

**LABORATORY CLOSEOUT AND RELOCATION GUIDELINES**

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All other paper or electronic copies of the document may be out of date.

**Environment, Health & Safety**

Risk Management Services

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**LABORATORY CLOSEOUT AND RELOCATION GUIDELINES**

# INTRODUCTION

The **Laboratory Closeout and Relocation Guidelines** are the only approved method for temporary or permanent closure of laboratory facilities at the University of Alberta. These procedures are in place for:

* Ensuring safe and healthy work environments.
* Efficient transfer of ownership or re-occupancy of laboratories.
* Avoidance of unnecessary disposal and decontamination costs.
* Avoidance of potential fines.

The **Laboratory Closeout and Relocation Guidelines** must be followed when:

* The individual responsible for a laboratory leaves the University.
* The individual responsible for a laboratory moves to a different laboratory space at the University of Alberta.
* Major renovations are undertaken in the laboratory, **which require the laboratory space to be shut down and/or would disrupt the performance of regular research operations** for the duration of the renovation.

In cases where laboratory renovations are limited to a confined area of the lab, or for minor maintenance activities in laboratories, the **Clearance to Work in Hazardous Areas** procedure must be followed. Further information on this procedure is available on the Environment, Health & Safety (EHS) website.

For those with any questions concerning these Laboratory Closeout and Relocation Guidelines or requiring information on the hazard status of particular materials in your group’s possession, please contact EHS via ehslab@ualberta.ca. Be sure to include the name of your Principal Investigator (PI) and your department on all correspondence.

# RESPONSIBILITIES

It is the expectation of the University of Alberta (U of A) that research personnel led by their PI take responsibility for the proper storage, handling and disposal of all hazardous materials they employ or create during the course of their research. When moving or closing laboratories, it is the responsibility of the research group to ensure the following:

* All hazardous materials used or produced by the research group are either properly packaged as per Transportation of Dangerous Goods (TDG) regulations for transport to the new location, formally transferred over to a second party for continued research use, or properly neutralized or packaged for disposal as hazardous waste.
* All equipment used with hazardous material, such as chemical fumehoods, fridges, autoclaves, etc., are decontaminated regardless of whether the equipment is remaining at the old location or being moved to the new location.
* The old location is properly cleaned of hazardous material prior to vacating the location.
* Complete a Laboratory Closeout Form (Appendix A) for each laboratory room being vacated and submit the form to EHS at ehslab@ualberta.ca.
* When moving labs, set-up of the new laboratory location is in accordance with all existing federal, provincial and university regulations and guidelines as outlined in the pertinent University of Alberta safety manuals.
* The research group communicates their requirements for assistance in the move to supporting university departments, such as EHS and Supply Management Services (SMS), in a timely fashion so that their needs can be met with minimal disruption to the provision of services by these departments to the rest of campus.
* As detailed in Section 5, Biological Safety Cabinets (BSCs) must:
	+ Be decontaminated prior to moving or transferred to a second party. To arrange for a decontamination, e-mail ehslab@ualberta.ca.
	+ Have all gas lines and other utilities disconnected prior to moving. Please contact your departmental APO to submit a work order on your behalf to the university plumbers and electricians to arrange for this.

# LABORATORY CLOSEOUT FLOWCHART

Environment, Health & Safety (EHS) requires **at least a two-week notice of your laboratory closeout.** Researchers must be aware that some aspects of the laboratory close-out, in particular the disconnection of utility lines from Biological Safety Cabinets may take longer. Please follow the steps below that apply to your group.



# IDENTIFICATION OF HAZARDOUS MATERIALS & EQUIPMENT

The research group shall update separate inventories of **all of** the following materials acquired or created by the research group:

* Radioactive stocks.
* Stocks of pathogenic microbes or eukaryotic cell lines rated Risk Group 2 or greater.
* Human clinical or animal tissue specimens.
* Chemicals.
* Equipment at the old laboratory location that was used by the research group with any of the above materials.

**Note**: Not all materials may be housed within the old laboratory location. Research groups are asked to consider if there are additional materials acquired or created by the group held in alternate storage locations. This can include, but is not limited to, areas such as department chemical storage rooms, or shared freezers and cold rooms.

