

Standard Operating Procedure- Laboratory Waste Disposal (Chemistry)

compiled by: Chemistry Department Sustainability Committee

Overview-

- *NEW* Glove recycling
- Hard plastic and transparent glass chemical containers
- Amber glass chemical containers
- Uncontaminated soft plastics
- Styrofoam
- Contaminated laboratory solid waste
- Broken/ contaminated glass waste
- Halogenated organic solvent waste
- Silica solid waste
- Oil waste
- Aqueous waste
- Battery recycling
- Sharps
- Cleaning solutions
- Safety considerations

If you are unsure how a waste material should be disposed of contact Environmental Services Facility (ESF) at (604)822-6306 or Monica Clarkson chemsafe@chem.ubc.ca or (604)827-5216.

It is crucial that our laboratory waste be disposed of appropriately not only to lower the cost of disposal but also to ensure that our research does not negatively impact the environment to a greater extent than is necessary.

Operational procedures-

Note: for non-contaminated and not recyclable solid waste the garbage cans at the doorways can be used. These are removed by janitorial staff.

Glove Recycling

Gloves that have not been contaminated with hazardous/biohazardous materials can be collected and recycled-- this means any gloves you would normally dispose of in the general waste can instead be collected. Labs can collect their own gloves and deposit in the recycling bin located in Chemistry Stores. Any glove material can be recycled. For more information about the glove recycling program see the poster and link below:

Disposable Glove Recycling Program

Please only place accepted gloves in the recycling bin

ACCEPTED

- All brands of gloves
- All types of gloves that are latex, nitrile or vinyl
- Non-hazardous

NOT ACCEPTED

- Contaminated
- Biohazardous
- Contains blood or sharps

Glove Recycling Pallet can be found in the shipping & receiving area of Chemistry Stores.



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For more information:
sustain.ubc.ca/green-labs
green.labs@ubc.ca

Hard plastic and transparent glass chemical containers:

Hard plastics and transparent glass can be disposed of with other recyclables. For chemical containers, the container must be cleaned and labels must be removed or defaced before collecting in plastics and glass recycling bins.

Amber glass chemical containers:

A new amber glass recycling program has been introduced in the chemistry department (as of 2022). The recycling bins for amber glass can be found at the Chemistry Stores loading dock. The guidelines for recycling amber glass are as follows:



Amber Glass Recycling

Must be:	Accepted:	Not Accepted:	
 Empty	 Amber Glass containers 50ml-4L	 Risk 1 or risk 2 biohazardous materials	 Toxic or corrosive materials
 Clean and dry	 Amber glass from organic solvents <i>(under fume hood for 24 hrs)</i>	 Clear or non-amber glass	 Broken glass
 Label and cap removed	 Contained non-hazardous substances	 Containers smaller than 50mL or larger than 4L	 Containers with labels or caps

For more information:
sustain.ubc.ca/greenlabs
green.labs@ubc.ca

UBC sustainability

Figure 1: the guidelines for recycling amber glass containers in the chemistry department

Non-contaminated soft plastics recycling:

The chemistry department has a soft plastics recycling program. Non-contaminated soft plastics that can be stretched can be collected in a clear garbage bag and recycled in the “Soft plastics” bin in the loading dock of Chemistry Stores.

Styrofoam recycling:

The chemistry department has a styrofoam recycling program. Styrofoam can be collected in a clear garbage bag and recycled at the loading dock of Chemistry Stores.

Prepared by: The UBC Chem Sustainability Committee

Latest review date: February 8th 2023

Contaminated solid waste:

Contaminated solid waste is to be collected in the plastic and/or metal pails

- Ensure there is no contaminated glassware or liquids collected in these pails.
- Ensure that the silica waste never exceeds ½ full
- Double bag the waste before bringing to disposal site
- Affix a **Non-regulated Contaminated Solid Waste** tag (see below) indicating type of waste and attaching group barcode sticker
- Bags should not exceed 10 kg

NON-REGULATED CONTAMINATED SOLID WASTE
The University of British Columbia, Environmental Services Facility

Parcel Identification No:

NON-REGULATED CONTAMINATED SOLID WASTE

Parcel Identification No:

GENERATOR TO COMPLETE THIS SECTION ONLY

AFFIX IDENTIFICATION BARCODE LABEL HERE

WASTE CONTENT

- Solid waste contaminated with Cytotoxics
- Solid waste contaminated with Ethidium Bromide
- Silica Gel

Other _____

Office use only:

UBC
Environmental Services Facility (ESF)
Phone 604.822.1285

Figure 2: solid waste disposal tag

Contaminated solid waste is disposed of in the cages (Cage #2) directly behind the d-wing building.

