

Chemical Waste Segregation Guideline

Introduction

The proper segregation of chemical wastes ensures these items can be disposed of in a safe and environmentally responsible manner.

General Rules for the Handling and Disposal of Chemical Wastes

When generating and disposing of wastes, use the following guidelines:

1. SEGREGATE chemical wastes based on the flowchart on page 2 of this guideline.
2. LABEL all waste containers with the following information
 - a. Contents
 - i. Write the full name of the chemical, percentages and/or concentration
 - ii. Short forms can be included, but not solely used
 - b. Approximate concentration of each component
 - c. Name of the generator
 - d. Lab location and extension

* when labelling containers with a UW label, remember to cover or deface the original label if any*...
3. ENSURE the containers you use are compatible with the wastes you put in them. A Chemical Compatibility guidance document can be accessed by opening this [link](#).
4. CLEAN containers are accepted at waste pick-ups. Bottles or containers with residues on the outside will not be accepted.



Figure 1: Examples of contaminated and non-contaminated waste container.

5. ONLY fill containers to 70 - 80% of the volume. This leaves room for expansion.



Figure 2: Example of the maximum fill level for liquids in a waste bottle.

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Waste Segregation

The flowchart below outlines how waste can be properly segregated.

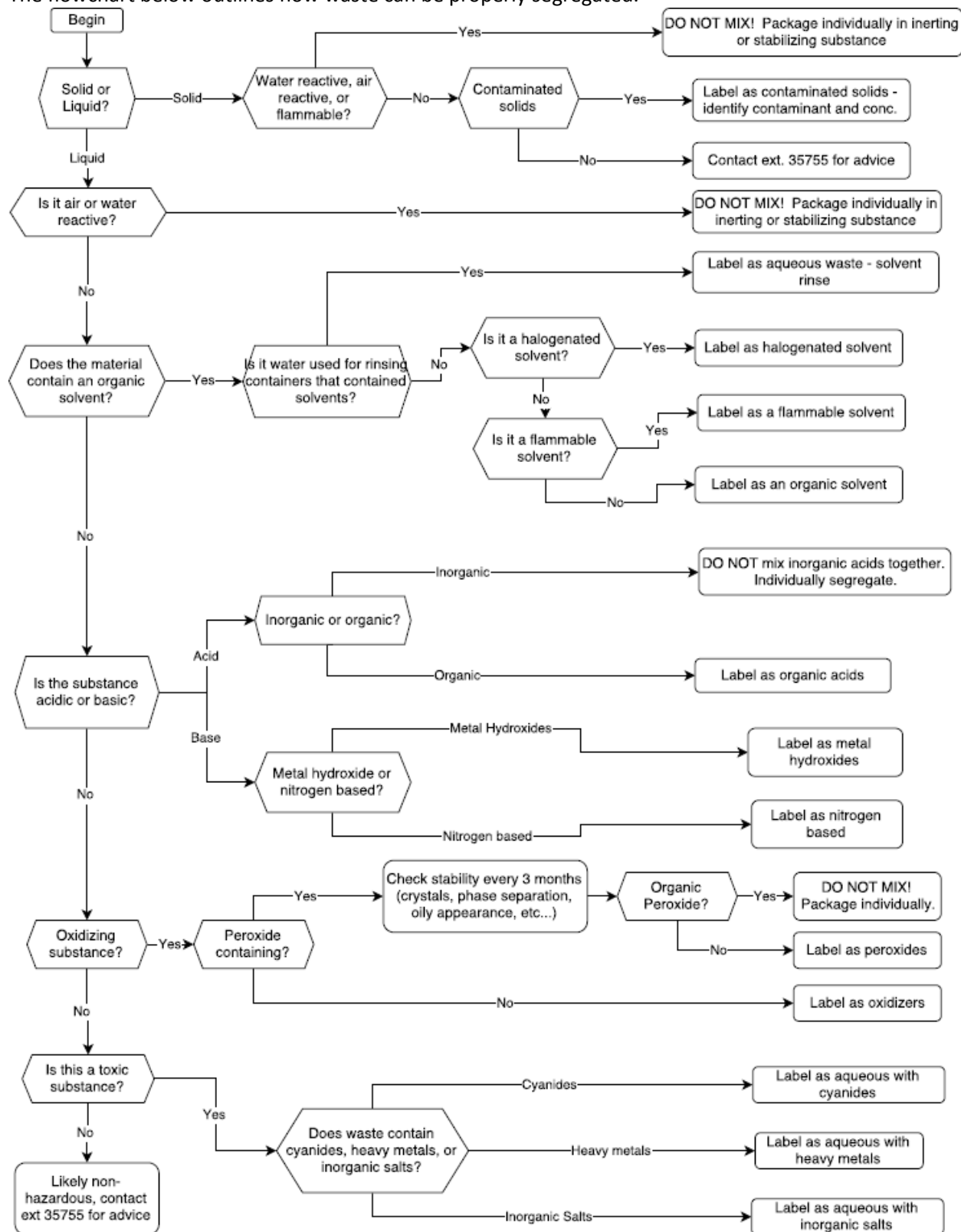


Figure 3: Flowchart summarizing the waste segregation guidelines for chemical wastes.

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Flowchart details

The tables below compliment Figure 3. It provides examples and descriptions for most of the wastes described on the flowchart in Figure 3.

Hazardous Wastes

Solvents:

Waste	Description	Examples
Non-Halogenated Solvents	Non-halogenated solvents mixed with less than 20% water.	<ul style="list-style-type: none"> • Acetone • Alcohol • Hexane • THF • Acetonitrile
Halogenated solvents	Halogenated solvents mixed with less than 20% water.	<ul style="list-style-type: none"> • Perchloroethylene • Methylene chloride

Sample Vials

