

Hazardous Materials Technical Services Program

Procedure for Disposal of Hazardous Waste and Transfer of Hazardous Materials

Version 1.0 (English)

Bureau de la gestion du risque
Office of Risk Management



uOttawa

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1.0 INTRODUCTION

The management of all hazardous materials at the University of Ottawa must be done in accordance with federal, provincial and municipal regulations. It is the responsibility of all waste generators and Faculties of the University to follow this procedure and abide by all applicable regulations relating to the safe storage and disposal of hazardous waste.

As a proactive approach the University of Ottawa provides an easy to use *Hazardous Materials Technical Services Program* to all of the Faculties of the University. The program includes the following regular core services to all faculties of the University: collection of hazardous waste, supply of hazardous waste containers and transfer of hazardous materials within campus. The program also offers additional services (further described as special services) including lab packs for laboratory decommissioning, transfer and refill of liquid nitrogen dewars, chemical transfers for laboratory moves, etc.

The Hazardous Materials Technical Services Programs aims to support research and is therefore continuously adapting to the changing requirements of the uOttawa. The program accepts most hazardous waste including ignitable, corrosive, reactive and toxic materials as well as certain biological sharp containers. This program does not accept radioactive waste.

2.0 PURPOSE & SCOPE

The purpose of this procedure is to provide waste generators with a consolidated source of information on the disposal of hazardous waste through the *Hazardous Materials Technical Services (HMTS) Program* offered at the University of Ottawa.

This document is intended to be used by the direct employees and students of the University of Ottawa and is for internal use only. The University of Ottawa accepts no liability, whether in negligence, contract or arising on any other basis for damages or for indemnification arising from decisions or actions by others based on this document.

All hazardous waste that is deemed biohazardous/infectious or radioactive is excluded from the scope of this procedure and does not fall under this Hazardous Materials Technical Services program. For questions or to dispose of biohazardous/infectious or radioactive materials please contact:

Biohazardous: bio.safety@uottawa.ca

Radioactive: rad.safety@uottawa.ca

3.0 LEGAL REQUIREMENTS

- I. Transportation of Dangerous Goods Act and Regulation
- II. Ontario Environmental Protection Act

- III. Ontario Water Resources Act (Sec. 30(2))
- IV. Ontario Regulation 347/90 – Regulation Made Under the EPA – General Waste Regulation
- V. R.R.O. 1990, REGULATION 362 – Waste Management PCB's
- VI. Controlled Goods Regulations (SOR/2001-32)
- VII. R.R.O 1990, Reg. 860
- VIII. R.R.O 1990, Reg. 833
- IX. Ontario OH&S Act

4.0 DEFINITIONS & ABBREVIATIONS

4.1 *Regular Hazardous Waste*

Regular hazardous waste is defined as chemical hazardous waste which has been generated during normal operating research related activities. This excludes biological and radiological waste; and also excludes hazardous waste posing a serious and immediate threat to life or health (*see special hazardous waste*).

4.2 *Special Hazardous Waste*

Special hazardous waste is defined as chemical hazardous waste which has not been generated during normal operating research related functions or pose an immediate threat to health or life (i.e. laboratory decommissioning, laboratory or equipment decontamination, fumigation, disposal of expired/unstable time sensitive chemicals, unstable PEROXIDES, unknown materials, used hazardous spill kits, contaminated soil and water, etc.).

4.3 *Regular Hazardous Materials Transfer*

The transfer of hazardous materials from one location to another on campus. Example: transferring a chemical from Science Store to a laboratory on campus.

4.4 *Special Hazardous Materials Transfer*

The transfer of hazardous materials for sensitive and/or highly dangerous substances. The following criteria are generally used to identify if the transfer is “special /ad-hoc”: Any hazardous materials that have an insurable value of over \$30,000, when there are over 30 hazardous materials to be transferred, and/or when live specimens are involved, etc.

4.5 *Biological Material*

Pathogenic and non-pathogenic microorganisms, proteins, and nucleic acids, as well as any biological matter that may contain microorganisms, proteins, nucleic acids, or parts thereof. Examples include, but are not limited to, bacteria, viruses, fungi, prions, toxins, genetically modified organisms, nucleic acids, tissue samples, diagnostic specimens, live vaccines, and isolates of a pathogen (e.g., pure culture, suspension, purified spores).

4.6 *Biohazardous Material*

Any pathogenic, or infectious /hazardous biological material, that presents a risk or potential risk to the health of humans, animals, plants, or the environment. The risk can be directly through infection or indirectly through damage to the environment. The material may cause disease in other living organisms or cause significant impact to the environment.

4.7 *Non-infectious Biological Material*

Any waste material that originates from living organisms, which does not present a risk or potential risk to the health of humans, animals, plants, or the environment.

4.8 HMTS

Hazardous Materials Technical Services

5.0 ROLES & RESPONSIBILITIES

5.1 *Supervisor Role (Principal Investigator / Lab Manager)*

- Ensuring that their personnel or students are adequately trained to handle the hazardous materials that they may come in contact with during the performance of their duties and to understand and implement their responsibilities as outlined at paragraph 5.2.
- Ensure all hazardous materials used on the University property are handled and stored in a safe and environmentally friendly manner up until the hazardous waste is turned over to the University contractor for disposal.
- Ensuring that all hazardous materials and hazardous waste are clearly and accurately identified at all times
- Ensuring that personnel and/or students do not dispose of hazardous chemicals or hazardous waste down the drain/sewage/regular garbage or through any other unauthorized means of disposal.

5.2 *Generators and Users of Hazardous Chemicals*

- Laboratory users are responsible for adhering to all applicable Laboratory specific operating procedures; including the use of adequate personal protective equipment.
- Abide at all times to this hazardous waste disposal procedure for all of the hazardous waste generated.
- Store and identify hazardous waste clearly and accurately using a hazardous waste label as well as using adequate containers for hazardous waste.
- Requesting hazardous waste pick-ups or transfers regularly for any hazardous materials, hazardous waste and/or unwanted empty hazardous material containers. (Excluding decontaminated empty containers, which can go in the recycling or domestic waste stream – refer to paragraph 6.1.5).
- Reporting hazardous spills or unknown suspected hazardous materials to the HSRM.
- In the event of a spill, the person responsible for the spill must ensure that the spill is managed appropriately and as per applicable Regulatory requirements (including contacting contractor).

5.3 *Office of Risk Management*

- Acts as the official “Consigner” for the University; therefore the office oversees, tracks and conforms to all regulations regarding the transportation of hazardous waste and its associated offsite disposal.
- Oversees the Hazardous Waste Technicians / Contractors responsible for collecting, transporting and disposing of hazardous waste

- Communicating, when required, with the Ministry of Environment and Climate Change
- Supplying a contractor for the collection and/or transfer of hazardous materials

6.0 PROCESS FOR THE DISPOSAL OF HAZARDOUS WASTE

6.1 *Hazardous Waste Generator Requirements*

Hazardous Waste Generators are responsible to package and label hazardous waste as per the requirements outlined below. The hazardous waste generators are also responsible for requesting services online in a timely manner as to not allow hazardous waste to accumulate in laboratories.