Together with their PI, the research group shall review and label the inventories to indicate which materials will be transferred to the new location, what materials will be turned over to second parties, and what materials will be disposed of as hazardous waste or surplus equipment.

**The inventories shall be signed by the PI and a copy of each inventory attached to the Laboratory Closeout Form (Appendix A) to be submitted to EHS.**

# DECONTAMINATION OF EQUIPMENT

All equipment used by the research group with chemical, radiation or biological hazards must be properly decontaminated and the decontamination must be documented using the EHS Equipment Decontamination Form, available on the EHS website. This form provides specific decontamination instructions for the research group to follow. Completed decontamination forms must be posted on the front of the **each** piece of equipment. SMS will not pick-up the equipment for transfer to the new laboratory or for surplus if this form is not completed. If the equipment remains at the old location, new occupants will not be able to move-in until the equipment decontamination form(s) have been completed.

Refrigerators and freezers shall be emptied and defrosted prior to decontamination. Refrigerators may only be moved if emptied. For equipment with vacuum pumps (excluding fridges and freezers), the pump oil should be drained prior to moving. Used vacuum pump oil must be disposed as Hazardous Material via Chematix.

**Exemptions:**

* Equipment that is shared with other groups and will remain in operation at the old location does not need to be decontaminated by the research group that is leaving; however, the group leaving must complete an Equipment & Hazardous Material Transfer form (Appendix B) for the piece of equipment as described in Section 4 to document that one of the groups remaining at the old location has agreed to assume responsibility for the piece of equipment.
* Specimen archival freezers may be moved without being emptied or defrosted **ONLY** if all materials inside the freezer are immobilized in holding racks (i.e., cannot roll about freely during transport), the freezer is locked for transport or secured shut with straps, and the group has received prior agreement from SMS to move the freezer in this fashion.
* Dewars may be moved with their liquid nitrogen and holdings in place provided the Dewar lid is secured and the group has received prior agreement from SMS.
* Biological safety cabinets require decontamination with gaseous formaldehyde before they may be moved. In addition, the cabinet must be tested at the new location before it can be used to ensure that its HEPA filter was not damaged in the move. To make arrangements for the decontamination and testing of biological safety cabinets, at least 2 weeks prior to your move date, send an email to ehslab@ualberta.ca with the following information:
	+ The name of your PI and Department.
	+ The make and model of each cabinet requiring transfer.
	+ The present location of each cabinet.
	+ The location where each cabinet will be moved to.
	+ Your preferred date of transfer.

Prior to the decontamination appointment, the research group must remove all equipment (i.e., vortexes, pipettors, waste containers, etc.) from the cabinet and decontaminate all surfaces of the cabinet workspace.

**Note:** Research groups must make arrangements for all services (i.e. vacuum, gas, water, oxygen) to be disconnected from the biological safety cabinet. Research groups must contact their departmental APO who will then submit a work order on their behalf. Groups must be aware that this process must be booked several weeks in advance. The cabinet can be decontaminated with gaseous formaldehyde by EHS prior to the services being disconnected.

# DISPOSAL OF HAZARDOUS MATERIALS OR SURPLUS EQUIPMENT

Unwanted equipment used with hazardous materials may be picked-up by SMS for surplus **ONLY** after it has been properly cleaned and has an Equipment Decontamination form attached to it (as per Section 5).

Any hazardous materials identified for disposal as waste that cannot be dealt with by autoclaving shall be disposed of using the University of Alberta Chematix waste management system.

Biohazardous materials must be disposed in the following manner:

* All microbial and eukaryotic cell line cultures shall be disposed of by autoclaving at 121°C for a minimum of 45 minutes.
* Human and animal tissue specimens received from another party (i.e., the Department of Anatomy, Alberta Health Services, U of A Laboratory Animal Services, etc.) should be returned to the original owner or destroyed. The research group shall contact the party from which the samples originated and request instructions on how to return the specimens or properly dispose of them.
* All transgenic animals and plants with novel traits shall be terminated and arrangements made for the remains to be picked up for incineration.
* Animal tissue specimens collected in the field must be incinerated.