Waste	Description	Examples
Non-halogenated	Organic compounds dissolved in non-halogenated solvents. Specify solvent and class of compound.	<ul style="list-style-type: none"> • Petroleum samples dissolved in toluene
Halogenated	Organic compounds dissolved in halogenated solvents. Specify solvent and class of compound.	<ul style="list-style-type: none"> • Pesticide samples dissolved in methylene chloride
Aqueous waste	Inorganic compounds dissolved in water. Specify class of compound.	
Solid	Organic compounds used for testing.	<ul style="list-style-type: none"> • Organic lab samples

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Aqueous Waste

Waste	Description	Examples
Water contaminated with non-halogenated solvents	Non-halogenated solvents mixed with more than 20% water.	<ul style="list-style-type: none"> Groundwater contaminated with xylene
Water contaminated with halogenated solvents	Halogenated solvents mixed with more than 20% water.	<ul style="list-style-type: none"> Groundwater contaminated with chloroform
Heavy metals	Heavy metals dissolved in water. Specify pH.	<ul style="list-style-type: none"> Solutions containing arsenic
Inorganic salts	Inorganic salts dissolved in water.	<ul style="list-style-type: none"> Ferric chloride Sodium sulfate solutions
Cyanides	Solutions of cyanide compounds.	<ul style="list-style-type: none"> Potassium ferrocyanide
Organic material	A material primarily consisting of carbon and hydrogen	<ul style="list-style-type: none"> Ethidium bromide

Oxidizing Liquids and Peroxides

Waste	Description	Examples
Oxidizing liquids	Substances that readily release oxygen or another oxidizing substance (chlorine, bromine, or fluorine).	<ul style="list-style-type: none"> Potassium nitrate Hydrogen peroxide Potassium permanganate Bleach Ozone
Peroxides	<p>Many peroxides are unstable and can easily degrade violently. Organic Peroxides are much more dangerous than Inorganic Peroxides.</p> <p>Before peroxides are used, specific training should be provided on how they should be disposed.</p>	<ul style="list-style-type: none"> Inorganic peroxides (hydrogen peroxide, Manganese peroxide, sodium peroxide) Organic peroxides (MEK peroxide and diacyl peroxides)