6.1.1 *Packaging and Container Selection*

Containers must be compatible with the hazardous materials (*See Table 2*). The container must be leak-free, have a screw cap and be clean on the outside. The containers must be adequate for transport – free of damage. The following general chemical storage requirements apply to all hazardous materials containers:

- Containers must be no more than 80% full to allow for vapour expansion and reduce the potential for spills during transport.
- Sound, sealable, undamaged containers;
- Protect containers from damage and weather;
- Store in secure area with controlled access, adequate ventilation and secondary containment; never move your hazardous waste into the hallways
- Never store with food or in food containers.
- Incompatible materials should never be mixed in a hazardous waste container
- Always ensure the container selected corresponds to the waste type (infectious vs. chemical vs. radioactive and also solid vs. liquid)
- Separate solids from liquids - All liquids must be free of solid material to facilitate consolidation, recycling and proper disposal. If solids cannot be separated from liquids the name and quality of the solid must be listed on the Regular Collection Request form (Additional Information section).
- Make every effort to consolidate compatible waste into as few containers as possible.

Some hazardous waste is known to off gas – if this is the case – keep the cap loosely fitted or obtain vented caps for your hazardous waste to avoid pressurizing containers and place the containers in a fume hood. Make sure to identify this requirement on the container for others who may not be aware.

The HMTS program supplies 20L high density polyethylene (HDPE) carboys for chemical liquid waste and 20L HDPE black pails for chemical solid waste free of charge. In some instances, we may also supply 10L HDPE carboys, drums and 1 L glass or HDPE bottles, pending approval.

If you need to request free supplies, such as hazardous waste containers kindly use the following [link](#). To request supplies without the need for a hazardous waste collection, simply input “0” or “N/A” in the mandatory *Hazardous Material Pick-Up Details 1* section of the online form and scroll down to the *Supply and Equipment Order 1* section. Hazardous waste containers ordered through the program must

be used for the sole purpose of hazardous waste and returned for disposal when the hazardous waste containers are full. Any hazardous waste pail or carboy received from the HMTS program that is used for a purpose other than hazardous waste will be charged to the faculty or responsible person, as applicable. For assistance with the online Regular Hazardous Waste Collection Request form kindly contact enviro@uottawa.ca.

Important: Any hazardous waste that is improperly packaged (including being overfilled) will not be removed.

Table 2. Suggested Waste Containers

Waste Type	Waste Container	Contact
Biohazardous / Infectious Waste Sharps (BIO ONLY)	Yellow 4.5L bench top sharp containers Yellow 23L HDPE pails	bio.safety@uottawa.ca
Biohazardous / Infectious Waste Solid Waste (No Sharps)	Yellow 23L HDPE pails Cardboard box with double liner	bio.safety@uottawa.ca
Contaminated Broken Glass & Sharps (Chemical ONLY)	White 4.5 L bench top sharp containers	enviro@uottawa.ca
Contaminated Solid Waste (Chemical ONLY, No sharps)	Black reusable HDPE pail Metal waste drum ²	enviro@uottawa.ca
Electronic Waste (Recycling)	No container necessary	sustainable@uottawa.ca
Empty chemical bottles	Original Container, rinsed and vented in fumehood	enviro@uottawa.ca
Liquid Chemical Waste ³	Amber glass bottle – Reused ¹ White HDPE 20L plastic carboy HDPE drum ²	enviro@uottawa.ca
Non-flammable and Flammable Compressed Gas including aerosols	Original Container	enviro@uottawa.ca
Radioactive Waste	White single use plastic pail	rad.safety@uottawa.ca
Refrigerators / Freezers	No container necessary	sustainable@uottawa.ca
Uncontaminated Broken Glass	Cardboard boxes designated for uncontaminated broken glass	Housekeeping
Uncontaminated plastic, Metal and Glass	Various relative to material	sustainable@uottawa.ca

¹ Always ensure that the original label is defaced and replaced with hazardous waste label

² Containers must be approved by the ORM prior to ordering drums through the Hazardous Waste Program

³ Not all liquid waste are compatible with HDPE containers.

6.1.2 *Labelling of Hazardous Waste Containers*

It is the responsibility of the hazardous waste generator to ensure that each hazardous waste container has an approved and completed hazardous waste label that includes the following information:

Figure 1. Hazardous Waste Label

The form is titled "DÉCHET DANGEREUX / HAZARDOUS WASTE" and "Université d'Ottawa / University of Ottawa". It contains the following fields and callouts:

- PROFESSEUR(E)/PROFESSOR :** Callout: Full name of the Principal Investigator (PI)
- ÉDIFICE/BUILDING:** Callout: Building Name & Room Number where the waste was generated
- PIÈCE # / ROOM #:** Callout: Building Name & Room Number where the waste was generated
- TÉL/TEL:** Callout: Telephone number of the Principal Investigator (PI)
- PERSONNE RESSOURCE / CONTACT PERSON:** Callout: Full name of a contact person in the lab (possibly person responsible for hazardous waste)
- DATE:** Callout: Date that the container started being filled with hazardous waste
- CONTENU / CONTENTS:** Callout: A complete list of the description of the nature of the hazardous waste contents (No vague descriptions, abbreviations or acronyms will be accepted)
- INFORMATION SPÉCIALE / SPECIAL INFORMATION:** Callout: Any special precautions or important information to be communicated and/or declassification approval number for declassified radioactive waste
- EN CAS D'URGENCE, COMPOSEZ 5411 / IN CASE OF EMERGENCY CALL 5411**

In order for the labelling to be acceptable for collection the following conditions must be met:

- The contents completed on the label must be highly visible and legible (washed out or faded labels and/or illegible writing will not be accepted)

- Each section of the uOttawa Hazardous waste label must be completed (with the exception of the special information section if it does not apply)
- The description of the contents must be accurate and reflect the complete inventory of the hazardous waste as contents are added
- The description of the content must be in specific generic names (abbreviations, acronyms or vague categories such as “solid waste”, “organic waste” or “liquid waste” will not be accepted)

Important: Any hazardous waste that is improperly labelled will not be removed.

6.1.3 *Preventing Unnecessary accumulation of hazardous waste*

It is the responsibility of the hazardous waste generators to regularly request hazardous waste disposal services as to avoid the accumulation of hazardous waste in laboratories. Periodic inspections of laboratory inventory should be made regularly as to avoid holding onto chemicals that are no longer needed / or are passed their shelf life.

6.2 *Hazardous Material Services*

There are four (4) main types of services which may be requested and each has a respective form. It is important to select the correct form/process as these services get processed and serviced separately. All requests must be completed by submitting an online request and/or email as described below.

6.2.1 *Regular Hazardous Waste Collection*

The regular hazardous waste collection is a free service that collects most hazardous waste including ignitable, corrosive, reactive and toxic materials as well as certain biological sharp containers directly from a laboratory / identified work space at uOttawa. The regular hazardous waste collection service is to be used for the disposal of:

- Hazardous chemicals resulting as a by-product of regular research, teaching and maintenance activities at uOttawa including the replacement of hazardous waste containers (30 containers or less)
- Request new containers and/or spill kits
- Collection of biohazardous sharps containers (4.5L yellow benchtop sharps containers, 23L yellow pails and double lined cardboard boxes *only*)

This includes everything from flammable solvents, corrosives, toxic materials, leachate toxic materials, reactive, chemically contaminated lab ware (small, i.e. contaminated broken glass), fluorescent bulbs and other hazardous lamps, paints, small aerosol cans and cylinders, photographic chemicals, waste oil, Pb/H+ batteries, etc.

