

## Chemical Hazardous Waste Introduction

Hazardous waste is waste that, when present in quantities and concentrations that are high enough, pose a threat to human health or the environment if they are improperly stored, transported, treated or disposed. Details on this can be found within the [O. Reg 347: General-Waste Management](#).

As part of the cradle-to-grave management system of the MECP, hazardous waste requires special handling with respect to how it is collected, stored, transported, treated, recovered and disposed to reduce adverse effects to human health and the environment.

At Brock, Science Stores staff coordinate the chemical hazardous waste collection. An external contactor licensed to haul and dispose of hazardous waste collects said waste from the labs in the company of the Brock staff.

Lab users that cause the generation of hazardous waste shall follow the procedures outlined below in alignment with the safety and environmental protection legislation that apply ([Environmental Protection Act, O. Reg 347: General- Waste Management](#)). In following these procedures, the handling and disposal of hazardous waste can be made safely.

Most questions regarding when and how waste is collected and what type of resources are available can be responded by the sciences stores staff. In addition, staff from HSW who oversee these activities and can also respond any questions or concerns.

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## Generation and Labelling

- Minimize volume and hazard upon ordering, when possible.
- Under no circumstances will hazardous chemicals/wastes be disposed of down a sink. Chemical wastes sent to the drain may react and cause significant damage which may result in loss of drains, impeding lab activities until they can be replaced. In addition, they may pollute the environment.
- Plan for weekly waste disposal. Designate a place for the waste. If a fume hood is used for this, that hood cannot accommodate any other activity/work.
- Plan for safe segregation of waste by compatibility and reactivity before beginning an experiment. Incompatible and highly reactive chemicals must always be kept separately.
- Minimum segregation groups include organics vs inorganic, acids vs bases, halogenated vs non-halogenated. Segregate further according to below.



For flammables-  
1 gal

For flammables-  
2 gal

For flammables-  
5 gal

White, for non-  
flammables-  
various sizes

Figure 1. Waste containers for liquid hazardous waste.

- Use safety data sheets to determine these and/or the compatibility chart found at the end of this document or the EPA Combability Chart available [online](#).
- Two types of containers (Fig. 1) are available for liquid hazardous waste: red, hard polypropylene (PP) spring-lidded safety containers with flame arrester; and white, semitransparent, PP containers with screw cap;
  - Use the Red containers are for flammable waste.
  - Use the screw cap plastic white containers for aqueous waste solutions, not for flammable liquid waste, unless the flammable is also very corrosive.
- Check the containers before using them. They must be intact and suitable to contain the chemical, and capable of a tight closure to prevent leaks during transport.
- Discard containers with a deteriorated flame arrester, without a lid/cap or with a compromised integrity.
- Obtain the yellow Chemical Waste (Fig. 2) sticker from Science Stores (MC E303) and affix it to every waste container prior to start adding wastes in.
  - Fill out all the parameters that asked for on the label.
  - Do not use abbreviations or short forms.
  - Represent the waste properly, i.e. if your mixture results in a product, list the product of the reaction and not individual reactants. This may have significant safety or legal implications.
- Containers must be filled to the shoulder only. NEVER fill it completely. It may lead to leaks.

**Brock University**  
**CHEMICAL WASTE**

LIQUID  Item # 169957  
 INORGANIC  To correspond with form

ACID pH  SOLID   
 BASE  ORGANIC   
 SOLVENT  HALOGENATED   
 PESTICIDE FREE   
 HERBICIDE FREE  MIXTURE YES  NO

LIST CHEMICAL NAMES \_\_\_\_\_ PERCENTAGE \_\_\_\_\_

Print Clearly

**HAZARDS**

FLAMMABLE  OXIDIZER   
 EXPLOSIVE  REACTIVE   
 CORROSIVE  (AIR OR WATER)  
 TOXIC  CARCINOGENIC   
 OTHER (Explain) \_\_\_\_\_

NAME OF RESEARCHER: Building \_\_\_\_\_  
 Room # \_\_\_\_\_  
 Tel # \_\_\_\_\_

DATE: \_\_\_\_\_ MM/DD/YY

Figure 2. The yellow **Chemical Waste** label.

