## Incompatible Chemicals from Prudent Practices in the Laboratory: Handling and Disposal of Chemicals

<table>
<thead>
<tr>
<th>Chemicals</th>
<th>Incompatibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic acid</td>
<td>Chromic acid, nitric acid, peroxides, permanganates</td>
</tr>
<tr>
<td>Acetic anhydride</td>
<td>Hydroxyl-containing compounds such as ethylene glycol, perchloric acid</td>
</tr>
<tr>
<td>Acetone</td>
<td>Concentrated nitric and sulfuric acid mixtures, hydrogen peroxide</td>
</tr>
<tr>
<td>Acetylene</td>
<td>Chlorine, bromine, copper, silver, fluorine, mercury</td>
</tr>
<tr>
<td>Alkali and alkaline earth metals, such as sodium, potassium, lithium, magnesium, calcium, powdered aluminum</td>
<td>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)</td>
</tr>
<tr>
<td>Ammonia (anhydrous)</td>
<td>Mercury, chlorine, calcium hypochlorite, iodine, bromine, hydrogen fluoride</td>
</tr>
<tr>
<td>Ammonium nitrate</td>
<td>Acids, metal powders, flammable liquids, chlorates, nitrites, sulfur, finely divided organics, combustibles</td>
</tr>
<tr>
<td>Aniline</td>
<td>Nitric acid, hydrogen peroxide</td>
</tr>
<tr>
<td>Bromine</td>
<td>Ammonia, acetylene, butadiene, butane, other petroleum gases, sodium carbide, turpentine, benzene, finely divided metals</td>
</tr>
<tr>
<td>Calcium oxide</td>
<td>Water</td>
</tr>
<tr>
<td>Carbon, activated</td>
<td>Calcium hypochlorite, other oxidants</td>
</tr>
<tr>
<td>Chlorates</td>
<td>Ammonium salts, acids, metal powders, sulfur, finely divided organics, combustibles</td>
</tr>
<tr>
<td>Chromic acid and chromium trioxide</td>
<td>Acetic acid, naphthalene, camphor, glycerol, turpentine, alcohol, other flammable liquids</td>
</tr>
<tr>
<td>Chlorine</td>
<td>Ammonia, acetylene, butadiene, butane, other petroleum gases, hydrogen, sodium carbide, turpentine, benzene, finely divided metals</td>
</tr>
<tr>
<td>Chlorine dioxide</td>
<td>Ammonia, methane, phosphine, hydrogen sulfide</td>
</tr>
<tr>
<td>Copper</td>
<td>Acetylene, hydrogen peroxide</td>
</tr>
<tr>
<td>Dimethyl sulfoxide (DMSO)</td>
<td>Active halogenated compounds (i.e. acyl chlorides) and active metal hydrides</td>
</tr>
<tr>
<td>Fluorine</td>
<td>Isolate from everything</td>
</tr>
<tr>
<td>Hydrazine</td>
<td>Hydrogen peroxide, nitric acid, any other oxidant</td>
</tr>
<tr>
<td>Hydrocarbons (benzene, butane, propane, gasoline, turpentine, etc.)</td>
<td>Fluorine, chlorine, bromine, chromic acid, peroxides</td>
</tr>
<tr>
<td>Hydrocyanic acid</td>
<td>Nitric acid, alkalis</td>
</tr>
<tr>
<td>Hydrofluoric acid (anhydrous)</td>
<td>Ammonia (aqueous or anhydrous) Hydrogen fluoride</td>
</tr>
<tr>
<td>Hydrogen peroxide</td>
<td>Copper, chromium, iron, most metals or their salts, any flammable liquid, combustible materials, aniline, nitromethane</td>
</tr>
<tr>
<td>Hydrogen sulfide</td>
<td>Fuming nitric acid, oxidizing gases</td>
</tr>
<tr>
<td>Iodine</td>
<td>Acetylene, ammonia (anhydrous or aqueous)</td>
</tr>
<tr>
<td>Mercury</td>
<td>Acetylene, fulminic acid, ammonia</td>
</tr>
<tr>
<td>Nitric acid (concentrated)</td>
<td>Acetic acid, acetone, alcohol, aniline, chromic acid, hydrocyanic acid, hydrogen sulfide, flammable liquids, flammable gases, nitratable substances</td>
</tr>
<tr>
<td><strong>Chemicals</strong></td>
<td><strong>Incompatibilities</strong></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Nitroparaffins</td>
<td>Inorganic bases, amines</td>
</tr>
<tr>
<td>Oxalic acid</td>
<td>Silver and mercury and their salts</td>
</tr>
<tr>
<td>Oxygen</td>
<td>Oils, grease, hydrogen, flammable liquids, solids, gases</td>
</tr>
<tr>
<td>Perchloric acid</td>
<td>Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, grease, oils (all organics)</td>
</tr>
<tr>
<td>Permanganates</td>
<td>Sulfuric acid</td>
</tr>
<tr>
<td>Peroxides, inorganic</td>
<td>When mixed with combustible materials, barium, sodium, and potassium peroxides for explosives that ignite easily.</td>
</tr>
<tr>
<td>Peroxides, organic</td>
<td>Acids (organic or mineral), (also avoid friction, store cold)</td>
</tr>
<tr>
<td>Phosphorus (white)</td>
<td>Air, oxygen</td>
</tr>
<tr>
<td>Phosphorus (white and red)</td>
<td>Forms explosive mixtures with oxidizing agents</td>
</tr>
<tr>
<td>Phosphorus pentoxide</td>
<td>Alcohols, strong bases, water</td>
</tr>
<tr>
<td>Potassium chlorate</td>
<td>Acids (see also chlorates)</td>
</tr>
<tr>
<td>Potassium perchlorate</td>
<td>Acids (see also perchloric acid)</td>
</tr>
<tr>
<td>Potassium permanganate</td>
<td>Glycerol, ethylene glycol, benzoaldehyde, sulfuric acid</td>
</tr>
<tr>
<td>Silver and silver salts</td>
<td>Acetylene, oxalic acid, tartaric acid, fulminic acid, ammonium compounds</td>
</tr>
<tr>
<td>Sodium</td>
<td>See alkali metals (above)</td>
</tr>
<tr>
<td>Sodium Amide</td>
<td>Air</td>
</tr>
<tr>
<td>Sodium nitrite</td>
<td>Ammonium nitrate and other ammonium salts</td>
</tr>
<tr>
<td>Sodium peroxide</td>
<td>Any oxidizable substance, such as ethanol, methanol, glacial acetic acid, acetic anhydride, benzoaldehyde, carbon disulfide, glycerol, ethylene glycol, ethyl acetate, methyl acetate, furfural</td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>Chlorates, perchlorates, permanganates</td>
</tr>
</tbody>
</table>