The deadline for submitting the completed *Hazardous Materials Technical Services Regular Collection Request Form* is 10 AM the day before you are requesting a collection pick-up. If the deadline is missed the request will be scheduled in the next available time slot according to the [service schedule](#) and faculty. *Example: If you are requesting a service for Tuesday you must complete and submit the online request by 10 AM on Monday.*

The regular hazardous waste collection can be requested by completing the [online form](#). The environmental contractor is only authorized to collect what has been identified on the form. Any last minute hazardous waste must be requested on a new form. It is the responsibility of the hazardous waste generator to clearly identify in detail all of the hazardous waste to be collected when completing the online form and to provide as much details as possible in the description. In order for the hazardous waste to be collected at the scheduled time each hazardous waste container must comply with all requirements outlined in this procedure. It is important to organize the hazardous waste in a manner which makes them highly visible and identifiable as hazardous waste. The contractor will not be responsible for searching through laboratory cabinets or fume hoods for the items listed on the waste inventory.

The description of the content submitted in the online form must be in specific generic names (abbreviations, acronyms or vague categories such as “solid waste”, “organic waste” or “liquid waste” will not be accepted).

Regular Hazardous waste collection requests are generally processed within 2 business days. Once the request has been processed, it is issued a reference code and a confirmation email with the date and time of collection will be emailed to the contact person listed on the request form. For all questions or modifications required to a scheduled collection request kindly have the internal reference code readily available.

6.2.2 *Special Hazardous Waste Collection Request*

This service is designed for hazardous waste that has not been generated through regular research and maintenance activities. It is essentially used for requests that cannot be performed during the regular hazardous waste collection time slots due to time restrictions and/or elevated risk. Some examples of this service include:

- Laboratory/equipment decommissioning or decontamination
- Lab packs (30+ chemical bottles)
- Extremely reactive and/or dangerous hazardous waste, (explosive waste)
- Declassified radioactive waste
- Large Contaminated equipment
- Waste relating to projects, etc.
- Unknown /suspected hazardous materials
- Expired/unstable time sensitive chemicals

The process for coordinating the disposal of special hazardous waste differs slightly from the regular waste requests; where the services are performed outside of the dedicated regular hazardous waste [schedule](#). A representative will contact the user to schedule a date and time that is convenient for all parties. The office of risk management cannot guarantee the scheduling of a special request in the same week and we therefore highly recommend planning in advance if this type of service is requested.

Depending on the type of request, the office of risk management may need to consult with a third party contractor and therefore would need to obtain specific project details and a quote before disposing of the

hazardous materials. This is especially true for explosives or dangerously unstable materials. Costs may apply for this type of service. If costs apply, the estimated cost will be agreed upon with the responsible party prior to the scheduling of the service.

The special hazardous waste collection can be requested by completing the [online form](#). Kindly attach all applicable supporting documents including a list of chemical inventory, photos, etc. as applicable.

6.2.2.1 Laboratory Decommissioning and Lab Packs (30+ chemicals)

For laboratory decommissioning or clean outs all of the controlled goods, radioactive and/or or biological materials must be disposed of prior to any chemical waste disposal. If applicable, kindly contact the following persons to organize the disposition of radioactive or biohazardous waste:

Biohazardous: bio.safety@uottawa.ca

Radioactive: rad.safety@uottawa.ca

Controlled Goods: hiraiei@uottawa.ca or mhisted@uottawa.ca

Our first recommendation in the event that there are many chemicals that can still be used is to try and give away as many chemicals as possible to neighboring laboratories. This can be coordinated with the help of your HSRM and will significantly reduce disposal costs and save costs for other laboratories.

In the case where a significant amount of chemical products are being disposed of as hazardous waste, obvious signs or posters may be applied onto a cabinet or fume hood doors to signify that any containers located in the following cabinets are to be disposed of, no exceptions. If this method is used, please note that every item located in the cabinets with this sign will be disposed of as hazardous waste. It is important to organize the hazardous waste in a manner which makes them highly visible and identifiable as hazardous waste. The contractor will not be responsible for searching through laboratory cabinets or fume hoods for the items listed on the waste inventory.

Before the laboratory decommissioning / lab packs the following requirements apply:

- A detailed inventory list of every chemical for disposal must be submitted to enviro@uottawa.ca. An extraction from vertere (the uOttawa inventory management system) may be exported via Excel assuming the inventory has been kept up to date.
- It is the responsibility of the laboratory to identify the chemicals as disposed of in our inventory system (Vertere)
- The laboratory must be free of excessive clutter and debris to ensure safe manoeuvring for staff and equipment such as drums and dollies

During the time of the laboratory decommissioning the following requirements apply:

- A contact person must be available at all times for questions/clarifications
- The materials for disposal are clearly identified as hazardous waste and are organized in such a way that they are segregated from the rest of the laboratory chemicals
- No other maintenance/activities must be planned in the space/laboratory during the hazardous waste disposal time frame

- The laboratory must be evacuated during the time frame specified by the Environmental Specialist; where only the contact person, environmental specialist or HSRM is permitted to enter the laboratory
- Contaminated glass and/or laboratory equipment must be gathered and in appropriate containers, loose debris or equipment will not be collected during this time.

The request form as well as the inventory list for laboratory decommissioning or large lab packs must be submitted with as much notice as possible. Generally speaking, if there are no biohazardous or radioactive materials to be disposed of beforehand and no complications, the turnaround time is at minimum 1.5 weeks. Refer to your Faculty specific procedures/checklists for all other Laboratory Decommissioning requirements.

The office of Risk Management does not cover the costs for laboratory or equipment decommissioning / decontamination. Certain lab packs can be accepted pending approval.

6.2.2.2 Highly Unstable Hazardous Waste

If you come across highly unstable and or potentially explosive materials inform others in your workspace of the presence of the chemical and its hazards and contact your HSRM and Supervisor immediately for further assistance. It is important to obtain confirmation that the HSRM has been reached directly (i.e. leaving a voicemail or sending an emails is not considered direct notification). If the HSRM cannot be reached, protection services is to be notified by calling 5411.

This category applies to reactive and potentially explosive chemicals; some examples of broad categories include: shock sensitive, heat sensitive, water reactive, air reactive and peroxide formers. Due to the nature of the hazardous waste under this category, special precautions are to be taken when dealing with these types of materials. **Do not attempt to open or move the container.** In most cases, a specialized external contractor will need to be called in for proper and safe disposal.

As a safety precaution, when possible, observe bottles of ethers and other classes of organic peroxides to note whether crystals, which could be the signs of decomposition, have formed INSIDE the container. Ethers and other classes of organic peroxides can decompose and produce potentially dangerous and explosive crystals. Do not allow time sensitive chemicals to accumulate and dispose of them as soon as they are no longer needed or nearing expiration.

Some materials are ordered in small quantities (less than 6 month supply) and dated when the container has been opened. Examples include acetal, decahydronaphthalene, dicyclopentadiene, diethylene glycol, dioxane and isopropyl ether. Even if a commercial inhibitor has been added by the manufacturer, organic peroxide formation can begin within 6 months following exposure to air. The ordering of smaller quantities and the reduction of the volume of these materials in storage encourages the quick turnover of inventory and reduces the likelihood of peroxide formation (organic peroxides are explosive).

6.2.2.3 Declassified Radioactive Waste

In order for declassified radioactive waste to be collected proof of declassification is required. The only acceptable means of declassifications is obtained by following the declassification manual and obtaining

necessary approvals from the Risk Management Specialist – Radiation. A copy of the manual can be obtained by contacting rad.safety@uottawa.ca

Once the necessary approvals are obtained a special hazardous waste collection request can be made [online](#). The declassification approval/paperwork must be attached to the request for processing. No radioactive waste will be collected without declassification approvals.

