GUIDELINE

Rowan University
ENVIRONMENTAL HEALTH & SAFETY

Chemical Compatibility for Waste Accumulation

Chemical compatibility is an important factor to take into consideration when collecting laboratory waste for disposal. Any chemicals added to a waste container must not react with one another or result in unsafe conditions at any time during handling, storage, or while being shipped to a disposal facility. There are several ways to evaluate chemicals to determine whether they are acceptable to add to a common waste container or whether they should be collected separately. No single method is fool-proof, and professional knowledge of chemical properties must be used when making the final decision on safety/compatibility. Laboratory Safety may also be consulted at any time for additional assistance with managing chemical waste.

Methods for assessing chemical compatibility:

Software Tools:

The CAMEO Chemicals Database of Hazardous Materials developed by the NOAA, is tool that can help you evaluate chemicals to see if they might react when mixed. It is available as a free web-based application and as an app for mobile devices. The program allows you to look up specific chemicals as well as reactive groups, add them to a virtual inventory, and predict potential reactivity.

Important Note: There are limitations to this program. Compatibility predictions are all made under the following specific scenario: 2 chemicals (in approximately equal proportions) mixed thoroughly under ambient conditions (i.e., 1 atmosphere of pressure and temperatures of 75-120°F [24-49°C]) and with no catalytic impurities. The table in the Appendix of this guide lists the chemical groupings utilized when making compatibility predictions with this tool.

SDS Section 10: Stability & Reactivity Data:

Safety Data Sheets (SDSs) for hazardous chemicals generally provide details in Section 10 that describe incompatible chemicals and some potential consequences if mixed. The information provided can sometimes be limited to only the most severe compatibility issues and may not sufficiently describe all potential hazards.

SDS Section 14: Transportation Data:

Section 14 of an SDS contains the Shipping Name and Hazard Class of the chemical which can potentially be helpful when trying to determine chemical compatibility. Look for chemicals that share the same Shipping Name and/or Primary Hazard Class Number. This can be helpful when creating coarse compatibility groupings for initial disposal planning. Further investigation still needs to be performed using the previously mentioned methods.

Common Compatibility Warning Signs:

Any of the following conditions potentially indicates that one or more chemicals are reacting and/or not compatible with the container material. Do not continue adding waste to a container experiencing any of these conditions:

- Pressure buildup in a closed waste container.
- Liberation of heat during/after adding waste to a container.
- Emission of unexpected odors.
- Waste containers that develop leaks or evidence of corrosion.
- Development of crystals or other physical changes after adding waste.

Contact Laboratory Safety if you believe to have any compatibility issues with the contents of a waste container. Assistance will be provided on how to best manage the container.

Reducing Waste Disposal Cost:

Limiting the number of individual waste containers in the laboratory is a good practice, however there are some benefits with keeping certain types of chemical waste in separate containers. Combining wastes with different characteristics in a container can generate mixtures that require specialized treatment methods at the disposal facility. Where possible, it is often best to collect wastes with different hazardous properties in separate containers.

Unless creating such mixtures are a direct product of the research, avoid the following practices:

- **Avoid disposing of water or aqueous wastes in the same container as flammable solvent wastes.**
    - Flammable solvent wastes are often repurposed/recycled as industrial fuels. Water and other non-flammable chemical contents drive down the BTU value of the waste preventing it from being utilized in this beneficial and cost-effective disposal method.
- **Avoid disposing of acutely toxic (P-Listed) chemicals with other wastes.**
    - A mostly aqueous waste for example can typically undergo simple treatment at a disposal facility. The presence of any quantity of an acutely toxic substance makes the entire volume of waste acutely toxic, requiring more complex treatment or incineration which is substantially more expensive.

The following disposal practices are prohibited for all wastes:

- **Never dispose of Acid, Base, or other corrosive chemicals in metal containers.**
    - Metal containers corrode and will develop leaks in storage. Leaking chemical containers are dangerous to the people handling them and must be repacked increasing cost.
- **Never add a waste to a container without listing it on the waste label even if it is a very small quantity. This practice is dangerous and can violate Federal/State laws.**
    - Disposal facilities test samples of waste prior to treatment. The University is charged additional fees for any waste found to not be as described.

Please contact Laboratory Safety at 856-256-5105 or LabSafety@Rowan.edu with any questions related to chemical compatibility of waste.