Table 3.9 from Prudent Practices in the Laboratory: Handling and Disposal of Chemicals.

*Note: Some of the items on this table were added from section 5.G.6.

The on-line version of this book can be located at http://www.nap.edu/books/0309052297/html

*Note: This table is not intended to be exhaustive lists.
<table>
<thead>
<tr>
<th>A (incompatible with)</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkali and alkaline earths</td>
<td></td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>Water</td>
</tr>
<tr>
<td>Hydrides</td>
<td>Acids</td>
</tr>
<tr>
<td>Hydroxides</td>
<td>Halogenated organic compounds</td>
</tr>
<tr>
<td>Metals</td>
<td>Halogenating agents</td>
</tr>
<tr>
<td>Oxides</td>
<td>Oxidizing agents</td>
</tr>
<tr>
<td>Peroxides</td>
<td></td>
</tr>
<tr>
<td>Azides, inorganic</td>
<td>Acids</td>
</tr>
<tr>
<td></td>
<td>Heavy metals and their salts</td>
</tr>
<tr>
<td></td>
<td>Oxidizing agents</td>
</tr>
<tr>
<td>Cyanides, inorganic</td>
<td>Acids</td>
</tr>
<tr>
<td></td>
<td>Strong bases</td>
</tr>
<tr>
<td>Nitrates, inorganic</td>
<td>Acids</td>
</tr>
<tr>
<td></td>
<td>Reducing agents</td>
</tr>
<tr>
<td>Nitrites, inorganic</td>
<td>Acids</td>
</tr>
<tr>
<td></td>
<td>Oxidizing agents</td>
</tr>
<tr>
<td>Organic compounds</td>
<td>Oxidizing agents</td>
</tr>
<tr>
<td>Organic acyl halides</td>
<td>Bases</td>
</tr>
<tr>
<td></td>
<td>Organic hydroxy and amino compounds</td>
</tr>
<tr>
<td>Organic anhydrides</td>
<td>Bases</td>
</tr>
<tr>
<td></td>
<td>Organic hydroxy and amino compounds</td>
</tr>
<tr>
<td>Organic halogen compounds</td>
<td>Group IA and IIA metals</td>
</tr>
<tr>
<td></td>
<td>Aluminium</td>
</tr>
<tr>
<td>Organic nitro compounds</td>
<td>Strong bases</td>
</tr>
<tr>
<td>Oxidizing agents</td>
<td>Reducing agents</td>
</tr>
<tr>
<td>Chlorates</td>
<td>Ammonia, anhydrous and aqueous</td>
</tr>
<tr>
<td>Chromates</td>
<td>Carbon</td>
</tr>
<tr>
<td>Chromium trioxide</td>
<td>Metals</td>
</tr>
<tr>
<td>Dichromates</td>
<td>Metal hydrides</td>
</tr>
<tr>
<td>Halogens</td>
<td>Nitrates</td>
</tr>
<tr>
<td>Halogenating agents</td>
<td>Hydrogen peroxide</td>
</tr>
<tr>
<td></td>
<td>Organic compounds</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>Phosphorus</td>
</tr>
<tr>
<td>Nitrates</td>
<td>Silicon</td>
</tr>
<tr>
<td>Perchlorates</td>
<td>Sulfur</td>
</tr>
<tr>
<td>Peroxides</td>
<td></td>
</tr>
<tr>
<td>Persulfates</td>
<td></td>
</tr>
<tr>
<td>Reducing agents</td>
<td>Oxidizing agents</td>
</tr>
<tr>
<td>Arsenates</td>
<td>Aqueous</td>
</tr>
<tr>
<td>Arsenites</td>
<td>Phosphorus</td>
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<tr>
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<td>Selenites</td>
</tr>
<tr>
<td>Selenium</td>
<td>Selenates</td>
</tr>
<tr>
<td>Tellurium salts and oxides</td>
<td></td>
</tr>
</tbody>
</table>

*The examples of oxidizing and reducing agents are illustrative of common laboratory chemicals; they are not intended to be exhaustive.*