6.2.2.4 Hazardous Waste relating to projects at uOttawa

The hazardous waste disposal services are also offered for projects at uOttawa. All manifests relating to the disposal of hazardous waste generated at uOttawa must be signed by a trained and authorised person. Therefore, Project Managers or Facility Managers at uOttawa that are coordinating the disposal of hazardous waste as a result of a project must notify the environmental department at the Office of Risk Management prior to scheduling services.

All original copies of Manifests received (Copy 2 – green copy and Copy 6 – brown copy) must be forwarded to the following contact (assuming copy 1 has been mailed to the MOECC):

*Environmental Risk Management Specialist – Hazardous Waste
University of Ottawa
1 Nicholas Street, Suite 840
Ottawa, ON
K1N 7B7*

6.2.3 Regular Hazardous Material Transfer Request

The service is designed for the transfer of hazardous materials including ignitable, corrosive, reactive and toxic materials on campus as this falls under the Transportation of Dangerous Goods regulation. This service does not accept radioactive waste. Some examples of this service are as follows:

- Hazardous materials that need to be transferred from one facility to another including the refilling of liquid nitrogen Dewars (under 50L) within Main Campus, 200 Lees, and Roger-Guindon Campus
- Hazardous materials that are purchased at Science Store and need to be transferred to a laboratory outside of D'Iorio

Important: If requesting a transfer from Science Store, the person requesting the transfer must have the necessary approvals to place the order (i.e. delegation authority). The Delegation Authority form needs to be completed by the Laboratory Supervisor (Principle Investigator) authorizing the contact person to make purchases on behalf of the laboratory and a signed PDF copy must be emailed to science.store@uottawa.ca . For more information on the required forms and approval process contact the Science Store. This delegation is mandatory as all chemical transfer originating from science store are deemed purchases of material.

The deadline for submitting the completed *Regular Hazardous Materials Transfer Form* is 10 AM the day before the scheduled transfer. Note there are no services offered on Mondays. Kindly note transfers are scheduled in at the next available time slot and we cannot guarantee the date requested will be the service date. It is strongly recommended to plan ahead of time when requesting this service.

The form is available at the following URL: <https://orm.uottawa.ca/transfer-request>

6.2.4 Special Hazardous Material Transfer Request

This service is to be used for:

- materials with declared insurable values over \$30,000,
- highly reactive materials,
- research samples/live specimens (moving of a PI from another Institution to uOttawa)
- Shipping hazardous materials internationally (to another University or Institution).

In order to request this service, please contact enviro@uottawa.ca and title the subject of the email special transfer request.

Kindly note it is impossible to identify the length of time required to offer this service as it is case by case. It is strongly recommended to plan ahead of time when requesting this service. The Office of Risk Management does not cover the costs for special transfer requests.

6.2.5 Unidentified/Unknown Hazardous Waste

Unknown chemicals pose a serious legal and safety problem for the University of Ottawa. Without an accurate description of the chemical, it is impossible to handle and dispose of the chemical safely. This means unidentified waste will not be accepted in the chemical waste program.

The unknown material must be sent for analysis and the costs of such analysis is not covered by the Office of Risk Management. Often it is possible to deduce the contents of an unknown chemical container by locating the original generator or talking to fellow researchers who are familiar with the kinds of chemicals used in a particular research project or laboratory. If identification of the "unknown" hazardous waste or material still cannot be made, then the item must be sent to an approved laboratory for analysis.

It is up to the principal investigator (PI) to ensure that students and employees are labelling all waste containers properly.

For legal and safety reasons, neither the University's Environmental Specialist nor the hazardous waste disposal contractor will accept or transfer "unidentified" or "unknown" containers of any kind, at any time.

6.3 *Scheduling of Collections and transfers*

Once a request is submitted online, the Environmental Specialist reviews the content in the Online Request form to ensure all applicable information is available. If clarification is required, the Environmental Specialist will contact the hazardous waste generator directly to request additional information or clarification prior to scheduling.

Once all of the required information is obtained, the hazardous materials technical service request will be scheduled into the next available opening as per the Hazardous Waste Program Schedule. The Environmental Specialist is responsible for confirming within 2 business days via email, the pick-up or

transfer date and time to the contact person identified on the form. Refer to *the ORM website* for a copy of the most up to date Hazardous Material Technical Services [Schedule](#).

The office of risk management reserves the right to modify the schedule at any time and without notice. The Office of Risk Management also reserves the right to reschedule the collection of any hazardous waste that does not comply with this procedure and to do so until the non-compliance is corrected.

6.4 *Collection of Hazardous Waste*

The contractor will physically remove the hazardous waste from the identified room number during the scheduled date and time slot and transport the waste to the satellite accumulation area. These rooms are kept locked while unattended and can be accessed only by authorised personnel.

Pending how many request were received for a certain time block and if there are issues with requests processed earlier in the day there may be slight delays in time schedules. Please be patient and contact enviro@uottawa.ca if the hazardous waste or transfer has not been performed by the end of the day.

In order for the contractor to perform the collection or transfer the following conditions must be met:

1. All Hazardous Materials must be clearly and accurately identified using the approved Hazardous Waste Labels (*See Figure 1*).
2. A representative of the facility or laboratory must be present/available via phone during the time of the collection/transfer or the hazardous waste must be easily visible and stored at an accessible location for this purpose.
3. The container selected for the storage of the Regular Hazardous Materials must be adequate as to not unnecessarily endanger the health and safety of the contractor and all nearby persons during the transportation of the hazardous waste. (i.e container must be compatible with the Hazardous Waste, have a tight lid and be in good condition. No broken containers will be accepted).
4. The contractor is only authorized to collect the hazardous waste identified on his/her copy of the *Hazardous Materials Technical Services Request*. Any last minute items will have to be requested separately and scheduled in the next available time slot.

6.5 *Empty Hazardous Waste Containers*

Empty containers generated by the University of Ottawa should not readily be disposed of in the regular solid waste or recycled, *without precautionary measures*. Containers that held hazardous materials or hazardous waste must be triple rinsed with water or a suitable solvent and air-dried before disposal. If a solvent is used for rinsing the emptied container, it must be air-dried in a fume hood or a ventilated area. The rinse/washing water generated in this process must be collected and disposed of as hazardous waste with proper labelling and packaging.

Empty chemical containers that have been rinsed are not usually regulated as hazardous waste unless they meet one of the following two categories:

- 1- Extremely Toxic Chemicals

Containers for substances listed in Schedule 3 of Ontario Regulation 347 at an unknown concentration or greater than 1 ppm. Listed contaminants are:

- Aflatoxin, pesticides,
- Tetrachlorodibenzo-p-dioxins (TCDDs),
- Pentachlorodibenzo-p-dioxins (PeCDDs),
- exachlorodibenzo-p-dioxins (HxCDDs)
- Tertachlorodibenzofurans

These containers are to be considered hazardous waste and should not be rinsed or washed.

2- Pathological waste

Contact bio.safety@uottawa.ca for information and processes.

Clean, empty, rinsed and vented containers can also be collected during hazardous waste regular collection when the request has been identified on the waste collection form.

6.6 Disposal of Controlled Goods

Due to regulatory requirements and special handling procedures, for substances controlled under the Controlled Drugs and Substances Act, Defence Production Act, and specifically, the Controlled Goods Regulations, their disposal has to be coordinated directly with the University's Controlled Goods Designated Official (DO). Therefore, these products cannot be disposed of in the exact same manner as regular hazardous waste.

