Supplement 1. Safe Handling of Hazardous Substances

Appendix 3-3 Ignition / Explosion Risk Caused by Blending

[Safety Guidelines for Chemical Experiments, 4th Edition] by the Chemical Society of Japan, Maruzen (1999)

This table has been classified and structured according to the chemical structure based on the NFPA's (National Fire Protection Association) "Manual of Hazardous Chemical Reaction 491M (1975)," in which examples of accident cases and hazardous reaction cases involving chemical substances blending have been compiled.

1. Oxidizing Substance & Flammable Substance	
1) Oxidizing Substance	2) Flammable Substance
a) oxo-halogen acid salt perchlorate, chlorate, bromate, iodate, chlorite, hypochlorite, etc.	a) non-metal elemental substance phosphorus, sulfur, activated carbon, etc.
b) metallic peroxide, hydrogen peroxide metallic peroxide: potassium peroxide, calcium peroxide, etc.	b) metal magnesium, zinc, aluminum, etc.
c) permanganate potassium permanganate, etc.	c) sulfide phosphorus sulfide, antimony sulfide, carbon bisulfide, etc.
d) nichrome acid salt dichromate potassium, etc.	d) hydride silane, phosphine, dibrane, arsine, etc.
e) nitrate salt potassium nitrate, sodium nitrate, ammonium nitrate, etc.	e) carbide calcium carbide
f) nitric acid, fuming nitric acid	f) organic substance hydrocarbon, alcohol, ketone, organic acid, amine, etc.
g) nitric acid, fuming nitric acid, chlorosulfuric acid	g) other metal amid, cyanide, hydroxylamine, etc.
h) chrome oxide (III)	
i) perchloric acid j) peroxodisulfuric acid	

k) chlorine oxide, chlorine dioxide, chlorine monoxide	
l) nitrogen dioxide (nitrogen tetroxide)	
m) halogen fluorine, chlorine, bromine, iodine, chlorine trifluoride, bromine trifluoride, iodine trifluoride, chlorine pentafluoride, bromine pentafluoride, iodine pentafluoride	
n) halogenation nitrogen nitrogen trifluoride, nitrogen trichloride, nitrogen tribromide, nitrogen triiodide	
2. Hydrogen Peroxide & Metallic Oxide	**3. Persulfate & Manganese**
metallic oxide managanese dioxide, mercuric oxide	
4. Halogen & Azide	**5. Halogen & Amine**
Halogen fluorine, chlorine, bromine, iodine, etc.	Halogen fluorine, chlorine, bromine, iodine, chlorine trifluoride, bromine trifluoride, iodine trifluoride, chlorine pentafluoride, bromine pentafluoride, iodine pentafluoride, etc.
Azide sodium azide, silver azide, etc.	Amine ammonia, hydrazine, hydroxylamine, etc
6. Ammonia & Metal	**7. Sodium Azide & Metal**
Metal mercury, gold, silver compound, etc.	Metal copper, zinc, lead, silver, etc.
8. Organohalide & Metal	**9. Acetylene & Metal**
Metal alkali metal, magnesium, barium, aluminum, etc.	Metal mercury, silver, copper, cobalt, etc.
10. Substances that ignite (or explode) by mixed touch with strong acid	
a) acid-base oxo-halogen perchlorate, chlorate, bromate, iodate, chlorite, hypochlorite, etc.	b) permanganate potassium permanganate
c) organic peroxide dibenzoyl peroxide	d) nitrosamine DPT, etc.