

## Appendix H

### SPECIFIC CHEMICAL INCOMPATIBILITIES

Chemical	Is Incompatible With
Acetic Acid	Chromic acid, nitric acid, peroxides, permanganates
Acetic anhydride	Hydroxyl-containing compounds such as ethylene glycol, perchloric acid
Acetone	Concentrated nitric and sulfuric acid mixtures, hydrogen peroxide
Acetylene	Chlorine, bromine, copper, fluorine, silver, mercury
Alkali and alkaline earth metals, such as sodium, potassium, lithium, magnesium, calcium, powdered aluminum	Carbon dioxide, carbon tetrachloride, other chlorinated hydrocarbons (also prohibit the use of water, foam, and dry chemical extinguishers on fires involving these metals-dry sand should be employed.
Ammonia, anhydrous	Mercury, chlorine, calcium hypochlorite, iodine, bromine, hydrofluoric acid (anhydrous)
Ammonium nitrate	Acids, metal powders, flammable liquids, chlorates, nitrates, sulfur, finely divided organic or combustible materials
Aniline	Nitric acid, hydrogen peroxide
Bromine	Ammonia, acetylene, butadiene, butane, methane, propane, (or other petroleum gases), hydrogen, sodium carbide, turpentine, benzene, finely divided metals
Calcium Oxide	Water, acids
Carbon, activated	Calcium hypochlorite, all oxidizing agents
Chlorates	Ammonium salts, acids, metal powders, sulfur, finely divided organic or combustible materials
Chromic acid and chromium trioxide	Acetic acid, naphthalene, camphor, glycerol, turpentine, alcohol, flammable liquids in general
Chlorine	Ammonia, acetylene, butadiene, butane, other petroleum gases, hydrogen, sodium carbide, turpentine, benzene, finely divided metals
Chlorine dioxide	Ammonia, methane, phosphine, hydrogen sulfide

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Chemical	Is Incompatible With
Copper	Acetylene, hydrogen peroxide
Cyanides, inorganic	Acids, strong bases
Dimethylsulfoxide	Iodine pentafluoride, periodic acid, potassium permanganate, acid chlorides, silver fluoride, and other strong oxidizing agents such as magnesium perchlorate and perchloric acid
Fluorine	Isolate from everything
Hydrazine	Hydrogen peroxide, nitric acid, any other oxidant
Hydrocarbons (butane, propane, benzene, gasoline, turpentine, etc.)	Fluorine, chlorine, bromine, chromic acid, peroxides
Hydrocyanic Acid	Nitric acid, alkalis
Hydrofluoric Acid, anhydrous	Ammonia, aqueous or anhydrous
Hydrogen peroxide	Copper, chromium, iron, most metals or their salts, aniline, nitromethane, flammable liquids, combustible materials
Hydrogen sulfide	Fuming nitric acid, oxidizing gases
Iodine	Acetylene, ammonia (aqueous or anhydrous)
Mercury and its amalgams	Acetylene, fulminic acid*, ammonia
Nitric acid (concentrated)	Acetic acid, acetone, alcohol, aniline, chromic acid, hydrocyanic acid, hydrogen sulfide, flammable liquids, flammable gases, nitratable substances
Nitroparaffins	Inorganic bases, amines
Organic acyl halides	Bases Organic hydroxy and amino compounds

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Chemical	Is Incompatible With
Organic anhydrides	Bases Organic hydroxy and amino compounds
Organic halogen compounds	Group IA and IIA metals Aluminum
Organic nitro compounds	Strong bases
Oxalic acid	Silver, mercury and their salts
Oxygen	Oils, grease, hydrogen, flammable liquids, solids or gases
Perchloric acid	Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, grease, oils (all organics)
Peroxides, organic	Acids, (organic or mineral) avoid friction, store cold
Phosphorus (white)	Air, oxygen, alkalis, oxidizing agents
Phosphorus pentoxide	Alcohols, strong bases, water
Potassium	Carbon tetrachloride, carbon dioxide, water and other halogenated hydrocarbons
Potassium chlorate	Ammonium salts, acids, metal powders, sulfur, finely divided organic or combustible materials, sulfuric and other acids
Potassium perchlorate	Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, grease, oils (all organics), sulfuric and other acids
Potassium permanganate	Hydrogen peroxide, oxidizable substances, nitric acid, ethylene glycol, benzaldehyde, sulfuric acid, glycerol
Selenides	Reducing agents, e.g. active metals: zinc
Silver and silver salts	Acetylene, oxalic acid, tartaric acid, ammonium compounds, fulminic acid
Sodium	Water, carbon dioxide, halogens, halogenated organic compounds, oxidizing agents, acids, halogenating agents carbon tetrachloride, and other halogenated hydrocarbons