Please contact the Controlled Goods DO at the Office of Risk Management to arrange for disposal of Controlled Goods:

Mrs. Homa Iraei
 Environmental Management Specialist
 Email: hiraiei@uottawa.ca

OR

Michael Histed
 Director, Office of Risk Management
mhisted@uottawa.ca

Visit the Office of Risk Management website to find the Controlled Goods program web page if you need any additional information regarding controlled goods. <https://orm.uottawa.ca/programs/controlled-goods>

6.7 Additional Resources

6.7.1 Uncontaminated Broken Glass

Uncontaminated broken glass is to be placed in the dedicated cardboard boxes, which are provided by housekeeping. These broken glass boxes are supplied and replaced by housekeeping and therefore are not

part of the hazardous waste program. It is significantly more costly to dispose of contaminated sharps (including glassware) and is therefore very important to respect both waste streams.

6.7.2 Recycling of Non Hazardous Materials

Non-hazardous materials that can be recycled are directed to our UOttawa sustainability department. Some examples of materials that can be recycled are: small regular household batteries (AA, AAA, etc.), cardboard, compost, certain construction and demolition waste, electronic waste, etc. for more information on the recycling program visit <https://sustainable.uottawa.ca>.

To dispose of a fridge and/or freezer (for a small fee) contact Facilities at ext 2222 and someone will come and collect the equipment.

6.8 *References*

- Laboratory Safety Manual, University of Ottawa, Office of Risk Management [Nov 2017]. https://orm.uottawa.ca/sites/orm.uottawa.ca/files/laboratory_safety_manual.pdf

Annexe 1 - List of HSRMs for each Faculty of the University

Faculty & Service	Contact Name	Employee Contact Info
Science	Pubalee Bera	613-562-5800 Ext 6425
	<i>Assistant</i>	613-562-5800 Ext 4580
Engineering	Pierre Laflamme	613-562-5800 Ext 6829
Medicine	Charles Mulcahy	613-562-5800 Ext 3210
	<i>Assistant</i>	613-562-5800 Ext 8628
Facilities	Guy Leblanc	613-562-5800 Ext 6992
All other faculties	Paul Fortin	613-562-5800 Ext 2627

Annexe 2 – Overview of Hazardous Waste Disposal

FLAMMABLE, COMBUSTIBLE OR IGNITABLE

Flammable and combustible liquids

Flammable and combustible liquids may be stored in either a glass container of 4L capacity or less, or approved high-density polyethylene plastic containers of 20L (5 gallons) or less.

Caution!

- Flammable liquids should be transferred inside a working fume hood.
- Before combining different wastes, test a small amount for reactivity. Pour wastes into waste containers slowly in a well vented area (i.e. fume hood). If the waste container becomes warm, wait until cool before recapping. Loosely seal waste container after each addition.

- Chemicals which have contained reactive metals (i.e. sodium or similar material) must be placed in separate containers from solvents which contain water.
- Store waste containers away from any sources of ignition. Use secondary containers to contain a potential spill.
- Ensure waste bottles are properly sealed and clean. Label all containers with a hazardous waste label indicating all chemicals contained, their concentrations and quantities, and the waste generator's name and phone number.

Ignitable Solids

Must be stored in an airtight container or bottle to prevent dispersal of dust. Store under an inert material if necessary. These materials must be stored in approved (i.e. CSA or equivalent) flammable storage cabinets. Doors to flammable storage cabinets are to be kept closed. Some flammable liquids (eg. ethers) are also peroxide formers.

Caution!

- Heat-sensitive flammable liquids must be stored in explosion-proof refrigerators. Non-vented refrigerators or cold rooms are not to be used for the storage of flammable liquids.
- Do not store other materials, such as reactive chemicals, in the same storage cabinet with flammable liquids.
- Materials must be used in well-ventilated areas and kept away from sources of ignition.
- For ignitable materials; Clean the work area frequently to prevent the accumulation of ignitable dusts.
- If transferring between metal containers, both containers must be grounded.
- Fill waste containers in a well vented area (i.e. fume hood).
- Store waste containers away from any ignition sources.

Solvents

Solvents should be stored, handled and disposed of as flammable or combustible liquids in approved High Density Polyethylene containers or 4 L amber glass bottles subject to compatibility. Additional precautions may be required in some cases (eg. ethers). Always add new solvents that have been added to the container on the label.

Caution!

Avoid exposure to the liquids and their vapours. Avoid skin contact; absorption may cause dryness and cracking of the skin, potentially leading to infection and / or allergic responses. Additional precautions may be required in some cases (eg. ethers).

Fuels & Oils

Fuels are considered flammable liquids and should be stored and handled as flammable liquids. Oils are typically less volatile and are considered combustible liquids.

Waste fuels and oils should be stored in either 5-gallon approved high-density polyethylene drums or 45-gallon drums, depending on volumes generated. Waste fuels should be transferred to the waste container in a well-vented area or a fume hood. Once transfer is complete, reseal the drum / container.

CORROSIVE CHEMICALS

Store in vented storage areas if possible. Solid bases may be combined with other chemically compatible bases or inorganic alkaline chemicals. Use approved high-density polyethylene or glass containers (always verify compatibility from safety data sheet first). Pour waste into containers slowly in a well-ventilated area with adequate personal protective equipment. If waste container becomes warm, wait until cool before recapping.

Caution!

- Do not add water to a highly-concentrated acid, as it can result in a violent exothermic reaction and may cause serious injury.
- Keep corrosives away from heat sources to avoid production of fumes. Avoid direct contact with fumes.
- Acids and bases must not be stored together (i.e. in the same cabinet or on the same shelf). Separate hazardous waste containers must always be used.

Photographic Chemicals

Photographic waste includes all fixers and developers used to process photographic film, x-ray film and autoradiography film and print. Photographic waste is classified as corrosive and therefore must be disposed of according to this procedure. Photography waste is to be disposed of in approved 20L HDPE carboys.

Caution!

- Do not mix fixers and developers. Use separate hazardous waste containers.
- Make sure to pour developer or fixer waste in well-ventilated areas or fume hood.
- Store corrosive materials on the lowest shelf

HIGHLY TOXIC MATERIALS

A highly (or acutely) toxic material is anything which, when ingested, inhaled or absorbed in relatively small amounts, may cause damage to bodily structure or function. There are many such substances, of both biological and chemical origin. A few examples include arsenic trioxide, cyanides, nickel carbonyl, phosgene, tetrodotoxin, etc. This list is not comprehensive. Highly toxic, carcinogenic or mutagenic materials must be locked in specific storage areas (eg. cabinet or cupboard) with access limited to authorized personnel. Most highly toxic wastes (eg. cyanides) should be put in separate, appropriately sized waste containers. Some, however, may be combined with other chemical wastes if compatible. Waste containers with particularly toxic contents should include the warning "toxic" on the label to signify the hazard for waste handling personnel.

Caution!

- Refer to Safety Data Sheets (SDS) prior to using product.
- Use only in a well vented area.

REACTIVE CHEMICALS

Reactive chemicals are substances which can create violent reactions during which the spontaneous liberation of heat and/or gases is too rapid to be safely dissipated by the surroundings. Thus, the reaction is out of control and either the vessel bursts, an explosion occurs, toxic vapours are uncontrollably liberated, flammable gas is evolved or spontaneous ignition occurs. Maintain only quantities that you require, completely isolate these chemicals from any sources of heat or moisture as applicable and clearly label the area where reactive chemicals are stored. Due to the risk associated with these materials it is highly recommended to maintain only quantities that you require and to date all chemicals when first delivered and opened. Use an appropriately-sized glass chemical bottle. Exercise caution if employing a used chemical bottle for reactive waste - confirm that the original contents are compatible with the waste.