- Always maintain all containers closed except when pouring in, even if they are inside a hood. Vapors or fumes emanating unnecessarily pollute the environment or the lab air depending on where the container is situated.
- While containers must be kept closed, do not seal screw cap closures until the day of collection from the lab to avoid any pressure buildup.
- Screw cap containers must be closed tightly the day of collection from the lab to prevent leakage during its transport.
- When little waste is foreseen for the week, use the smallest container available to avoid carrying waste over to the following week.
- When preparing the waste for pickup, check that containers are not overfilled or overflowing. Containers that are overflowing or filled past the shoulder line will not be collected under regular pickup procedures. Since this may carry a safety implication or cause a spill cleanup surcharge ENSURE proper fill.
- Metal and glass containers are not permitted for hazardous waste, unless extraordinary situations exist. If that is the case, use a secondary container to catch any spill in the event of a breakage.
- When additional or replacement containers are needed, ask the science stores staff.
- For silica waste ask the science stores staff for a container. White, PP, wide mouthed 20 L pails with a lid (Fig. 3) are available for this type of waste.



Figure 3. PP pail with lid for silica waste.

## Hazardous waste registration and pick up from labs

For the waste to be picked up from your lab, the sciences stores staff must be notified.

- Use the **Chemical Waste Disposal Record** form (Fig. 6) to request a pickup. The form is available from Science Stores and can be downloaded at <http://brocku.ca/mathematics-science/departments-and-centres/sciencestores/waste-disposal>
- All containers which are filled to the shoulder level must be disposed every week. This contributes to your lab being compliant with the allowable limit of flammable liquids and to safety by reducing the availability of hazardous products.
- Each container registered for disposal must list the number which corresponds to the item # located on the upper right of the yellow Chemical Waste label.
- Submit the completed form to Science Stores by Tuesday at 3:00 pm in person (MC E303), by fax (905 984 4864) or email (sciencestores@brocku.ca).
- External waste technicians and staff from Science Stores will pick up waste every Wednesday morning from every lab that registered waste.

- Wastes that are not properly labelled will not be picked up.
- Wastes that are overflowing or present any safety problem will not be picked up under regular collection procedures and may be left behind until an arrangement for spill cleanup can be made. Since this carries a surcharge, follow waste procedures strictly to prevent unnecessary expenses.

#### Excess solvent cans / other metal containers and glass waste

- Excess/unused clean metal containers from labs are collected to prevent clutter and tripping hazards and are recycled.
- Containers which had hazardous materials must be emptied and triple rinsed. Collect the rinsate as hazardous waste.
- Affix the **Safe for Disposal** (Fig. 4) label, which can be obtained from Science Stores.
- Place the labelled container in the hallway by the main entry door to your lab on Mondays during office hours.
- Custodial services will pick up containers that meet the above criteria.
  - Unused clean glass containers or clean pieces of glass. Place them in the cardboard box shown in Fig. 5. Contact Custodial Services (CS) to obtain these boxes.
  - When a container had had hazardous materials, it must be emptied and triple rinsed. Collect the rinsate as hazardous waste.
  - When the box is  $\frac{3}{4}$  full, close the plastic liner and the lid and write down **Please Dispose** on the box. CS will collect it replace it.



Figure 4. **Safe for Disposal** label for recycling metal containers.



Figure 5. Cardboard box for disposal of clean glass waste.

**Note:** wastes from pyrophoric and other reactive materials must follow special precautions which are not covered here. Contact your Principal Investigator for these.

#### Hydrofluoric Acid waste

Hydrofluoric acid (HF) is a very corrosive and toxic substance, for which special precautions apply. If you are new to work with HF, please contact the Lab Safety Specialist at ext 6179 for an assessment of your fume hood and the especial instructions that apply.

Containers for hydrofluoric acid waste. HF waste must be collected in specific type of containers (UN 3H1/Y) different to the ones described above and rated for holding HF waste, which are provided by Science Stores. Two types of containers are available.

- For work with small volumes and a concentration of HF of up to 48%, containers are of 2L capacity, made of PE, with a secure lid.

- For work with large volumes and a concentration of HF up to 48%, containers are of 4 L capacity, made of HDPE, with a secure lid.
- Dispose HF waste according to the schedule and registration protocol used for other hazardous waste at the University.
- Containers may only be filled to the shoulder level.
- Waste containers must always be kept tightly closed and clean from any residues.
- If you apply any solution to neutralize residues of HF that there may be on the container surface, the remains of said solution must be cleaned before the waste is offered for disposal to the waste contractor.
- HF waste must not be mixed with any other material.
- Containers with HF waste may not be reused.



