carcinogenic - Review your SDS before working with toxic material - Use NIOSH approved gloves, eye protection, face shield and apron
Explosives 	- Picric acid (dry) - Ammonium nitrate - Nitro urea - Trinitroaniline - Benzoyl peroxide (dry) - Trinitrobenzene - Trinitrobenzoic acid - Trinitrotoluene - Urea nitrate - Trinitrophenol - Diazoisbutylnitrile - Sodium azide (solid)	- Store in a secure location away from other chemicals; store in an area away from friction or shock - Store Picric acid in cool location or in a hazard rated fridge to prevent explosive crystallization - Storage regulations DO NOT apply to binary explosives until mixed.	- Please consult the SDS - Explosive's must be stored as "STAND ALONE" They must never be stored with any chemicals of any kind	- Explosion hazard - Violent reaction - Heat - Shock sensitive - Regular inspection may be required, to check for deposits or crystallization - Use spark proof tools - Use NIOSH approved gloves, eye protection, face shield and apron
Water Reactive 	- Sodium Metals - Lithium Metals - Potassium Metals - Sodium Borohydride - Alkali Metal Hydrides - Cesium Metal	- Store in a dry, cool area away from potential spray from fire sprinklers and other water sources (DONOT store under the sink) - Label this area for water-reactive storage - Do not store with any other chemicals	- Aqueous solutions - Oxidizers - Please consult the Safety Data Sheet (SDS)	- Heat evolution - Violent reaction when mix with water - Liberates hydrogen gas with water - Reacts violently with water - Use NIOSH approved gloves, eye protection, face shield and apron

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Oxidizers 	- Peroxides - Nitrates - Perchlorates - Permanganates - Sodium hypochlorite (solid) - Potassium dichromate - Chlorates - Chlorites - Chromates - Bromates - Superoxide	- Store in secondary containment separately from combustibles and flammable materials - May explosively decompose on shock, friction, or concussion - May EXPLODE ON HEATING, to form irritating toxic fumes and gases of Benzoic Acid and Carbon Monoxide. Its a strong oxidant and reacts violently with combustible, organic and inorganic acids, and reducing materials, causing fire and explosion hazard. Attacks some forms of plastics, rubber or coatings	- Combustibles - Flammable - Organic materials - Reducing agents	- Fire hazard - Gas generation - Toxic gas - Explosion hazard - Forms irritating toxic fumes - Use NIOSH approved gloves, eye protection, face shield & apron.
Peroxide Formers 	- Acrylonitrile - Iso propyl alcohol - Ethers (e.g. diethyl ether, iso propyl ether) - Acetals and ketals, especially cyclic ethers and those with primary and/or secondary alkyl groups or aldehydes (e.g. acetaldehyde, benzaldehyde) - Vinyl and vinylidene compounds - Dienes - tetrahydrofuran dioxane - Butylated hydroxy toluene (BHT)	- Store in airtight bottles, away from light and heat in a dark, cool dry area; avoid using containers with loose fitting lids and ground glass stoppers; crystallization, discoloration, and formation or deposition of layers are signs a peroxide former may have become shock sensitive. do not use or move such containers - All bottles of peroxide-forming chemicals must have the received date marked on the container; when the bottle is first opened, the container must be marked with the date opened	Always consult the Safety Data Sheet (SDS) .	- Explosion hazard - Violent reaction - Shock sensitive - Combustion (exothermic reaction) - If an old or expired container of a peroxidemay forming chemical or reactive is found, do not move it. - Use proper PPE - Use NIOSH approved gloves, eye protection, face shield and apron
Carcinogens 	- Benzene - Benzadine - Methylene chloride - Carbon tetrachloride - Cadmium & compounds - Arsenic & compounds - Asbestos - Alfatoxins - Beryllium & compounds	- Label all containers as "Cancer Suspect Agents" or the equivalent - Store according to the hazardous nature of the chemical, using appropriate security when necessary	Please consult the specific SDS	- Please consult the specific SDS - Use NIOSH approved gloves, eye protection, face shield, and apron
Flammable Aerosol Cans 	- Pressurized Aerosol cans containing flammable liquid not limited to: - Acetone - Thinner - Toluene - Petroleum Distillates - Butyl Cellusolve - Xylenes - Methanol	- Content under pressure: - Store at room temperatur; or store above 120°F - Do not use near heat, sparks and open flames - Always use secondary containers when storing with other chemicals	- See incompatibles for flammable liquids - Do not store with acids, oxidizers, toxic and reactive chemicals - Use secondary container with flat surfaces for stability	- Read instructions and usage as directed - Review SDS prior to use - Use NIOSH approve gloves or PPE. Rinse skin thoroughly with soap and water - Contact emergency services for severe skin impact or eye exposure - Use fire extinguisher in case of fire or dial 101