General Caution!

- Exercise extreme caution when handling these materials.
- In case reactive or explosive chemicals are spilled and / or being evaporated into the atmosphere, do not switch any electrical equipment on or off.
- Refer to Safety Data Sheets (SDS) prior to using product.
- Looks for Visual Signs of Instability: The first signs of chemical aging, peroxide formation or chemical instability are usually visual. To make an early diagnosis and prevent an explosion and potential serious injury, please refer to the

following list of visible signs:

- Discolouration of the liquid/solution. Check the SDS for the original colour.
- Formation of crystals inside the solution is often an indication of peroxide formation.
- Formation of crystals around the cap of the bottle is usually a sign of advanced peroxide formation and should not be tampered with. Report the situation to the Health, Safety and Risk Manager and / or the Office of Risk Management for safe and immediate removal.
- Some materials are wetted for safe handling and storage (i.e. picric acid) and should appear paste-like. Once these materials dry out, they become extremely shock-sensitive and explosive.
- Disposal of reactive chemicals should be handled only by knowledgeable personnel.
- Do not combine reactive chemical wastes with other wastes.

Explosives (Shock Sensitive / Heat Sensitive Materials)

Chemicals readily sensitive to friction, shock, or sudden heating, or which can become shock-sensitive when allowed to dry out (eg. picric acid). Examples may include certain azides, diazo compounds, n-nitro compounds, picrates (especially metal salts), polynitroalkyl compounds, polynitroaromatic compounds, etc.

Caution!

- Protect from shock, elevated temperature, light, ignition sources and other reactive chemicals.
- Store all explosive compounds in areas isolated from high-traffic areas and away from other combustible materials.
- Use a flammable storage cabinet.
- Clearly label the area where explosives are stored.
- Check containers regularly for crystallization of liquids (eg. peroxide formation in ethers), or discolouration of liquid or solid, or drying out. Whenever possible, use the chemicals with added inhibitors.
- If crystallization has occurred DO NOT try to open or move the container. Advise others in the laboratory and contact your Health, Safety & Risk Manager.

Water Reactives

Examples may include alkali metals (sodium), organometallic compounds, halides, hydrides, peroxides, carbides, oxides, phosphides, anhydrides, etc.

Caution!

- Store in a cool, water-proof area. They should be properly desiccated whenever possible.
- Do not store water reactive materials under the sink.
- Isolate from other reactive materials.
- Clearly label the area where water reactives are stored.
- Protect water reactive chemicals from exposure to moisture or accidental contact with water. When working with water reactives, always have a class "D" fire extinguisher available.

Air Reactives

Examples of Air Reactives may include Metallic dusts (eg. nickel, titanium, zinc), alkali metals (potassium), hydrides, etc. Metallic dusts such as nickel and titanium should normally be stored in containers with some moisture. Other solids should be stored under an inert gas or liquid.

Caution!

- Isolate such materials from oxidizing agents.
- Clearly label the area where air reactives are stored.

- Minimize exposure to air.
- When working with air reactives, always have always have a class "D" fire extinguisher available.

Oxidizers and Reducers

Many oxidizers and reducers are also explosive, water reactive or air reactive - take the appropriate precautions. Minimize the possibility of oxidizers and reducers coming in contact with one another. Do not put oxidizers and reducers in the same waste container.

Caution!

- Do not store oxidizers and reducers together. Use separate storage cabinets or shelves.
- Isolate oxidizers and reducers from other potentially reactive materials.
- Do not store oxidizers with flammable liquids.

Peroxide Formers

Common laboratory chemicals can form peroxides when exposed to air over time. Store in air-tight, amber glass bottles, in a dark location and under inert atmosphere if possible. Test all ethers and peroxidizable compounds for peroxide concentration at regular intervals. If peroxide concentrations are acceptable, re-date the container and retest at the next scheduled test date. If the peroxide concentrations are not acceptable, or if crystals have formed in the bottle or around the cap, do not move the bottle or attempt to remove the cap. Contact your Health, Safety and Risk Manager and / or the Office of Risk Management for assistance in disposal. Buy ethers and other peroxidizable compounds in the smallest size possible to limit amounts exposed to air. Date all chemicals when they are received and when they are opened.

Peroxides can be treacherously and violently explosive in concentrated solution or as solids. There are maximum storage times depending on the group of chemicals. Examples of peroxide-forming chemicals, (including maximum storage times):

- Dispose after 3 months: isopropyl ether, divinylacetylene, potassium metal, potassium amide, sodium amide, vinylidene chloride (dichloroethylene).
- Dispose or test after 6 months: acetaldehyde diethyl acetal, *chloroprene, cumene, cyclohexene, cyclopentene, ether, diethylene glycol dimethyl ether, dioxane, furan, methylacetylene, *styrene, tetrahydrofuran, *vinyl acetate, vinyl ethers, *vinylpyridine.
- Dispose after 12 months: *butadiene, *tetrafluoroethylene, *vinyl chloride.

(*These monomers **MUST** be stored with a suitable polymerization inhibitor)

BATTERIES

Waste batteries are considered a toxic metal waste and therefore should not be disposed to the landfill. Small AA or AAA Batteries are recyclable and can be disposed of in the waste stations in the white battery recycling receptacles. For other batteries (i.e lithium batteries) gloves should be worn if the outer casing of the battery is damaged and/or leaking. Lithium batteries are considered to be reactive waste and therefore should be stored separate from regular household batteries or mercury and cadmium batteries. Batteries with live ends should be taped to prevent accidental contact in the recycling receptacle.

For more information on the recycling of small batteries please contact Facilities at sustainable@uottawa.ca

BALLASTS & FLUORESCENT LAMPS

Ballasts must be dismantled from the fixture and ready for disposal.

Fluorescent lamps must be handled carefully and placed in the appropriate cardboard disposal container / in a

cardboard box and in a position in which there is no risk of it falling and/or breaking.
<p>SILICA GEL AND SAND</p> <p>Waste silica can be picked up in 20L HDPE black pails or original containers. Do not store silica in glass containers.</p>
<p>PRESERVED SPECIMENS, BIOLOGICAL SHARPS</p> <p>Biological sharps must be stored in appropriate biohazardous sharps containers (4.5 L yellow benchtop, 23 L yellow pail or approved cardboard box with double liner) and must never be overfilled. Containers that cannot be sealed will not be accepted.</p> <p>Non-infectious / non-biohazardous preserved specimens must be stored in leak-proof containers.</p>
<p>NON-PRESERVED SPECIMENS, BLOOD SAMPLES, ANIMAL WASTE, HUMAN ANATOMICAL WASTE</p> <p>The disposal of non-preserved specimens, biological materials such as blood samples and or any other biological material are to be disposed and coordinated through the biosafety team. Contact bio.safety@uottawa.ca for additional information and or visit the Office of risk Management website: http://orm.uottawa.ca/programs/biosafety/operational-hub.</p>

Annexe 3 – Special Considerations for Certain Chemicals

Perchloric Acid

! Contact with organic matter or other combustible material will usually cause an explosion !

Perchloric acid is a corrosive acid as well as a strong oxidizer. It can react with metal to form shock sensitive metal perchlorates.

Perchloric acid (60-75%)

At standard temperatures, 73% perchloric acid solution reacts as a strong non-oxidizing acid, is relatively stable and may be stored for extended periods in glass bottles with no contact with oxidizable material. At high temperatures (~160°C), it becomes a strong and active oxidizing agent and a strong dehydrating reagent (anhydrous perchloric acid).