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Chemical	Is Incompatible With
Sodium peroxide	Ethyl or methyl alcohol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerin, ethylene glycol, ethyl acetate, methyl acetate, furfural, any oxidizable substance
Sodium nitrite	Any oxidizable substance, such as ethanol, methanol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerol, ethylene glycol, ethyl acetate, methyl acetate, furfural, ammonium nitrate and other ammonium salts
Sulfides, inorganic	Acids
Sulfuric acid	Potassium chlorate, potassium perchlorate, potassium permanganate (or compounds with similar light metals, such as sodium, lithium) bases, perchlorates, water, chlorates, permanganates
Tellurides	Reducing agents, e.g. sodium, magnesium, hydrogen, zinc  *produced in nitric acid-ethanol mixtures

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#### Reference

The above list is a compilation from various sources, some of which are unknown. However, a large number were referenced in the NATIONAL ACADEMY PRESS -- Prudent Practices for Disposal of Chemicals from Laboratories. Washington, D.C.: National Academy Press, 1995, and Hazards in the Chemical Laboratory, 4th edition, L. Bretherick, Ed. (1986).

## Appendix I

### SHOCK-SENSITIVE COMPOUNDS

**Acetylenic compounds** - especially polyacetylenes, haloacetylenes and heavy metal salts of acetylenes (copper, silver and mercury salts are particularly sensitive)

**Acyl nitrates**

**Alkyl nitrates** - particularly polyol nitrates (i.e. nitrocellulose and nitroglycerine)

**Alkyl and acyl nitrites**

**Alkyl perchlorates**

**Amminemetal oxosalts** - metal compounds with coordinated ammonia, hydrazine or similar nitrogenous donors and ionic perchlorate, nitrate, permanganate or other oxidizing groups

**Azides** - including metal, nonmetal and organic azides

**Chlorite salts of metals** (i.e.  $\text{AgClO}_2$  and  $\text{Hg}(\text{ClO}_2)_2$ )

**Diazo compounds** (i.e.  $\text{CH}_2\text{N}_2$ )

**Diazonium salts** (when dry)

**Fulminates** - silver fulminate ( $\text{AgCNO}$ ) can form in the reaction mixture from the Tollens' test for aldehydes if it is allowed to stand for some time; this can be prevented by adding dilute nitric acid to the test mixture as soon as the test has been completed

**Hydrogen peroxide** - becomes increasingly treacherous as the concentration rises above 30 percent, forming explosive mixtures with organic materials and decomposing violently in the presence of traces of transition metals

**N-Halogen compounds** (i.e. difluoroamino compounds and halogen azides)

**N-Nitro compounds** (i.e. *N*-nitromethylamine, nitrourea, nitroguanidine and nitric amide)

**Oxo salts of nitrogenous bases** - perchlorates, dichromates, nitrates, iodates, chlorites, chlorates and permanganates of ammonia, amines, hydroxylamine, guanidine, etc.

**Perchlorate salts** - most metal, nonmetal and amine perchlorates can be detonated and may undergo violent reaction in contact with combustible materials

**Peroxides and hydroperoxides**

**Peroxides (solid)** - crystallized from or are left from evaporation of peroxidizable solvents

## Appendix I

### SHOCK-SENSITIVE COMPOUNDS

**Peroxides** - transition-metal salts

**Picrates** - especially salts of transition and heavy metals (i.e. Ni, Pb, Hg, Cu and Zn); picric acid is explosive but is less sensitive to shock or friction than its metal salts and is relatively safe as a water-wet paste

**Polynitroalkyl compounds** (i.e. tetranitromethane and dinitroacetonitrile)

**Polynitroaromatic compounds** - especially polynitro hydrocarbons, phenols and amines

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#### Reference

National Academy Press. *Prudent Practices for Disposal of Chemicals from Laboratories*. Washington, D.C.: National Academy Press, 1983.