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Acids

Waste	Description	Examples
Mineral acids (Inorganic acids)	Note: Be aware of what acids can be mixed. <i>Piranha solutions</i> (sulfuric acid/peroxide mix) as well as <i>aqua regia</i> (nitric acid/hydrochloric acid mix) are highly aggressive, off-gassing solutions. These cannot be brought to the ESF and need to be neutralized in house. They should be diluted (usually 20x) before being neutralized. Note, some inorganic acids can also be oxidizers.	<ul style="list-style-type: none"> Hydrochloric acid Nitric acid Sulfuric acid Perchloric acid
Organic acids	Organic acids are acids that contain a carbon-hydrogen backbone.	<ul style="list-style-type: none"> Formic acid Acetic acid Propionic acid

Bases

Waste	Description	Examples
Metal hydroxides	Solutions or powders of metals linked to hydroxides	<ul style="list-style-type: none"> Sodium hydroxide Potassium hydroxide
Nitrogen based bases	Generally these are considered organic bases, and these tend to be weak.	<ul style="list-style-type: none"> Methyl amine Pyridine

Nanomaterials:

Waste	Description	Examples
Nanomaterials	Carbon nanotubes, metals (gold, titanium, silver, etc...), and others. Double bagged and placed into a plastic container that has a bag in it. Label with full nanomaterial name.	<ul style="list-style-type: none"> Carbon nanotubes Metal powders (gold, titanium, silver, etc...) Graphene
Nanomaterial contaminated liquids	Solvents or aqueous solutions containing nanomaterials should be drained into a jug and labelled. Example – Gold nanoparticles (10 nm) in acetone.	<ul style="list-style-type: none"> Non-halogenated solvents (acetone) containing carbon nano-tubes, graphene, etc... Metal powders (gold, titanium, silver, etc...)
Nanomaterial contaminated items	Material that is contaminated with carbon nano-tubes should be double-bagged and properly labelled.	<ul style="list-style-type: none"> Pipettes and gloves contaminated with nanoparticles (CNTs, metals, etc...)

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Air and Water Reactives

<i>Waste</i>	<i>Description</i>	<i>Examples</i>
Air Reactive	Material that produces flammable gases when mixed with air.	<ul style="list-style-type: none"> • Alkyl metals • Phosphorous
Water Reactive	Material that produces flammable gases when mixed with water.	<ul style="list-style-type: none"> • Sodium • Lithium

Metals

<i>Waste</i>	<i>Description</i>	<i>Examples</i>
Metals	The smaller the particle size, the greater the hazard.	<ul style="list-style-type: none"> • Mercury (very toxic!) • Arsenic • Lead • Silver • Gold • Titanium

Contaminated Solids Wastes

<i>Waste</i>	<i>Description</i>	<i>Examples</i>
Contaminated with organic compounds	Solid material contaminated with organic compounds.	<ul style="list-style-type: none"> • Filter paper or alumina contaminated with solvents • Ethidium bromide gels
Contaminated with inorganic compounds	Solid material contaminated with inorganic compounds.	<ul style="list-style-type: none"> • Filter paper contaminated with sodium sulfate

Other

<i>Waste</i>	<i>Description</i>	<i>Examples</i>
Silica	Silica only with minimal amounts of sand, no filter paper, or resins.	<ul style="list-style-type: none"> • Alumina contaminated with acetone
Monomers, resins, etc...	Unlinked monomers.	<ul style="list-style-type: none"> • Epoxy resin

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Packaging Instructions

1. Do not mix waste. Use a separate container for each waste.
2. All material must be placed in appropriated container (container material will not be degraded by contents).
3. The following containers are available without charge from the Environmental Safety Facility (ESF):
 - a. 20 L plastic drum (halogenated organic solvents)
 - b. 20 L plastic drum (aqueous liquids)
 - c. 20 L plastic drum (aqueous liquids)
 - d. 4 L glass bottles
 - e. 4 L plastic jugs
 - f. Pump oil waste container – please ask for it at ESF if you need one!
 - g. Smaller bottles too (100 mL, 250 mL, 500 mL, 1 L, 2.5L, etc...)
4. Container must be sealed (leaking containers will not be accepted).
5. Containers are to be labeled University of Waterloo (UW) waste label (available from ESF) and contents listed.
6. Liquids containers should be only 70 - 80 % full.
7. Store waste bottle in a secure area (not on floor).
8. Unknown substances will be accepted (an account number is required for classification of the unknown).