**Group 1: Inorganic Acids**

Chlorosulfonic acid  
Hydrochloric acid (aqueous)  
Hydrofluoric acid (aqueous)  
Hydrogen chloride (anhydrous)  
Hydrogen fluoride (anhydrous)  
Nitric acid  
Oleum Phosphoric acid  
Sulfuric acid

**Group 2: Organic Acids**

Acetic acid  
Butyric acid (n-)  
Formic acid  
Propionic acid

**Group 3: Caustics**

Potassium hydroxide  
Sodium hydroxide  
Ammonium hydroxide

**Group 4: Amines and Alkanolamines**

Aminoethyl ethanolamine  
Aniline  
Diethanolamine  
Diethylenetriamine  
Diisopropanolamine  
Dimethylamine  
Ethylenediamine  
Hexamethylene diamine  
Methyl-5-ethylpyridine  
Monoethanolamine  
Monoisopropanolamine  
Morpholine  
Pyridine  
Triethanolamine  
Triethylamine  
Triethylenetetramine  
Trimethylamine

**Group 5: Halogenated Compounds**

Allyl chloride  
Carbon tetrachloride  
Chlorobenzene  
Chloroform  
Chlorohydrines  
crude Dichlorobenzene (o-)  
Dichlorobenzene (p-)  
Dichlorodifluoromethane  
Dichloroethyl ether  
Dichloropropane  
Ethyl chloride  
Ethylene dibromide  
Ethylene dichloride  
Methyl bromide  
Methyl chloride  
Methylene chloride  
Monochlorodifluoromethane  
Perchloroethylene  
Propylene dichloride  
1,2,4-Trichlorobenzene  
1,1,1-Trichloroethane  
Trichloroethylene  
Trichlorofluoromethane

**Group 6: Alcohols, Glycols and Glycol Ethers**

Allyl alcohol  
Amyl alcohol  
1,4-Butanediol  
Butyl alcohol  
Butylene glycol  
Corn syrup  
Cyclohexyl alcohol  
Decyl alcohol (n, iso)  
Dextrose solution  
Diacetone alcohol  
Diethylene glycol  
Diethylene glycol dimethyl ether  
Diethylene glycol monobutyl ether  
Diethylene glycol monoethyl ether  
Diethylene glycol monomethyl ether  
Diisobutyl carbitol  
Dipropylene glycol  
Dodecanol  
Ethoxylated dodecanol  
Ethoxylated pentadecanol  
Ethoxylated tetradecanol  
Ethoxylated tridecanol

Ethoxytriglycol  
Ethyl alcohol  
Ethyl butanol  
2-Ethylbutyl alcohol  
2-Ethylhexyl alcohol  
Ethylene glycol  
Ethylene glycol monobutyl ether  
Ethylene glycol monoethyl ether  
Ethylene glycol monomethyl ether  
Furfuryl alcohol  
Glycerine  
Heptanol  
Hexanol  
Hexylene glycol  
Isoamyl alcohol  
Isooctyl alcohol  
Methoxytriglycol  
Methyl alcohol  
Methylamyl alcohol  
Molasses, all  
Nonanol  
Octanol  
Pentadecanol  
Polypropylene glycol methyl ether

Propyl alcohols (n, iso)  
Propylene glycol  
Sorbitol  
Tetradecanol  
Tetraethylene glycol  
Tridecyl alcohol  
Triethylene glycol Undecanol

**Group 7: Aldehydes**

Acetaldehyde  
Acrolein (inhibited)  
Butyraldehyde (n, iso)  
Crotonaldehyde  
Decaldehyde (n, iso)  
2-Ethyl-3-propylacrolein  
Formaldehyde solutions  
Furfural  
Hexamethylenetetramine  
Isooctyl aldehyde  
Methyl butyraldehyde  
Methyl formal  
Paraformaldehyde  
Valeraldehyde

**Group 8: Ketones**

Acetone  
Acetophenone  
Camphor oil  
Cyclohexanone  
Diisobutyl ketone  
Isophorone  
Mesityl oxide  
Methyl ethyl ketone  
Methyl isobutyl ketone

