Chemical Waste Management

1. **Purpose:**

   Provide guidance on the safe collection, storage and disposal of chemical waste in the Teaching Laboratories for the safety of lab personnel and lab users and the protection of the community and environment.

2. **Scope:**

   Staff, Faculty, Postdoctoral Fellows, Graduate Students, Undergraduate Research Students, Volunteers and visitors working in the Chemistry Teaching Laboratory in the Department of Chemical and Physical Sciences (CPS).

3. **Prerequisites:**

   EHS101: WHMIS and Lab Safety (or Annual Refresher EHS112)
   EHS002: Basic Health and Safety Awareness
   EHS803: Hazardous Waste Management
   EHS602: Biosafety Training (Only when required)
   CPS Onboarding Training

*Not an extensive list. Confirm with PI, Supervisor or Manager.

4. **Introduction:** *(Adapted from UofT EHS Office)*

   Proper waste management minimizes risk to employees and the community and reduces the risk of release of hazardous material to the environment. Hazardous liquids **must not be flushed** down drains as a method of disposal. Hazardous waste management is provided through Environmental Protection Services (EPS). Questions about chemical waste disposal should be directed to EPS at 416-978-7000.

5. **Responsibilities:**

   5.1 Chairs/Directors

   It is the responsibility of Directors and Department Heads to ensure employees are aware of these guidelines.

   5.2 Principal Investigators (PI) and Lab Managers

   Principal Investigators and Lab Managers must ensure that all laboratory users have the appropriate training to safely store and dispose of chemical waste.

5.3 Employees, Student Lab Users and Lab Visitors

It is the responsibility of any University of Toronto lab user or lab visitor to adhere to the procedural requirements specified in this SOP.

6. Definition: *(Taken directly from UofT EHS Office)*

Chemical waste includes solids, liquids or gases containing or contaminated with any of:

- flammable solvents (*e.g., acetone, alcohols, acetonitrile)*;
- leachate toxic materials (*e.g., heavy metals, pesticides*);
- corrosives *(e.g., hydrochloric acid, potassium hydroxide pellets)*;
- reactives such as oxidizers, cyanides, sulphides, explosives, unstable materials and water-reactive materials (*e.g., sodium metal, benzoyl peroxide)*;
- toxic materials including mutagenic, carcinogenic, acute or chronic toxicity materials *(e.g., chloroform, ethidium bromide)*;
- polychlorinated biphenyls (> 50 ppm concentration);
- non-returnable gas cylinders

7. Personal Protective Equipment:

At minimum – Lab coat, chemical resistant gloves, and safety glasses.
Refer to SDS for additional PPE and precautions.

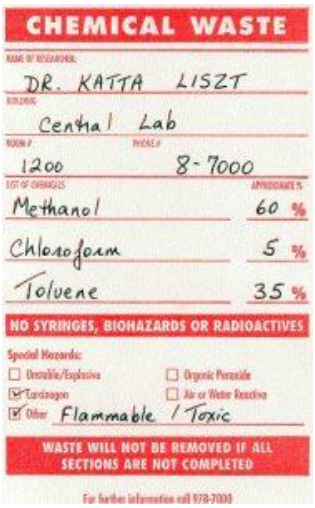
8. Waste Collection, Labelling and Packaging:

(Adapted from UofT EHS Office and UTSG Chemistry Department)

8.1 Waste Containers:

- 20 L green plastic pails, biological waste pails and sharps waste containers are available from Shipping and Receiving.
- Empty chemical bottles can be used as waste containers. Allow bottle to vent before use. Original labelling must be crossed out and inventory barcodes must be removed.
- Liquid waste containers should not be filled more than 75% volume to allow for vapour expansion.
- Waste containers must be compatible with the chemicals stored. Examples:
    - Sharps must be in puncture-resistant containers.
    - Hydrofluoric acid cannot be stored in glass containers.
    - Piranha solution must have a lid that allows for vapours to vent.
    - Solvent safety cans should to be used to collect and temporarily store large volumes (10-20 litres) of flammable organic waste solvents.
- Waste containers must remain closed unless being vented or waste is being added.
- Secondary containers such as trays or bins are encouraged.

8.2 Waste Labelling:



Waste labels are available at Shipping and Receiving.

Waste labels must be attached directly to the waste container before waste is added to the container.