Anhydrous perchloric acid (>85%)

Only experienced research workers should handle anhydrous Perchloric acid and these workers must be thoroughly familiar with the safety data sheet on the acid.

Work involving anhydrous perchloric acid (>85% w/w) should always be done in a dedicated perchloric acid fume hood. Never store anhydrous perchloric acid (>85%) for more than 30 days. Date all chemicals when they are first delivered and opened.

Storage

Store in flammable storage cabinet, away from organic materials. Do not allow perchloric acid to come into contact with strong dehydrating agents (concentrated sulphuric acid, anhydrous phosphorous pentoxide) or organic materials. Check containers regularly for formation of crystals around the cap, or discolouration of the clear white solution (yellow discolouration indicates expiry). Any discolouration of the anhydrous acid requires its immediate disposal. If discolouration or crystal formation is noted, do not move bottle or attempt to remove the cap. Contact the Health, Safety and Risk Manager and / or the Office of Risk Management for assistance in disposing such material.

Handling

A face shield and fume hood must be used. Clearly identify any fume hoods used for perchloric acid work as perchloric acid vapours tend to condense on the inside of fume hoods and the inner lining of ducts, eventually forming perchlorate crystals which are shock-sensitive explosives. Keep the quantities handled to a bare minimum.

In wet combustion, treat the sample with nitric acid to destroy easily oxidizable matter. For anhydrous perchloric acid (>85%) a second person must be informed of the intended use of anhydrous perchloric acid and be in the same room with research worker during the experiment. A lab coat, safety glasses, thick gauntlets and rubber apron must be worn. Only freshly prepared acid may be used. Do not make any more anhydrous perchloric acid than is required for a single day's work.

Disposal

Perchloric acid (73% or less) – dispose of according to the general disposal guidelines for reactive wastes. Do not combine with any other types of waste. Anhydrous perchloric acid (>85%) –

Picric Acid

! When allowed to dry, picric acid can form highly unstable crystals that are shock, friction and heat sensitive – can lead to explosion. If crystallisation occurs DO NOT try to move or open the bottle. Contact your HSRM immediately for disposal. !

Storage

Never let picric acid dry out. Store in cool, dry, well ventilated area out of direct sunlight and from sources of heat. Use or store picric acid in HDPE or glass containers – avoid metal caps or metal containers. Picric acid is incompatible and must not be stored with oxidizers, reducing agents, inorganic salts, alkaloids and metals. Picric acid can react with metals to form picrate salts which are explosive.

Handling

Maintain inventory of the picric acid and dispose of as soon as it is no longer required and/or coordinate disposal with the expiration date for the product. Do not allow to dry out. All work involving picric acid must be performed in a fume hood with appropriate PPE and must never be performed alone. There should always be a second person around who is knowledgeable on the risks and dangers of picric acid. Always clean the neck of the bottle and cap with a wet cloth before recapping and seal cap with parafilm.

Aqua Regia

Aqua regia solutions are extremely corrosive and may result in explosion or skin burns if not handled with extreme caution.

Storage

Always use approved glass containers for aqua regia solutions (preferably Pyrex). Aqua regia will melt some plastics and corrode/dissolve most metals.

Handling

All work involving Aqua regia must be performed in a fume hood with appropriate PPE and must never be performed alone. There should always be a second person around who is knowledgeable on the risks and dangers of Aqua regia. Do not store aqua regia solutions, submit hazardous waste collection requests frequently to ensure solutions are not stored for long periods of time. Never store aqua regia in a tightly closed container as the solution will oxidize over time to form toxic nitrosyl chloride, nitrogen dioxide and chlorine gases.

Hydrofluoric Acid

Hydrofluoric acid is a strong corrosive and highly toxic chemical that causes severe burns from dilute solutions and exposure to concentrated solutions can be fatal. HF burns may penetrate the skin and symptoms can be delayed up to 24 hours.

It is mandatory for every laboratory using hydrofluoric acid to purchase two (2) tubes of calcium gluconate among other items as an exposure kit to skin exposure. If hydrofluoric acid is used in your laboratory, it is important to

contact your HSRM for additional information on mandatory safety equipment and to ensure the laboratory is set-up to begin using the acid.

Hydrofluoric acid must be stored in approved HDPE (high-density polyethylene) containers and is NEVER to be stored in glass.

Storage

Concentrated HF should be stored in an acid cabinet in a secondary containment container made of polyethylene. Do not store HF with incompatible materials such as glass, ceramic and metals as this may produce hydrogen gas.

Handling

All work involving HF must be performed in a fume hood with appropriate PPE and must never be performed alone. There should always be a second person around who is knowledgeable on the risks and dangers of HF. It is strongly suggested to use a secondary containment made of high-density polyethylene to contain any potential spills.

Annexe 4 – Incompatible hazardous materials

<p>TABLE 4-A General Classes of Incompatible Chemicals Chemicals from Column A must <u>not</u> be combined with chemicals from Column B.</p>	
<p>A ACIDS Oxidizing Agents</p>	<p>B METALS, BASES Reducing Agents</p>
<p>Chlorates Chromates Chromium Trioxide Dichromates Halogens Halogenating Agents Hydrogen Peroxide Nitric Acid Nitrates Perchlorates Peroxides Permanganates Persulfates, Metals</p>	<p>Ammonia Carbon Metals Metal Hydrides Nitrites Organic Compounds Phosphorus Silicon Sulphur</p>

<p>TABLE 4B –Incompatible families</p>
<p>This table provides a more complete list of specific compounds that can pose reactivity hazards. The chemicals in the left-hand column should be transported, stored, used and disposed of in such manner that they do not accidentally come into contact with the corresponding chemicals in the right-hand column.</p>

TABLE 4B –Incompatible families

This table provides a more complete list of specific compounds that can pose reactivity hazards. The chemicals in the left-hand column should be transported, stored, used and disposed of in such manner that they do not accidentally come into contact with the corresponding chemicals in the right-hand column.

This chemical:	Is INCOMPATIBLE with:
Acetic Acid	Chromic acid, nitric acid, hydroxyl compounds, ethylene glycol, perchloric acid, peroxides, permanganates
Acetone	Concentrated nitric and sulfuric acid mixtures, chlorinated solvent/alkali mixtures
Acetylene and monosubstituted acetylenes	Chlorine, bromine, copper, fluorine, silver, mercury
Alkali, alkaline earth metals such as powdered aluminium, magnesium, calcium, lithium, sodium and potassium	Water, carbon tetrachloride or other chlorinated hydrocarbons, carbon dioxide, halogens
Aluminium and its alloys (particularly powders)	Acid or alkaline solutions, ammonium persulphate and water, chlorinated compounds, nitrates, and organic compounds in nitrate/nitrite salt baths.
Ammonia (anhydrous)	Mercury (in manometers, for example), chlorine, calcium hypochlorite, iodine, bromine, hydrofluoric acid (anhydrous)
Ammonium nitrate	Acids, powdered metals, flammable liquids, chlorates, nitrites, sulphur, finely divided organic or combustible materials
Aniline	Nitric acid, hydrogen peroxide
Arsenical materials	Any reducing agent
Azides	Acids
Barium peroxide	Combustible organics, oxidizable materials, and water
Barium rhodanide	Sodium nitrate
Bismuth and its alloys	Perchloric acid
Bromine	Ammonia, acetylene, butadiene, butane, methane, propane (or other petroleum gases), hydrogen, sodium carbide, benzene, finely divided metals,