All materials to be incinerated shall be disposed of through the Chematix system.

If in doubt as to the proper means of disposal for a given type of biological material, contact biosafety@ualberta.ca.

To register in Chematix, visit the EHS website.

All hazardous materials to be picked up by EHS must be packaged and labeled according to TDG regulations. It is a violation of TDG regulations to transport unlabeled dangerous goods. Incompatible chemicals must not be packed together. See Appendix C for a list of incompatible chemicals. **All boxes and packages must be clearly labeled with the contents of that box or package ONLY.**

Please allow at least two weeks turnaround for the pick-up of hazardous waste by EHS.

# TRANSFER OF HAZARDOUS MATERIALS OR SURPLUS EQUIPMENT TO SECOND PARTY

Research groups may elect to turnover hazardous materials or equipment used with hazardous materials to second parties remaining at the old laboratory location. To do so, the research group transferring the materials and the receiving research group must together complete a Hazardous Material Transfer form.

If gas cylinders are being left behind at the old laboratory location, they must be transferred to a new Principal Investigator and Speed Code. Contact SMS for more information regarding this process.

Complete inventories of the following **must** be attached to the Hazardous Materials Transfer form:

* Biohazardous material
* Chemicals
* Radioisotopes

**Note**: Radioactive stocks may be turned over to a second party provided the second party is certified to work with radionuclides and has the radionuclides involved already listed on their Radionuclide Permit. The inventory records must be updated for each individual radioisotope.

# MOVING OUT OF OLD LABORATORY LOCATION

When cleaning the old laboratory location and packaging hazardous materials for transfer, personnel shall wear appropriate personal protective equipment (PPE) consisting of a fully-fastened laboratory coat, gloves compatible with the hazards in use in the laboratory, safety glasses, full-length pants and closed-toe shoes. Depending on the hazards involved, fit-tested respiratory protection may also be warranted. Consult the Material Safety Data Sheets for the hazards involved prior to handling the hazardous materials.

If during the course of the laboratory close-out or relocation a hazardous spill occurs or is discovered, it must be cleaned up according to the spill remediation protocols (biological, chemical, radiological). Regardless of the hazardous material, research groups are expected to have appropriate spill remediation materials available prior to moving any hazardous materials. Following clean-up of the spill, the research group shall complete an Incident Report form on the EHS website.

**Packing Laboratory Material and Hazardous Material**

The following information is required on each box to be moved:

* The name and contact information of the Principal Investigator.
* The room number of the new laboratory.
* The TDG hazard class symbol for the appropriate hazard within the box if the boxes will be placed in a vehicle (i.e., moving within a building does not require TDG labeling).
* A list of the hazardous materials and quantities **held in the box.**

**a) General Packaging**

All glassware must be cleaned and appropriately packaged for transport. Use sufficient packaging material to prevent breakage.

Containers must be in good condition with caps that are tightly closed when being transported. Damaged containers must not be transported.

Primary containers of hazardous material must be properly labeled as per Workplace Hazardous Materials Information System (WHMIS) and TDG regulations to accurately describe the contents. Each box must be labeled with **its contents only.**

All boxes must be closed and sealed.

Specific types of hazardous material shall be packaged and labeled for transfer as follows.

**b) Radioactive Material Packaging**

Separate radioactive material from any non-radioactive chemicals. Radioactive materials must be transported by laboratory personnel; they are not to be transported by SMS. Instructions for the proper labeling of these items can be found in Appendix D.

Contact EHS to obtain additional information on the labeling requirements for each package as required.

All equipment that was used for radioactive experiments must be free of contamination prior to being transferred to the new laboratory.

**c) Chemical Material Packaging**

Separate chemicals in accordance with the Chemical Incompatibility Guide (Appendix C). Keep groups of incompatible chemicals separated during packing (i.e., do not pack acids and bases into the same box). Liquid hazardous chemicals must be packed in a leak-proof secondary container (e.g., plastic lined) before being placed in an outer container (i.e., cardboard box). The secondary container must be large enough to contain the volume of liquid being transported. Use adequate packaging material to prevent breakage of bottles.