Appendix

Chemical Reactive/Functional Groups		
The categories in this chart contain chemical groups that typically react in similar ways. The CAMEO Chemicals software utilizes these groups when predicting reactivity. More information on each group along with prediction methodology can be found on the Reactive Groups section of the website.		
Acids		
Acids, Carboxylic	Acids, Strong Non-oxidizing	Acids, Strong Oxidizing
Acids, Weak	Acrylates and Acrylic Acids	Salts, Acidic
Bases		
Amines, Aromatic	Amines, Phosphines, and Pyridines	Bases, Strong
Bases, Weak	Carbonate Salts	Metal Hydrides, Metal Alkyls, Metal Aryls, and Silanes
Salts, Basic		
Boron Compounds		
Esters, Sulfate Esters, Phosphate Esters, Thiophosphate Esters, and Borate Esters		
Carbon Compounds		
Acyl Halides, Sulfonyl Halides, and Chloroformates	Alkynes, with Acetylenic Hydrogen	Alkynes, with No Acetylenic Hydrogen
Conjugated Dienes	Hydrocarbons, Aliphatic Saturated	Hydrocarbons, Aliphatic Unsaturated
Hydrocarbons, Aromatic	Nitrides, Phosphides, Carbides, and Silicides	
Halogen Compounds		
Acyl Halides, Sulfonyl Halides, and Chloroformates	Aryl Halides	Chlorosilanes
Fluoride Salts, Soluble	Fluorinated Organic Compounds	Halogenated Organic Compounds
Halogenating Agents		
Metals/Neutral Salts		
Carbonate Salts	Diazonium Salts	Metal Hydrides, Metal Alkyls, Metal Aryls, and Silanes
Metals, Alkali, Very Active	Metals, Elemental and Powder, Active	Metals, Less Reactive
Non-Redox-Active Inorganic Compounds	Organometallics	Phenolic Salts
Nitrogen Compounds		
Amides and Imides	Amines, Aromatic	Amines, Phosphines, and Pyridines
Azo, Diazo, Azido, Hydrazine, and Azide Compounds	Carbamates	Cyanides, Inorganic
Diazonium Salts	Isocyanates and Isothiocyanates	Nitrate and Nitrite Compounds, Inorganic
Nitrides, Phosphides, Carbides, and Silicides	Nitriles	Nitro, Nitroso, Nitrate, and Nitrite Compounds, Organic
Oximes	Quaternary Ammonium and Phosphonium Salts	Thiocarbamate Esters and Salts/Dithiocarbamate Esters and Salts
Oxidizing Agents		
Acids, Strong Oxidizing	Nitrate and Nitrite Compounds, Inorganic	Nitro, Nitroso, Nitrate, and Nitrite Compounds, Organic
Oxidizing Agents, Strong	Oxidizing Agents, Weak	Peroxides, Organic

Chemical Reactive/Functional Groups (Continued)		
Oxygen Compounds		
Acetals, Ketals, Hemiacetals, and Hemiketals	Acrylates and Acrylic Acids	Alcohols and Polyols
Aldehydes	Anhydrides	Carbamates
Carbonate Salts	Epoxides	Esters, Sulfate Esters, Phosphate Esters, Thiophosphate Esters, and Borate Esters
Ethers	Isocyanates and Isothiocyanates	Ketones
Oximes	Peroxides, Organic	Phenolic Salts
Phenols and Cresols	Thiocarbamate Esters and Salts/Dithiocarbamate Esters and Salts	
Phosphorus Compounds		
Amines, Phosphines, and Pyridines	Esters, Sulfate Esters, Phosphate Esters, Thiophosphate Esters, and Borate Esters	Nitrides, Phosphides, Carbides, and Silicides
Quaternary Ammonium and Phosphonium Salts	Sulfonates, Phosphonates, and Thiophosphonates, Organic	
Reducing Agents		
Azo, Diazo, Azido, Hydrazine, and Azide Compounds	Metal Hydrides, Metal Alkyls, Metal Aryls, and Silanes	Metals, Alkali, Very Active
Metals, Elemental and Powder, Active	Nitrides, Phosphides, Carbides, and Silicides	Organometallics
Reducing Agents, Strong	Reducing Agents, Weak	Sulfides, Inorganic
Sulfides, Organic	Sulfite and Thiosulfate Salts	
Silicon Compounds		
Chlorosilanes	Nitrides, Phosphides, Carbides, and Silicides	Siloxanes
Sulfur Compounds		
Esters, Sulfate Esters, Phosphate Esters, Thiophosphate Esters, and Borate Esters	Isocyanates and Isothiocyanates	Sulfides, Inorganic
Sulfides, Organic	Sulfite and Thiosulfate Salts	Sulfonates, Phosphonates, and Thiophosphonates, Organic
Thiocarbamate Esters and Salts/Dithiocarbamate Esters and Salts		
Other		
Insufficient Information for Classification	Not Chemically Reactive	Polymerizable Compounds
Water and Aqueous Solutions		