Organic solvent waste:


Non-halogenated waste may not contain any halogens even at low concentration

- Ensure that organic solvent waste is not contaminated with aqueous waste, inorganic chemicals, oil, stir bars, etc.
- Collect only in 5 or 20 L Jerry cans
- Affix a group barcode onto a **Flammable Liquid Disposal** tag (see below), identify species in waste if possible and attach to the waste can


Organic solvent waste is disposed of in the cages (Cage #2) directly behind the d-wing building.

FLAMMABLE LIQUID DISPOSAL TAG
The University of British Columbia, Environmental Services Facility


Parcel Identification No: S071900001



FLAMMABLE LIQUID DISPOSAL TAG



Parcel Identification No: S071900001



GENERATOR TO COMPLETE THIS SECTION ONLY


AFFIX IDENTIFICATION BARCODE LABEL HERE

WASTE CONTENT (Please ✓ and quantify components >10%)
Do **NOT** include acidic, basic or aqueous solutions, or solids such as sludge, grit, glass, plastic, paper, or inorganic chemicals, etc.

NON-HALOGENATED	
<input type="checkbox"/> Alcohols _____%	<input type="checkbox"/> Ketones _____%
<input type="checkbox"/> Aldehydes _____%	<input type="checkbox"/> Thinners _____%
<input type="checkbox"/> Aliphatics _____%	<input type="checkbox"/> Oil (non-PCB) _____%
<input type="checkbox"/> Aromatics _____%	<input type="checkbox"/> HALOGENATED
<input type="checkbox"/> Amines _____%	<input type="checkbox"/> Carbon Tet. _____%
<input type="checkbox"/> Scintillation Cocktail _____%	<input type="checkbox"/> Chloroform _____%
<input type="checkbox"/> Esters _____%	<input type="checkbox"/> TCE _____%
<input type="checkbox"/> Ethers _____%	<input type="checkbox"/> Freons _____%
Other _____%	

NOTE: Contents in this container may be recycled or reused.

Office use only:
Quantity _____ 5L _____ 20L _____ 205L



Environmental Services Facility (ESF)
Phone 604.822.1285

Figure 3: flammable liquid disposal tag

Glass waste:

- Use cut-proof gloves when handling glass waste
- Dispose of broken glassware into a double bagged metal bin found at every fumehood throughout the lab
 - Ensure broken glass waste bins never exceed $\frac{3}{4}$ full, tie bag closed, affix with label, including room number and research group's name, and bring to broken glass waste disposal area in the metal bin (do not try to remove from the bin to bring to disposal site)
 - Leave bin containing glass waste at disposal site
 - Take empty bins from room if available
 - If there are no empty bins, please notify chemsafe@chem.ubc.ca.
 - Never dispose of needles or other sharps in glass waste
- Disposal site for glass waste bins is D136A.

Oil waste:

Collect oil in either original container or designated clean 4-5L clear plastic containers

Affix a group barcode onto the **Flammable Liquid Disposal** tag and indicate "Oil (non-PCB)"—under "other" include type of waste oil (eg. Vacuum pump oil).

Oil waste is disposed of in the cages (Cage #2) directly behind the d-wing building.

Battery disposal:

Household, non-rechargeable batteries are recycled via Call2Recycle. These can be brought to Chemistry Stores (B170) or the Chemistry Main Office (D223, see picture below) where they will be accumulated for recycling.



Figure 4: photo of the battery recycling box in the chemistry main office.

For larger batteries, rechargeable batteries and uninterruptible power supplies they must be appropriately labelled with battery type (indicate whether they contain sodium), name of waste generator, quantity and location of pickup.

Call ESF to request pickup (604)827-5389 for larger batteries.

Sharps:

Collect sharps in the red or yellow puncture-resistant containers (can be purchased from Chemistry Stores- B170)

- Do not fill past $\frac{3}{4}$ full (fill line is indicated on container)
- Securely close lid when filled and bring whole container to disposal site
- Tag container with **Biological Waste Disposal** tag with group barcode sticker attached
 - Indicate if potentially contaminated with cytotoxic materials



The image shows a 'Biological Waste Disposal' tag form. At the top, it says 'BIOLOGICAL WASTE DISPOSAL' and 'The University of British Columbia Environmental Services Facility'. Below this is a red biohazard symbol. The form is divided into sections: 'GENERATOR TO COMPLETE THIS SECTION ONLY' and 'WASTE CONTENT'. The 'WASTE CONTENT' section has two columns of checkboxes for various waste types: 'Sharps (Needles, Syringes, etc.)', 'Sharps (Surgical Instruments, etc.)', 'Blood, Plasma, Serum, etc.', 'Tissue, Organ, etc.', 'Organ, etc.', 'Plant Material, etc.', 'Microorganisms (Bacteria, Fungi, etc.)', 'Cytotoxic Materials', 'Other (Specify):', 'Other (Specify):', 'Other (Specify):', 'Other (Specify):', 'Other (Specify):', 'Other (Specify):'. There are also fields for 'Date', 'Weight (kg)', and 'Volume (L)'. At the bottom, it says 'Environmental Services Facility (ESF) Phone: 604-681-5281'.