**Group 9: Saturated Hydrocarbons**

Butane  
Cyclohexane  
Ethane  
Heptane  
Hexane  
Isobutane  
Liquified natural gas  
Liquified petroleum gas  
Methane  
Nonane  
n-Paraffins  
Pentane

**Group 12: Petroleum Oils**

Asphalt  
Gasolines  
Jet Fuels & kerosene  
Mineral spirits  
Naphtha  
Oils  
    Absorption oil  
    Clarified oil  
    Crude oil  
    Diesel oil  
    Fuel oil  
Lubricating oil  
Mineral oil  
Mineral seal oil  
Motor oil  
Penetration oil  
Range oil  
Road oil  
Spindle oil  
Spray oil  
Transformer oil  
Turbine oil

Petrolatum  
Petroleum ethers  
Petroleum naphtha  
Polybutene  
Propane  
Propylene butylene polymer

**Group 10: Aromatic Hydrocarbons**

Benzene  
Cumene  
p-Cymene  
Coal tar oil  
Diethylbenzene  
Dodecyl benzene  
Dowtherm  
Ethylbenzene  
Naphtha, coal tar  
Naphthalene (includes molten)  
Tetrahydronaphthalene  
Toluene  
Triethyl benzene  
Xylene (m-, o-, p-)

**Group 13: Esters**

Amyl acetate  
Amyl tallate  
Butyl acetates (n, iso, sec)  
Butyl benzyl phthalate  
Castor oil  
Croton oil  
Dibutyl phthalate  
Diethyl carbonate  
Dimethyl sulfate  
Diocetyl adipate  
Diocetyl phthalate  
Epoxidized vegetable oils  
Ethyl acetate  
Ethyl diacetate  
Ethylene glycol monoethyl ether acetate  
Ethylhexyl tallate  
Fish oil  
Glycol diacetate  
Methyl acetate  
Methyl amyl acetate  
Neatsfoot oil  
Olive oil  
Peanut oil  
Propyl acetates (n, iso)

**Group 11: Olefins**

Butylene  
1-Decene  
Dicyclopentadiene  
Diisobuytlene  
Dipentene  
Dodecene  
1-Dodecene  
Ethylene  
Liquified petroleum gas  
1-Heptene  
1-Hexane  
Isobutylene  
Nonene  
1-Octene  
1-Pentene  
Polybutene  
Propylene  
Propylene butylene polymer  
Propylene tetramer (dodecene)  
1-Tetradecene  
1-Tridecene  
Turpentine  
1-Undecene

**Group 14: Monomers and Polymerizable esters**

Resin oil  
Soya bean oil  
Sperm oil  
Tallow  
Tanner's oil  
Vegetable oil  
Wax, carnauba  
Acrylic acid (inhibited)  
Acrylonitrile  
Butadiene (inhibited)  
Butyl acrylate (n, iso)  
Ethyl acrylate (inhibited)  
2-Ethylhexyl acrylate (inhibited)  
Isodecyl acrylate (inhibited)  
Isoprene (inhibited)  
Methyl acrylate (inhibited)  
Methyl methacrylate (inhibited)  
o-Propiolactone  
Styrene (inhibited)  
Vinyl acetate (inhibited)  
Vinyl chloride (inhibited)  
Vinyl toluene  
Vinylidene chloride (inhibited)



**Group 15: Phenols**

Carbolic oil  
Creosote, coal tar  
Cresols  
Nonylphenol  
Phenol

**Group 16: Alkylene Oxides**

Ethylene Oxide  
Propylene Oxide

**Group 17: Cyanohydrins**

Acetone cyanohydrin  
Ethylene cyanohydrin

**Group 18: Nitriles**

Acetonitrile  
Adiponitrile

**Group 19: Ammonia**

Ammonium hydroxide

**Group 20: Halogens**

Bromine  
Chlorine

**Group 21: Ethers**

Diethyl ether (ethyl ether)  
1, 4, Dioxane  
Isopropyl ether  
Tetrahydrofuran

**Group 22: Phosphorus,  
elemental****Group 23: Sulfur, molten****Group 24: Acid Anhydride**

Acetic anhydride  
Propionic anhydride