Tables of Incompatibilities

Table 1. Strong Oxidizer-Reducer Incompatibilities

(Chemical Safety and Disposal Guide, University of Wisconsin-Madison Safety Department)

When combined, strong oxidizers and reducers can result in a violent reaction. Therefore, contact between these chemicals must be avoided.

OXIDIZERS	REDUCERS
Benzoyl peroxide Bromine Chloramides Chlorimides Hydrogen peroxide solutions Metal peroxides (i.e. sodium, barium, zinc) NBS (N-bromosuccinimide) NCS (N-chlorosuccinimide) Osmium tetraoxide **Salts and Solutions of:** Bromates Bromites Chlorates Chlorites Chromates Dichromates Hypochlorites Iodates Manganates Nitrates Nitrites Percarbonates Perchlorates Periodates Permanganates Persulfates Selenates Vanadates	**Group I metals:** Cs, K, Li, Na, Rb and some of these salts **Group II metals:** Be, Mg, Ca powder, and some salts of these metals, including Grignard reagents, Ba and Sr **Transition metals:** Co, Cr, Fe, Mn, Ni, and V carbonyls Al, Fe, Ni, Zn powders **Catalysts:** Pd, Pt, Rh, and Ru **Others:** Alkenes Alkynes Amines Anilines Carbon powder Hydrazine Hydroxylamine Indoles Phenols Pyrroles Mercaptans Phosphines Phosphorous (any color) Hydrides Sulfides Silicone hydrides Sodium dithionite or hydrosulfite **Solid Salts and solution of:** Hypophosphites Phosphites Sulfites Sulfides Thiocyanates Thiosulfates Cyanides Sulfur powder

Table 2. Toxic Gas Generation

(Chemical Safety and Disposal Guide, University of Wisconsin-Madison Safety Department)

Toxic gases can be produced when certain chemicals are mixed together, whether in a spill or breakage in a package. The following table represents the production of these gases with respect to the chemicals used to produce them.

COMPOUND	MIXED WITH	PRODUCES
Ammonium Salts	Strong Base	Ammonia
Azide Salts	Strong Acid	Hydrazoic Acid
Bromide Salts	Strong Acid	Hydrogen Bromide
Bromide Salts	Strong Oxidizer	Bromine Vapor
Bromites and Bromates	Strong Acid	Bromine & Bromine Oxides
Chloride Salts	Strong Acid	Hydrogen Chloride
Chloride Salts	Strong Oxidizer	Chlorine Gas
Chlorite or Chlorate Salts	Strong Acid	Chlorine and Chlorine Oxides
Cyanide Salts	Any Acid	Hydrogen Cyanide
Ferrocyanide or Ferrocyanide Salts	Strong Acid	Hydrogen Cyanide
Fluoride Salts	Strong Acid	Hydrogen Fluoride
Hypochlorite Salts	Any Acid	Chlorine
Iodide Salts	Strong Acid	Hydrogen Iodide
Methyl, Nitroso Amides (Diazald)	Any Base	Diazomethane
Nitrite Salts	Strong Acid	Nitric Oxides
Sulfide or Bisulfide Salts	Any Acid	Hydrogen Sulfide
Sulfite or Bisulfite Salts	Any Acid	Sulfur Dioxide

Table 3. Water or Moist Air Incompatibilities

(Chemical Safety and Disposal Guide, University of Wisconsin-Madison Safety Department)

Certain chemicals used in laboratories have the potential to react with water. Therefore such chemicals should not be kept in damp areas or in places where they might accidentally contact water, such as under sinks.

Immediate Violent Reaction with Water
Aluminum chloride, anhydrous
Boron tribromide
Chlorosulfonic acid
Diketene
Fuming sulfuric acid (Oleum)
Magnesium chloride, anhydrous
Methyl fluorosulfonate
Oxalyl chloride
Phosphorus pentachloride
Phosphorus pentoxide
Silicon tetrachloride
Titanium tetrachloride
Triethyl oxonium hexafluorophosphate
Trifluoroacetic anhydride
Trimethyl oxonium hexafluorophosphate
Trifluoromethane sulfonic anhydride

Reaction with Water that Slowly Accelerates to Violence
Acetyl chloride
Alkyl isocyanates
Chloroformate esters
Methane sulfonyl chloride
Phosphorus tribromide
Phosphorus trichloride

Reaction with Water that Slowly Accelerates to Violence
Sulfur mono-, di-, and tetra-chlorides
Sulfur trioxide
Sulfuryl chloride
Thionyl chloride
Thiophosphoryl chloride

Produces Chlorine Spontaneously
Sulfuryl chloride
Phosphorus pentachloride

Produces Chlorine Due to Water Absorption
Calcium hypochlorite

Produces Chlorine Due to Carbon Dioxide Absorption
Calcium hypochlorite
Sodium hypochlorite solution
Methyl ethyl ketone peroxide in dimethyl
Dimethyl phtalate
Hydrogen peroxide solution
Pyruvie acid
Trichloromethyl carbonate

Immediate Violent Reaction with Water & Ignition in Air as a Result of Reaction
Calcium carbide
Group 1A, 2A, 3A alkyls, amides, hydrides and nitrides
Lithium aluminum hydride
(lithium tetrahidridoaluminate)
NaK (sodium-potassium alloy)
Potassium metal
Sodium metal

Absorption of Atmospheric Water Causes Heat &/or Pressure Build-up
Alkyl chloroformates
Calcium chloride, anhydrous
Chloroacetone
Chloroacetaldehyde

Absorption of Atmospheric Water Causes Slow Hydrogen Chloride Release
Arsenic, antimony, and bismuth trichloride
Dichlorodimethyl silane
Silicon, titanium, vanadium, germanium,
And tin tetrachloride, anhydrous
Toluenesulfonyl chloride

Absorption of Atmospheric Water is Continually diluting salt
Antimony trichloride
Ferric perchlorate
Mercuric nitrate
Sodium sulfide, nonanhydrate
Trichloroacetic acid
Zinc Chloride

Self-Pressurizing:
Chloroformate esters
Chromic acid (spent)
Diethyl pyrocarbonate
Formic acid
Methyl formate