Figure 5: sharps/ biohazardous disposal tag

Sharps waste is disposed of in the cages (Cage #2) directly behind the d-wing building.

Aqueous waste:

Small amounts of non-hazardous aqueous waste can be disposed of via sanitary sewer (i.e. down the drain).


Acid, bases and bleach-



- Neutralize before pouring down the sink with excess water
 - Appropriate neutralizing agents include sodium bicarbonate, sodium carbonate, citric acid and other non-toxic neutralizing agents

Toxic aqueous waste-

Obtain a **Toxic Waste disposal** tag and affix group's barcode sticker.

TOXIC WASTE
The University of British Columbia, Environmental Services Facility

Parcel Identification No: T071900001


 TOXIC WASTE
T071900001
Parcel Identification No: 

GENERATOR TO COMPLETE THIS SECTION ONLY

AFFIX IDENTIFICATION BARCODE LABEL HERE

WASTE CONTENT

Toxic Liquid

Toxic Solid

Other

Office use only:
Quantity kg 5L 20L 205L


 Environmental Services Facility (ESF)
Phone 604.822.1285

Figure 6: toxic aqueous waste disposal tag

If unsure whether your aqueous waste is suitable for sink disposal, fill out an aqueous waste profile (online, link: <https://riskmanagement.sites.olt.ubc.ca/files/2019/08/Aqueous-Waste-Disposal.pdf>) to allow environmental services to determine appropriate disposal method.

Additionally, if you have a high volume of aqueous waste contact environmental services to determine if it is suitable for disposal via sink disposal.

Cleaning solutions:

Piranha-

1. Slowly pipette piranha solution onto ice (5x as much ice as piranha solution)
2. Slowly add appropriate neutralizing agent to ice solution and stir continuously
 - a. Use sodium bicarbonate for acidic piranha and citric acid or another weak acid for basic piranha)
3. If the spent solution is not expected to contain any regulated metals it can be poured down the drain with excess water once neutralized

Source: <https://drs.illinois.edu/Page/SafetyLibrary/PiranhaSolutions>

Aqua regia-

1. Slowly pipette solution onto ice (5x as much ice as solution)
2. Slowly add appropriate neutralizing agent to ice solution and stir continuously
3. If the spent solution is not expected to contain any regulated metals it can be poured down the drain with excess water once neutralized

Don't store aqua regia! Not only is it easily oxidized and thus much less effective when stored but it also can explode if capped.

After solution has cooled it can be neutralized in the same manner as acidic piranha:

1. Slowly pipette solution onto ice (5x as much ice as solution)
2. Slowly add appropriate neutralizing agent to ice solution and stir continuously
3. If the spent solution is not expected to contain any regulated metals it can be poured down the drain with excess water once neutralized

Source: <https://ehs.princeton.edu/laboratory-research/chemical-safety/chemical-specific-protocols/aqua-regia>

Chromic acid-

Lets just really try not to use this... If you must use this, follow the waste disposal procedure outlined below:

1. The amount of solution should be less than 100ml. All work should be done in a fume hood.
2. Wear nitrile rubber gloves, laboratory coat and eye protection.
3. Do a 1:1 dilution by slowly adding the solution to a container of water.
4. Adjust the pH to 1 by the addition of 3M sulfuric acid or sodium carbonate.
5. With stirring, slowly add solid sodium thiosulfate (~13.5g) until the solution becomes cloudy and blue in color.
6. Neutralize the solution with sodium carbonate and wait till a blue-gray flocculent precipitate is formed.
7. Let the mixture stand for 1 week until much of the supernatant can be decanted.
8. The remaining liquid is allowed to evaporate or filtered through Celite.
9. The solid residue should be washed with hot water to remove sodium sulfate, then dried, packaged, labeled and lastly sent for disposal

Source: <https://www.chemistry.nus.edu.sg/PSSO/safety/Special%20Chemical%20Waste.htm>

Safety considerations-

1. Always wear PPE when performing waste disposal duties (at the very least gloves and safety glasses, for working with cleaning agents listed above always where a lab coat and consider wearing two pairs of gloves—ensure no skin is exposed!)
2. Always refer to SDS for additional safety precautions
3. Ensure no broken glass is protruding from bag in glass waste bins
 - a. Use cut-proof gloves when handling broken glass, cut-proof gloves are available for purchase from Chemistry Stores.
4. Never try to remove glass waste bags from their pails
5. Do not inhale while removing silica waste (silica is a known carcinogen)
 - a. If possible, silica should be handled inside a fume hood.
6. Do not attempt to recap needles simply dispose of needles uncapped to prevent potentially stabbing oneself whilst recapping

Sources-

Unless otherwise indicated all information was obtained from UBC's Hazardous Waste Disposal Procedures Guide: <https://srs.ubc.ca/environment/hazardous-waste-management/hazardous-waste-procedures/>