TABLE 4B –Incompatible families

This table provides a more complete list of specific compounds that can pose reactivity hazards. The chemicals in the left-hand column should be transported, stored, used and disposed of in such manner that they do not accidentally come into contact with the corresponding chemicals in the right-hand column.

	turpentine
Calcium or sodium carbide	Moisture (in air) or water
Calcium oxide	Water
Carbon (activated)	Calcium hypochlorite, all oxidizing agents
Carbon tetrachloride	Sodium
Chlorates or perchlorates	Ammonium salts, acids, powdered metals, sulfur, finely divided organic or combustible materials
Chlorine	Acetone, acetylene, ammonia, benzene, butadiene butane and other petroleum gases, hydrogen, metal powders, sodium carbide, and turpentine
Chlorine dioxide	Ammonia, hydrogen sulphide, methane, and phosphine
Chloroform	Strong bases, ketones and strong base, alkaline metals, aluminium, strong oxidizers
Chromic acid and chromium trioxide	Acetic acid, naphthalene, camphor, glycerol, alcohol, flammable liquids in general
Copper	Acetylene, hydrogen peroxide
Cumene hydroperoxide	Acids (organic or inorganic)
Cyanides	Acids or alkalies
Flammable Liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, halogens
Fluorine	Most materials
Hydrazine	Hydrogen peroxide, nitric acid, or any other oxidant
Hydrocarbons such as benzene, butane, gasoline, propane, etc.	Fluorine, chlorine, bromine, chromic acid, sodium peroxide
Hydrocyanic acid	Nitric acid, alkali

TABLE 4B –Incompatible families

This table provides a more complete list of specific compounds that can pose reactivity hazards. The chemicals in the left-hand column should be transported, stored, used and disposed of in such manner that they do not accidentally come into contact with the corresponding chemicals in the right-hand column.

Hydrofluoric acid or anhydrous hydrogen fluoride	Ammonia (aqueous or anhydrous)
Hydrogen peroxide 3%	Chromium, copper, iron, most metals or their salts
Hydrogen peroxide 30% to 90%	Chromium, copper, iron, most metals or their salts, aniline, any flammable liquid, combustible materials, nitromethane, and all other organic matter.
Hydrogen sulphide	Fuming nitric acid, oxidizing gases
Hypochlorites	Acids, activated carbon
Iodine	Acetylene, ammonia (aqueous or anhydrous), hydrogen
Lithium	Acids, moisture in air, and water
Lithium aluminium hydride	Air, chlorinated hydrocarbons, carbon dioxide, ethyl acetate, and water
Mercuric Oxide	Sulphur
Mercury	Acetylene, alkali metals, ammonia, nitric acid with ethanol, fulminic acid, and oxalic acid
Nitrates	Sulphuric acid
Nitric acid (concentrated)	Acetic acid, aniline, chromic acid, hydrocyanic acid, hydrogen sulphide, flammable liquids, flammable gases, copper, brass, any heavy metals
Nitrites	Acids, potassium or sodium cyanide
Nitroparaffins	Inorganic bases, amines
Oxalic acid	Silver, mercury
Oxygen (liquid or enriched air)	Flammable gases, liquids, or solids such as acetone, acetylene, grease, hydrogen, oils, and phosphorus
Perchloric acid	Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, grease, oils, and reducing agents
Peroxides (organic)	Acids (organic or mineral), avoid friction, store cold

TABLE 4B –Incompatible families

This table provides a more complete list of specific compounds that can pose reactivity hazards. The chemicals in the left-hand column should be transported, stored, used and disposed of in such manner that they do not accidentally come into contact with the corresponding chemicals in the right-hand column.

Phosphorus (white)	Chlorates and perchlorates, nitrates and nitric acid
Phosphorous pentoxide	Organic compounds or water
Phosphorous (red)	Oxidizing materials
Phosphorous (white)	Air (oxygen) or other oxidizing material
Picric acid	Ammonia heated with oxides, or salts of heavy metals and friction with oxidizing agents, or friction associated with picric acid crystals
Potassium	Air (moisture and/or oxygen), carbon tetrachloride, carbon dioxide, water
Potassium chlorate or perchlorate	Acids and their vapours, combustible materials, especially organic solvents, phosphorus, and sulphur
Potassium permanganate	Glycerol, ethylene glycol, benzaldehyde, glycerine, and sulphuric acid
Selenides	Reducing agents
Silver	Acetylene, oxalic acid, tartaric acid, ammonium compounds, fulminic acid, nitric acid with ethanol
Sodium	As for potassium
Sodium amide	Air (moisture and oxygen) or water
Sodium chlorate	Acids, ammonium salts, oxidizable materials and sulphur
Sodium hydrosulfite	Air (moisture) or combustible materials
Sodium nitrite	Ammonia compounds, ammonium nitrate, or other ammonium salts
Sodium peroxide	Ethyl or methyl alcohol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerin, ethylene glycol, ethyl acetate, methyl acetate, furfural
Sulphides	Acids

TABLE 4B –Incompatible families

This table provides a more complete list of specific compounds that can pose reactivity hazards. The chemicals in the left-hand column should be transported, stored, used and disposed of in such manner that they do not accidentally come into contact with the corresponding chemicals in the right-hand column.

Sulphur	Any oxidizing materials
Sulphuric acid	Chlorates, perchlorates, permanganates (compounds of light metals, such as sodium, lithium, and potassium)
Tellurides	Reducing agents
Water	Acetyl chloride, alkaline and alkaline earth metals, their hydrides and oxides, barium peroxide, carbides, chromic acid, phosphorous pentoxide, phosphorous oxychloride, phosphorous pentachloride, sulphuric acid and sulphur trioxide
Zinc Chlorate	Acids or organic materials
Zinc (particularly powder)	Acids or water
Zirconium (particularly powder form)	Carbon tetrachloride and other halogenated hydrocarbons, in peroxides, sodium bicarbonate, and water

Annexe 5 – Common Waste Streams

WASTE TYPE	EXAMPLES	CONTACT
Hazardous Chemical Waste 	<i>Photographic supply waste, laboratory supplies and waste (Corrosives, flammables, toxic substances, small compressed gases i.e lecture bottles), paints, thinners, batteries, Phosphate buffered saline solutions (PBS), etc.</i>	ORM enviro@uottawa.ca https://orm.uottawa.ca/hazardous-regular-collection https://orm.uottawa.ca/hazardous-special-request
Chemically Contaminated Solids		ORM enviro@uottawa.ca https://orm.uottawa.ca/hazardous-regular-collection

		<p>regular-collection</p> <p>https://orm.uottawa.ca/hazardous-special-request</p>
<p>Preserved dissection specimens (not biohazardous / infectious)</p> 	<p>Specimens that are not infectious and that are chemically preserved.</p>	<p>ORM enviro@uottawa.ca</p> <p>https://orm.uottawa.ca/hazardous-regular-collection</p> <p>https://orm.uottawa.ca/hazardous-special-request</p>
<p>Uncontaminated Broken Glass</p> 	<p>Broken glass that is not chemically contaminated / glassware that is no longer needed that can be recycled</p>	<p>Physical Resources <i>Via HSRM / Facility Manager</i></p>
<p>Non Hazardous Waste</p> 	<p>Vegetable oil, vinegar, baking soda, any items that you may find in a regular kitchen / household that are not hazardous.</p>	<p>Compost or regular Garbage</p>