Carefully examine sensitive chemicals to ensure they are safe to transport. Some chemicals are sensitive to air, heat and movement. Refer to Sections 5.6 to 5.8 of the U of A Laboratory Chemical Safety Manual. Contact EHS if a sensitive chemical that may pose a risk during transport is found.

Make arrangements for the removal of empty compressed gas cylinders or of gas cylinders that are no longer required. Ensure gas cylinder regulators are removed and a safety cap is secured over the cylinder valve prior to transport of any compressed gas cylinders.

If laboratory personnel will be transporting chemicals themselves within a building, the following steps apply:

* Use a cart to move multiple containers. Ensure the cart has rails so the containers don’t slip off. Chemicals must be within secondary container on the cart.
* Transport single bottles in bottle carriers.
* Personnel transporting chemicals must carry a cell phone to call for help in the event of a spill or other incident.
* Use freight elevators to transport chemicals if at all possible. Do not use the stairs.

**d) Biological Material Packaging**

Biological materials should be transported in screw-capped plastic primary containers. If transferring biological materials in Petri plates or snap-capped tubes, the opening of the primary container must be completely ringed with parafilm to prevent leakage. Biological materials in liquid cultures or tissue culture media **may not** be turned over to SMS for transport. If biological materials will be transported in glass primary containers, each primary container shall be wrapped in padding to prevent breakage.

Primary containers of biological material shall be sealed in a plastic bag or zip-lock secondary container prior to placement in the outer transport container (i.e., box, cooler, etc.).

If biological materials are temperature-sensitive, they may be packed on ice packs or in dry ice. If using dry ice, the dry ice must be indicated on the list of contents for the box and the TDG miscellaneous symbol must be added to the outside of the box.

**Caution:** Dry ice may not be used in an air-tight container, as the sublimation of the dry ice will result in a pressure build-up in the container that may cause an explosion.

For delicate biological materials or to prevent interruption of ongoing experiments such as continuous microbial cultures, research groups may elect to transport their biological materials to the new laboratory location themselves following the Transfer of Biological Materials on Campus guidelines.

**Cleaning Laboratory Space**

**Once all hazardous materials and laboratory equipment has been removed, clean all laboratory surfaces and fume hoods with detergent solution or decontamination solution as appropriate to the hazards used in that location.**

***Important Note:***

Once all the cupboards, and drawers are cleaned and/or vacuumed; please leave them open for inspection. This will facilitate efficient inspection of the laboratory by EHS personnel.

**All cupboards, drawers and storage spaces within the laboratory must be emptied and cleaned/vacuumed. EHS personnel will not be able to sign the laboratory closeout form if any equipment, hazardous waste or laboratory supplies are still located within the lab.**

**Radiation Decontamination Survey**

When a radioactive work area is no longer required the area must be properly restored as a clean area for non-radioactive work. The purpose of this is to ensure that the radioactive material is removed from the area, that all surfaces are free of contamination and that the radioactive warning tape which was used to identify it as a radioactive work area is removed. For this purpose, the following procedure must be followed:

a) Perform a wipe test on each piece of equipment that was used in the radioactive work area. This should be done before cleaning the equipment to identify the extent of potential contamination.

b) If radioactive contamination is found on a piece of equipment it must be either decontaminated or disposed of as radioactive waste in accordance with section I.15 of the *Code of Practice for Use/Handling of Radioactive Substances*anh. If the equipment is to be decontaminated, perform the following action:

 1. Transfer the equipment to a sink designated for radioactive decontamination.

 2. Wash the equipment using soap and water or decontamination reagent.

 3. Rinse the equipment using running water from the sink tap.

 4. Dry the equipment using paper towel.

 5. Dispose of the paper towel into a solid radioactive waste container.

 6. Perform a wipe test on the equipment to verify it is free of contamination.

 7. If the item is free of contamination, remove any radioactive label and return it to storage.

 8. If the item is still contaminated, repeat steps 2 – 7.

c) After removing all pieces of equipment including the spill tray from the radioactive work area, remove the absorbent bench-cote from the vertical surface where the experiment was performed. Dispose of the bench-cote into a solid radioactive waste container.

