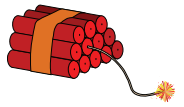
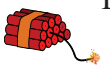
University of Houston Clear Lake

APPENDIX 7: CHEMICAL SEGREGATION & INCOMPATIBILITIES GUIDELINES

Class of Chemical	Examples	Recommended Storage Method	Incompatible Materials	Possible Reaction If Mixed
Corrosive Acids	**Mineral Acids** – Chromic Acid Hydrogen Chloride Hydrochloric Acid Nitric Acid Perchloric Acid Phosphoric Acid Sulfuric Acid	Separate cabinet or storage area away from potential water sources, i.e. under sink	Flammable Liquids Flammable Solids Bases Oxidizers Poisons	Heat Gas Generation Violent Reaction
Corrosive Bases/Caustics	Ammonium Hydroxide Sodium Hydroxide Sodium Bicarbonate	Separate cabinet or storage area away from potential water sources, i.e. under sink	Flammable Liquids Flammable Solids Acids Oxidizers Poisons	Heat Gas Generation Violent Reaction
Explosives	Ammonium Nitrate Nitro Urea, Picric Acid Trinitroaniline Trinitrobenzene Trinitrobenzoic Acid Trinitrotoluene Urea Nitrate	Secure location away from other chemicals	Flammable Liquids Oxidizers Poisons Acids Bases	Explosion Hazard 

Class of Chemical	Examples	Recommended Storage Method	Incompatible Materials	Possible Reaction If Mixed
Flammable Liquids	Acetone Benzene Diethyl Ether Methanol Ethanol Toluene Glacial Acetic Acid	Grounded flammable storage cabinet of flammable storage refrigerator	Acids Bases Oxidizers Poisons	Fire Hazard Heat Violent Reaction
Flammable Solids	Phosphorus Magnesium	Separate dry cool area	Acids Bases Oxidizers Poisons	Fire Hazard Heat Violent Reaction
Oxidizers	Sodium Hypochlorite Benzoyl Peroxide Potassium Permanganate Potassium Chlorate Potassium Dichromate Peroxides Perchlorates Chlorates Nitrates	Spill tray that is separate from flammable and combustible materials	Reducing Agents Flammables Combustibles Corrosives	Fire Hazard Toxic Gas Generation
Poisons	Cyanides Cadmium Mercury Osmium Acrylamide DMSO	Vented, cool, dry area in unbreakable chemically resistant secondary containers	Flammable Liquids Acids Bases Oxidizers Corrosives	Generation of Toxic & Flammable Gas Violent Reaction

Class of Chemical	Examples	Recommended Storage Method	Incompatible Materials	Possible Reaction If Mixed
Water Reactive Chemicals	Sodium Metal Potassium Metal Lithium Metal Lithium Aluminum Hydride	Dry, cool location away from potential spray from fire sprinklers and other water sources, i.e. under sink	Aqueous Solutions Oxidizers	Heat Violent Reaction
Flammable Compressed Gases	Methane Acetylene Propane Hydrogen	Cool, dry area away from oxidizing gases while securely attached to wall or bench	Oxidizing & Toxic Compressed Gases Oxidizing Solids	Fire Hazard Explosion Hazard
Oxidizing Compressed Gases	Oxygen Chlorine Bromine	Cool, dry area away from flammable gases while securely attached to wall or bench	Flammable Gases	Fire Hazard  Explosion Hazard
Poisonous Compressed Gases	Carbon Monoxide Hydrogen Sulfide	Cool, dry area away from flammable gases or liquids while securely attached to wall or bench	Flammable Gases Oxidizing Gases	Release of Toxic Gas Violent Reaction

Partial Incompatibility Listing

Compound/Class	Avoid Storage Near or Contact With:
Acids	
Acetic Acid	Chromic acid, nitric acid, hydroxyl compounds, ethylene, glycogen, perchloric acid, peroxides, permanganate
Hydrofluoric Acid	Ammonia (aqueous or anhydrous), do not store in glass container
Nitric Acid (conc.)	Acetic acid, aniline, chromic acid, acetone, alcohol, or other flammable liquids, hydrocyanic acid, hydrogen sulfide, or other flammable gases, nitratable substances: copper, brass or any heavy metals (or will generate nitrogen dioxide/nitrous fumes) or organic products such as wood and paper
Sulfuric Acid	Light metals (lithium, sodium, potassium), chlorates, perchlorates, permanganates
Bases	
Ammonia	Mercury, chlorine, bromine, iodine, hydrofluoric acid, calcium hypochlorite
Calcium oxide	Water
Alkaline metals	Sodium, potassium, magnesium, calcium, aluminum, carbon dioxide, carbon tetrachloride or other chlorinated hydrocarbons, halogens, water
Bromine	Ammonia, acetylene, butadiene, methane, propane, butane (or other petroleum gases), hydrogen, sodium carbide, turpentine, benzene, finely divided metals
Carbon, activated	Calcium hypochlorite, oxidizing agents
Chlorine	Ammonia, acetylene, butadiene, methane, propane, butane, or other petroleum gases, hydrogen, sodium carbide, turpentine, benzene, finely divided metals
Copper	Acetylene, hydrogen peroxide, nitric acid
Fluorine	Isolate from everything
Iodine	Acetylene, ammonia (aqueous or anhydrous), hydrogen
Mercury	Acetylene, ammonia, fulminic acid (produced in nitric acid ethanol mixtures)
Oxygen	Oils, grease, hydrogen, other flammable gases, liquids, or solids

