Safety Fact Sheet - Incompatible Chemicals

1. Why do we need to keep different chemicals separated (from each other)?

   Some chemicals should not be mixed together. In fact, these chemicals should not even be stored near each other on the chance that an accident could occur and the chemicals could react. Be sure to keep incompatibilities in mind when reusing containers to store other chemicals.

2. Why these chemicals are dangerous when mixed or stored together?

   This is because some seeming harmless chemicals will react with each other to produce very hazardous gases, may lead to fire and explosion or even cause serious environmental issues.

3. How do I know what chemicals are incompatible?

   Such information is available from the Safety Data Sheet (SDS) provided by the manufacturer or supplier. That is one reason why the vendor is required by law to provide you the SDS.

Section	Description
7	Handling and Storage
9	Physical and Chemical Properties
10	Stability and Reactivity
13	Disposal Consideration

4. How else can I get information guides on chemical incompatibility for storage and transportation?

   Each chemical during storage should be in such a manner that will not cause spillage. The container should be of sound construction.

Incompatibilities by Hazard Class

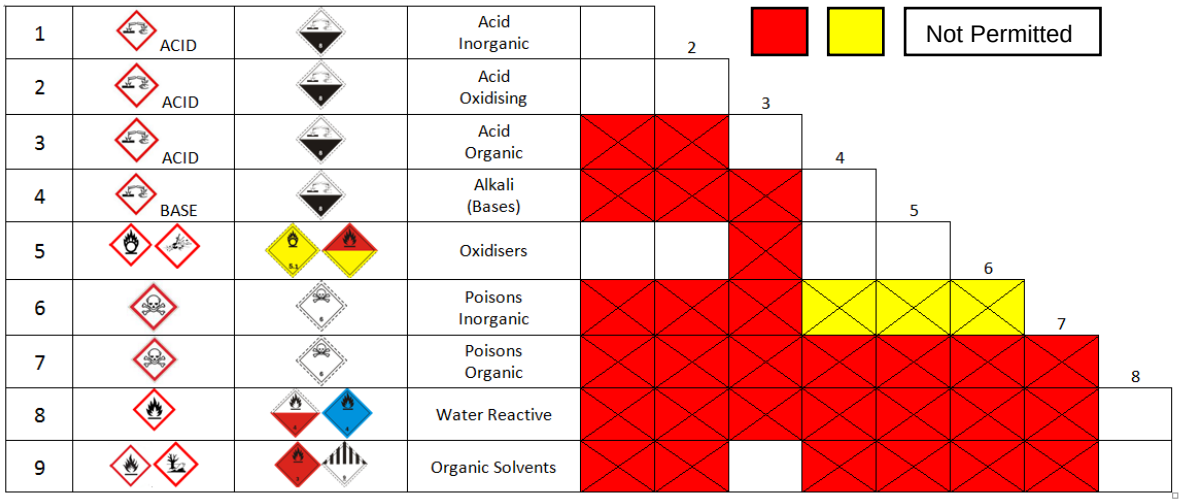

Figure 1

As a guide, Figure 1 can be used to determine if two packages of chemicals can be stored within the same location. The table use hazard class as a means of storage guideline.

5. How would I know if two chemicals can be disposed of into a single waste package?

For that, US EPA (United States Environment Protection Agency has produced a chart to check if the chemicals are likely to be problematic:

No.	Reactivity Group Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	101	102	103	104	105	106	107
1	Acids, Mineral, Non-oxidizing	1																																								
2	Acids, Mineral, Oxidizing		2																																							
3	Acids, Organic		G H	3																																						
4	Alcohols and Glycols	H	H F	H P	4																																					
5	Aldehydes	H P	H F	H P		5																																				
6	Amides	H	H GT				6																																			
7	Amines, Aliphatic and Aromatic	H	H GT	H		H		7																																		
8	Azo Compounds, Diazo Compounds and Hydrazines	H G	H GT	H G	H G	H			8																																	
9	Carbamates	H G	H GT						G H	9																																
10	Caustics	H	H	H		H				H G	10																															
11	Cyanides	GT GF	GT GF	GT GF					G			11																														
12	Dithiocarbamates	H,F GF	H,F GF	H,GT GF		GF GT		U	H G				12																													
13	Esters	H	H F						H G		H			13																												
14	Ethers	H	H F												14																											
15	Fluorides, Inorganic	GT	GT	GT												15																										
16	Hydrocarbons, Aromatic		H F														16																									
17	Halogenated Organics	H GT	H,F GT					H GT	H G		H GF	H						17																								
18	Isocyanates	H G	H,F GT	H G	H P			H P	H G		H,P G	H G	U						18																							
19	Ketones	H	H F						H G		H	H								19																						
20	Mercaptans and Other Organic Sulfides	GT GF	H,F GT						H G									H	H	H	20																					
21	Metals, Alkali and Alkaline Earth, Elemental	H,F GF	H,F GF	H,F GF	H,F GF	H,F GF	GF H	GF H	GF H	GF H	GF H	GF H	GF,H GT	GF H				H E	GF H	GF H	GF H	21																				
22	Metals, Other Elemental & Alloys as Powders, Vapors, or Sponges	H,F GF	H,F GF	G F					H,F GT	U	GF H							H E	GF H		H,F GF		22																			
23	Metals, Other Elemental & Alloys as Sheets, Rods, Drops, etc.	H,F GF	H,F GF						H,F G									H F						23																		
24	Metals and Metal Compounds, Toxic	S	S	S			S	S			S														24																	
25	Nitrides	GF HF	H,F E	H GF	H,E GF	GF H			U	H G	U	GF H	GF H	GF H				GF H	U	GF H	GF H	E				25																
26	Nitriles	H,GT GF	H,F GT	H							U											H P			S	GF H	26															
27	Nitro Compounds, Organic		H,F GT			H					H E											H,E GF				H,E GF		27														
28	Hydrocarbons, Aliphatic, Unsaturated	H	H F			H																	H E						28													
29	Hydrocarbons, Aliphatic, Saturated		H F																											29												
30	Peroxides and Hydroperoxides, Organic	H G	H E		H F	H G		H GT	H,F E	H,F GT		H,E GT	H,F GT					H E	H	E	H,F GT	H E	H G		H G	H,E GF	H,F GT		H P	,	30											
31	Phenols and Cresols	H	H F						H G										H P			GF H				GF H					H	31										
32	Organophosphates, Phosphothioates, Phosphodithioates	H GT	H GT						U		H E											H									U		32									
33	Sulfides, Inorganic	GT GF	HF GF	GT		H			E										H												H GT			33									
34	Epoxides	H P	H P	H P	H P	U		H P	H P		H P	H P	U								H P	H P	H P		H P	H P					H P	H P	U	H P	34							
101	Combustible and Flammable Materials, Miscellaneous	H G	H,F GT																			H,F G				H,F GF					H,F GT					101						
102	Explosives	H E	H E	H E					H E		H E			H E								H E	H E	H E	E	E					H E	H E		H E	H E	H E	102					
103	Polymerizable Compounds	P H	P H	P H					P H		P H	P H	U									P H	P H	P H	P H	P H					P H	P H		P H			H E	103				
104	Oxidizing Agents, Strong	H GT		H GT	H F	H F	H,F GT	H,F GT	H E	H,F GT		H,E GT	H,F GT	H F	H F		H F	H GT	H,F GT	H F	H,F GT	H,F E	H,F E	H F		H,F E	H,F GT	H E	H F	H F	H G	H F	H,F GT	H,F GT	H,F G	H E	H,F GT		104		
105	Reducing Agents, Strong	H GF	H,F GT	H GF	H,F GF	H,F GF	H,F GF	H G				H GT	H F				H,F E	H E	H GF	H GF	H GF						H GF	H E			H E	H GF	H,GT GF		H	H GF	H E	H,P GF	H,F E		105		
106	Water and Mixtures Containing Water	H	H						G										H G			H GF	H GF		P	H GF								GT GF							GF GT	106	
107	Water Reactive Substances	←——EXTREMELY REACTIVE!!!! DO NOT MIX WITH ANY CHEMICAL OR WASTE MATERIAL!!!! EXTREMELY REACTIVE!!!!——→																																								107
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	101	102	103	104	105	106	107