d) Perform wipe tests on the vertical surfaces within the radioactive work area and immediately outside the work area including the floor. For fume hoods also wipe test the inner walls, inner sash surface, sash handle and any control knobs that might have been used.

e) If radioactive contamination is found on any of the surfaces tested, decontaminate as follows:

1. Wash the surface with soap and water, or decontamination reagent starting at the perimeter of the contamination and working inwards to the centre of the contamination.
2. Rinse the surface using a squirt bottle containing water.
3. Dry the surface using paper towel and dispose of this as solid radioactive waste.
4. Perform a wipe test on the surface to verify it is free of contamination.
5. If the surface is still contaminated, repeat steps 1 - 4.

f) After the work area has been verified to be free of contamination remove any radioactive warning tape that was used to identify it as a potentially contaminated area.

g) Arrange for the removal of radioactive waste using the procedure given in section I.15 of *Code of Practice for Use/Handling of Radioactive Substances*.

**Note:** All hazard signs must be removed from laboratory equipment and spaces within the laboratory.

**EHS Personnel will remove all signage from the laboratory doors once the Laboratory Closeout has been completed.**

# MOVING INTO NEW LABORATORY LOCATION

Ensure someone is present at the new laboratory location to receive boxes of hazardous materials from SMS.

Open boxes carefully and examine contents for breakage or damage. Spill kits should be on hand in the laboratory to handle any breakage or spills.

When unpacking chemicals, store them according to compatibility groups in designated locations. Refer to Section 5 of the U of A Laboratory Chemical Safety Manual for information on the storage of chemicals.

When unpacking radioactive material, store the material in a secure location that is listed on the research group’s Radionuclide Permit. Verify that all radioactive stocks that were inventoried prior to the move have been received at the new location. Contact EHS should any radioactive material not arrive at the new location.

Once boxes of hazardous materials have been emptied, remove or deface any TDG hazard class stickers on the box prior to disposing of them.

Ensure compressed gas cylinders are securely attached to the wall or bench with a proper strapping system.

# COMMENCING WORK IN THE NEW LABORATORY

Prior to commencing research at the new location, follow the steps below that apply to your research group:

* The research group must receive confirmation that testing of their biological safety cabinets at their new location was completed.
* All fumehoods within the new laboratory must have a certification sticker indicating the average face velocity of the unit and the date the velocity test was conducted. Fume hoods moved from another location must be tested prior to being used.
* The Principal Investigator must update and sign a hardcopy of their Laboratory Biosafety Registry on which the new laboratory space(s) and any changes to the research group have been updated.
* Proper hazard signs for the laboratory space must be ordered. Hazard signs are required for all research space leading off the main and cross corridors of a given floor as well as on the doors for the cross corridor space if it will be used for the storage of hazardous materials. In order to receive new signs, research groups must complete a Laboratory Hazard Sign Order Form.
* Ensure the Radioactive Permit is posted in the new location.
* Contact EHS to update Chematix profile.

**Shared Space**

Many areas in new research facilities are designated as shared between several research groups. In order to ensure the safety of research personnel, groups who are sharing space must consider the following:

* The research groups will learn the location of the nearest emergency shower and eye wash, first aid kit, fire alarm pull station, emergency exits spill kits and other safety/emergency equipment. All members of the research group shall receive and sign-off on a documented orientation of the locations of this safety equipment. The research groups will work together to develop information on common practices such as waste management storage locations, contact personnel for shared equipment, and operation and maintenance procedures for shared core facilities.
* Groups shall collaborate to cross-train personnel on hazards each group is working with and to review decontamination and safety procedures for common use areas and equipment to confirm the procedures are appropriate for all hazards in use.
* Researchers are asked to assign primary and secondary emergency contact personnel who can speak on behalf of all the groups using the space in the event of an incident (i.e., burst pipe, freezer failure, detection of a spill, etc.). This discussion should be used to fill out and submit one hazard sign order form for the particular shared space involved.