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Non-Flammable Corrosive-Toxic Aerosol Cans  	Pressurized aerosol cans NOT containing flammable liquid but not limited to corrosive or toxic carrier: - Ammonia - Sodium hydroxide - Sodium hypochlorite - Amines	Content under pressure: - Store at room temperature - Do not use near heat, sparks and open flames - Always use secondary containers when storing with other chemicals	- See incompatibles for corrosive acid, base and toxic items above - Use secondary container with flat surface for stability	- Read instructions and usage as directed - Review SDS prior to use - Use NIOSH approved gloves or PPE. Rinse skin thoroughly with soap and water - Contact emergency services for severe skin impact or eye exposure - Use fire extinguisher in case of fire or dial 101
Teratogens 	- Tegretol - Aminopterin - Chlorobiphenyls - Coumarins - Tetracycline - Tapazole - Propylthiouracil (PTU)	- Label all containers as "Suspect Reproductive Hazard" or "Reproductive Effector" - Store according to the hazardous nature of the chemical, using appropriate security when necessary	- Aniline is incompatible with nitric acid and hydrogen peroxide - Please consult the specific SDS	- Please consult the specific SDS - Use NIOSH approved gloves, eye protection, face shield, and apron
Toxic Compressed Gases  	- Carbon monoxide - Hydrogen dioxide - Arsenic - Pentafluoride - Boron tribromide - Bromine - Chlorine - Fluorine - Chloropicrin - Cyanogen	- Handle toxic compressed gases in a chemical fume hood - Must be secured in upright position, bonded or chained against the wall - Indoor storage or use of toxic compressed gases shall be provided with a gas cabinet, exhausted enclosure, or gas room - Refer to the SDS information for additional guidance on the storage and compatibility requirements	- Flammable compressed gases - Oxidizing compressed gases - Please consult the specific SDS	- Release of toxic gas - Hydrogen sulfide is a colorless, flammable, extremely hazardous gas with a "rotten egg" smell; - Prolonged exposure may cause nausea, tearing of the eyes, headaches or loss of sleep, or bronchial constriction in some asthma patients - Possible fatigue, loss of appetite, headache, irritability, poor memory, dizziness and slight conjunctivitis - Use NIOSH approved gloves, eye protection, face shield, & apron - Wear safety shoes

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Flammable Compressed Gases  	- Methane - Acetylene - Butane - Propane - Hydrogen - Silane - Ethane - Arsine - Germane	- Handle flammable compressed gases in a chemical fume hood - Store in well-ventilated areas; store away from oxidizers, open flames, sparks, and other sources of heat ignition; post NO SMOKING signs around storage area(s) or entrance(s) to storage room(s); flammable gases stored outdoors where ambient temperatures exceed 125 degrees F (51.7 degrees C) shall be protected from direct sunlight - Must be secured in upright position, bonded or chained against the wall - Use a spark proof wrench to attach regulators and make other connections; install a flame/flash arrestor at the regulator outlet flow valve	- Oxidizers - Toxic compressed gases	- Fire hazard - Explosion hazard - Use NIOSH approved gloves, eye protection, face shield and apron - Wear safety shoes
Oxidizing Compressed Gases  	- Oxygen - Chlorine - Fluorine - Nitrogen oxides - Gas mixtures containing oxygen higher than atmospheric concentrations (above 23%)	- Store oxidizers separately from flammable gas containers or combustible materials; minimum separation requirement from these materials is 20 ft. or a 5 ft. noncombustible barrier with a fire resistance rating of at least 30 minutes - Must be secured in upright position, bonded or chained against the wall - Clean equipment used for Oxygen and Nitrous Oxide with Oxygen compatible materials free from oils, greases and other contaminants - Fluorine shall be handled in specially passivated containers and associated equipment	- Flammable compressed gases - Toxic compressed gases	- Fire hazard - Explosion hazard - Use NIOSH approved gloves, eye protection and apron - Wear safety shoes