Legend

Code	Consequences
H	Heat Generation
F	Fire
G	Innocuous and non-flammable gas generation
GT	Toxic Gas formation
GF	Flammable Gas formation
E	Explosion
P	Violent Polymerization
S	Solubilization of toxic substance
U	May be hazardous, but Unknown

IF you are not sure of two chemicals which are to be disposed of, please refer to your supervisor or PI.

Refer to Annex 1

Note: All of us have the responsibility of disposing waste properly so as not to cause harm to our colleagues in the lab and also the waste disposal workers.

Annex 1- How to use the EPA's Chemical Compatibility Chart

Example 1

Step 1 - Select the 2 chemicals to be mixed

#	Reactivity Group Name
7	Amines, Aliphatic and Aromatic
17	Halogenated Organics

CODE	CONSEQUENCE
H	Heat Generation
F	Fire
G	Innocuous and non-flammable gas generation
GT	Toxic Gas formation
GF	Flammable Gas formation
E	Explosion
P	Violent Polymerization
S	Solubilization of toxic substance
U	May be hazardous, but Unknown

Step 2 - Locate the intersection point

7	Amines, Aliphatic and Aromatic	H	H GT	H		H		7								
8	Azo Compounds, Diazo Compounds and Hydrazines	H G	H GT	H G	H G	H			8							
9	Carbamates	H G	H GT						G H	9						
10	Caustics	H	H	H		H				H G	10					
11	Cyanides	GT GF	GT GF	GT GF					G			11				
12	Dithiocarbamates	H,F GF	H,F GF	H,GT GF		GF GT		U	H G				12			
13	Esters	H	H F						H G		H			13		
14	Ethers	H	H F												14	
15	Fluorides, Inorganic	GT	GT	GT												15
16	Hydrocarbons, Aromatic		H F													16
17	Halogenated Organics	H GT	H,F GT					H GT	H G		H GF	H				

Step 3 - From the intersection point, **"H"** and **"GT"** are seen

Conclusion: Mixing Amines/Aliphatic/Aromatic with Halogenated Organics generates heat and toxic gas formation.

NOT ACCEPTABLE

Example 2

Step 1 - Select the 2 chemicals to be mixed

#	Reactivity Group Name
28	Hydrocarbons, Aliphatic, Unsaturated
31	Phenols and Cresols

CODE	CONSEQUENCE
H	Heat Generation
F	Fire
G	Innocuous and non-flammable gas generation
GT	Toxic Gas formation
GF	Flammable Gas formation
E	Explosion
P	Violent Polymerization
S	Solubilization of toxic substance
U	May be hazardous, but Unknown

Step 2 - Locate the intersection point

27	Nitro Compounds, Organic		H,F GT			H					H E											H,E GF				H,E GF		27				
28	Hydrocarbons, Aliphatic, Unsaturated	H	H F			H																	H E						28			
29	Hydrocarbons, Aliphatic, Saturated		H F																											29		
30	Peroxides and Hydroperoxides, Organic	H G	H E		H F	H G		H GT	H,F E	H,F GT		H,E GT	H,F GT					H E	H	E	H,F GT	H E	H G		H G	H,E GF	H,P GT		H P		30	
31	Phenols and Cresols	H	H F						H G										H P			GF H				GF H					H	31

Step 3 - From the intersection point, it shows a blank space

Conclusion: Mixing Hydrocarbons/Aliphatic/unsaturated with Phenols and Cresols does not produce any known reaction.

ACCEPTABLE