Criteria

- ✓ All information requested on waste label must be provided.
- ✓ Chemical (IUPAC) names of chemicals must be listed (No abbreviations, acronyms or trade mark names)
- ✓ Inventory of waste materials must be accurate.
- ✓ In case of biological waste, a permit number must be listed.

8.3 Waste Compatibility:

Incompatible chemicals should not be mixed in a single waste container. Consult SDS to determine compatibility. For example:

- Acid-reactive compounds (e.g. cyanides, sulphides) which liberate gaseous products when acidified should not be mixed with any inorganic acid (e.g., sulphuric or hydrochloric acid).
- Organic acids (e.g. glacial acetic acid) should be segregated from inorganic acids. Generally inorganic acids are oxidizing agents while some organic acids may be either reducing agents or combustible.
- Water reactive materials (e.g. sodium) should be kept away from any water source.
- Oxidizers (i.e. hydrogen peroxide, lead nitrate, concentrated perchloric acid) should never be mixed with organic materials (e.g. organic bases such as pyridine, aniline, amines, flammable solvents such as toluene, acetone) or reducing agents (e.g. water-reactive chemicals such as sodium).

Dispose halogenated and non-halogenated solvents separately, if possible.

Do not mix lightly contaminated solid waste with powders.

For any wastes that require special handling such as organic peroxides, PCBs (polychlorinated biphenyls) or explosives, consult the Manager, Environmental Protection, Environmental Protection Services 416.978.7000 or e-mail eps.hazdisposal@utoronto.ca.

9. Waste Storage and Removal:

9.1 Common Waste *(Adapted from UTSG Chemistry Department)*

Chemical waste should not be stored in the teaching labs and should be taken to Shipping and Receiving promptly. In the case were waste is stored, it should never be stored on the floor. Storage locations should be properly labeled and be compatible with the type of waste it is housing. For example:

- Flammables in flammable cabinets.
- Corrosives in corrosive cabinets.
- Hazardous chemicals below eye level.

Chemical waste should not be allowed to accumulate.

Waste should only be transported using either a cart or a chemical carrier. Carts should have a lip to prevent waste from falling off. Use secondary containment to contain leaks and spills.

9.2 Special Cases *(Taken directly from UofT EHS Office)*

Asbestos
Asbestos-containing materials such as Bunsen burner pads, gloves etc., are disposed of by Facilities and Services Trades staff trained in the proper handling of these materials. Contact Facilities by placing a work order.

Batteries
Household batteries should be discarded separately and can be dropped off at Shipping and Receiving. Tape the terminals of all lithium batteries before dropping them off.

Explosives
Do not handle explosive materials. Examples of explosives include materials such as trinitrated compounds (e.g., TNT), dry picric acid (<20% by weight water content), fulminated mercury, heavy metal azides (e.g., lead azide). These materials require special handling for disposal. These materials must be checked frequently for signs of deterioration and aging. These signs would include “sweating” of a container, bulging, crystal formation around the cap, etc. Deteriorating explosive materials are potentially more dangerous to handle than new explosives. Inform EPS immediately.

Mercury thermometers

Mercury thermometers for disposal should be treated as chemical waste. Broken thermometers should be considered contaminated and all free liquid mercury should be collected and packaged in a leak-proof container, together with all contaminated solids such as glassware, gloves used during the clean-up, etc.

Polychlorinated Biphenyls (PCBs)

The handling of PCB-contaminated waste materials requires special consideration for handling, storage and disposal. In Ontario, any waste material with a concentration of PCBs greater than 50 ppm is considered to be PCB-contaminated. Sources of PCBs include transformers containing the trade name Aroclor (or the generic fluid called askarel) which were commonly used in North America. Almost every capacitor manufactured between 1930-1980 contains liquid PCBs. PCBs were also used in a variety of applications including hydraulic equipment, electromagnets, heat transfer equipment and vapour diffusion pumps. EPS staff can analyze samples to determine if they are PCB-contaminated. Special arrangements for disposal must be coordinated by Environmental Protection Services.

10. Resources:

https://ehs.utoronto.ca/laboratory-hazardous-waste-management-and-disposal-manual/introduction/

https://www.chemistry.utoronto.ca/sites/chemistry.utoronto.ca/files/LM-SOP-005%20Chemical%20Waste%20Management.pdf