Bases, continued	
Phosphorous (white)	Air, oxygen, caustic alkalis as reducing agents (or will generate phosphine)
Potassium	Carbon tetrachloride, carbon dioxide, water
Silver	Acetylene, oxalic acid, tartaric acid, fulminic acid (produced in nitric acid-ethanol mixtures), and ammonium compounds
Organics	
Acetone	Concentrated nitric acid and sulfuric acid mixtures
Acetylene	Fluorine, chlorine, bromine, copper, silver, mercury
Aniline	Nitric acid, hydrogen peroxide
Flammable Liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide, halogens
Hydrocarbons (propane, butane, etc.)	Fluoride, chlorine, bromine, chromic acid, sodium peroxide
Nitroparaffins	Inorganic bases, amines
Oxalic Acid	Silver, mercury
Oxidizers	
Chlorates	Ammonia salts, acids, metal powders, sulfur, finely divided organics, or combustible materials
Chromic Acid (trioxide)	Acetic acid, naphthalene, camphor, glycerol, turpentine, alcohol or flammable liquids
Ammonium Nitrate	Acids, metal powders, flammable liquids, chlorates, nitrates, sulfur, finely divided organic or combustible materials
Chlorine Dioxide	Ammonia, methane, phosphine, hydrogen sulfide
Cumene Hydroperoxide	Organic or inorganic acids

Oxidizers, continued	
Hydrogen Peroxide	Copper, chromium, iron, most other metals or salts, alcohols, acetone, or other flammable liquids, aniline, nitromethane, or other organic or combustible materials
Hypochlorites	Acids (will generate chlorine or hypochlorous acid)
Nitrates	Sulfuric acid (will generate nitrogen dioxide)
Perchloric Acid	Acetic acid, bismuth and its alloys, alcohol, paper, wood, grease, oils
Peroxides (Organics)	Organic or inorganic acids, also avoid friction and store cold
Potassium Chlorate	Acids, especially sulfuric acid
Potassium Permanganate	Glycerol, ethylene glycol, benzaldehyde, sulfuric acid
Sodium Peroxide	Any oxidizable substance such as methanol, ethanol, glycerol, ethylene glycol, glacial acetic acid, acetic anhydride, benzaldehyde, furfural, methyl acetate, ethyl acetate, carbon disulfide
Alkaline metals	Sodium, potassium, magnesium, calcium, aluminum, carbon dioxide, carbon tetrachloride or other chlorinated hydrocarbons, halogens, water
Calcium oxide	Water
Cyanides	Acids (will generate hydrogen cyanide)
Phosphorous (white)	Air, oxygen, caustic alkalis as reducing agents (will generate phosphine)
Potassium	Carbon tetrachloride, carbon dioxide, water
Sodium	Carbon tetrachloride, carbon dioxide, water
Sodium Peroxide	Any oxidizable substance such as methanol, ethanol, glycerol, ethylene glycol, glacial acetic acid, acetic anhydride, benzaldehyde, furfural, methyl acetate, ethyl acetate, carbon disulfide
Sulfides	Acids (will generate hydrogen sulfide)

Reducing Agents	
Hydrazine	Hydrogen peroxide, nitric acid, other oxidants
Nitrites	Acids (will generate nitrous fumes)
Sodium Nitrite	Ammonium nitrate and other ammonium salts
Toxics/Poisons	
Arsenicals	Reducing agents (will generate arsine)
Azides	Acids (will generate hydrogen azide)
Cyanides	Acids (will generate hydrogen cyanide)
Hydrocyanic Acid	Nitric Acid, alkalis
Hydrogen Sulfide	Fuming nitric acid, oxidizing gases
Selenides	Reducing agents (will generate hydrogen selenide)
Sulfides	Acids (will generate hydrogen sulfide)
Tellurides	Reducing agents (will generate hydrogen telluride)