# Appendix A: LABORATORY CLOSEOUT FORM

**Building \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Room Number\_\_\_\_\_\_\_\_\_ Phone Number\_\_\_\_\_\_\_\_\_**

**Lab Contact: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ E-mail\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Please choose one:**

**[ ]  Leaving University [ ]  Renovations – Full Lab [ ]  Moving to new location on campus**

|  |  |
| --- | --- |
| **Hazardous Material/Procedure** | **Date Completed or N/A** |
| **General** |
| Send Notice and anticipated date of closeout to EHS at ehslab@ualberta.ca |  |
| Decontaminate each piece of equipment that has been used with hazardous materials and Complete ***Equipment Decontamination Form*** for each piece of equipment. |  |
| Update Inventories for all:* Chemicals
* Biohazards
* Radioisotopes
 |  |
| All hazardous waste has been disposed of through Chematix |  |
| Clean and/or decontaminate laboratory surfaces (benches, sinks, etc.) |  |
| Transfer responsibility of equipment by completing ***Equipment & Hazardous Material(s) Transfer Form (Appendix B)*** |  |
| **Chemicals** |
| Evaluate all chemicals; ensure all containers have WHMIS labels |  |
| Transfer responsibility for chemicals via Hazardous Materials Transfer Form |  |
| Return Gas Cylinders to Supplier or transfer to another researcher |  |
| **Radioactive Material** |
| Perform thorough decontamination survey of lab benches, floors, equipment, etc**. Attach a map and printout of lab survey to this document.**  |  |
| **Biohazards** |
| Send Request to schedule Biological Safety Cabinet decontamination to biosafety@ualberta.ca. |  |
| Dispose of biohazards and waste by autoclaving or incineration |  |
| Transfer responsibility for biohazards via Hazardous Materials Transfer Form |  |

***Note***: Please complete one lab closeout form for each room (e.g., Lab 1-23 includes Radiation Room 1-23A, Tissue Culture Room 1-23B, Cold Room 1-43, therefore 4 separate close-out forms are required). Offices/student room/computer room, etc., where no hazardous materials were handled not require a lab closeout form.

**Appendix A: Laboratory Close-Out Form:**

**Department and EHS Sign Off**

**Department Sign Off: Submit completed check list to department head for signature**

**Department:**

**Researcher: Date:**

 **Signature Printed Name**

**Department Head: Date:**

 **Signature Printed Name**

#

#

**Environment, Health & Safety Sign-Off:**

**Name: Date:**

 **Signature Printed Name**

***Please post the lab closeout form on the door(s) of the laboratory following successful inspection by EHS and keep a copy for your records.***

**Comments:**

**Lab Contact Contacted by EHS Staff on mm/dd/yy)**

**Additional Notes:**

**Do not send this Form to EHS until completed!!**

**A New Researcher may not take possession of the lab until the closeout has been approved by Environment, Health & Safety. EHS will contact the Research Group to arrange a closeout inspection. This form will be returned to the originating Research Group when the closeout is complete.**

**Disclaimer**: The Laboratory Closeout review is conducted based on the information provided; wipe tests conducted for radioactive decontamination (where applicable); and visual inspection of the laboratory at the time of site visit. Every attempt has been made to identify, evaluate, mitigate and control potential hazards arising from the laboratory closeout procedure. EHS is not liable for any discrepancy. New lab occupants, departments, and contractors should perform their own hazard assessment prior to occupying or working in the laboratory space.

# Appendix B: EQUIPMENT & HAZARDOUS MATERIAL(S) TRANSFER FORM

|  |
| --- |
| **Declaration** |
| On \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the releasing research group represented by Date (dd/mm/yyyy) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Print Name Releasing Group Principal Investigator Releasing Group Departmenttransferred ownership of the hazardous materials and equipment described in the inventory attached to this document to the receiving research group represented by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Print Name Receiving Group Principal Investigator Receiving Group DepartmentThe receiving group assumes responsibility for the proper handling, storage and disposal of the materials and equipment identified in the attached inventory. |
| **Signatures** |
| Principal Investigator of the Releasing Group | Principal Investigator of the Receiving Group |

* The attached inventory of transferred hazardous materials and equipment will include the quantity and current location of each item.
* The original copy of the signed document will be retained by the Principal Investigator of the releasing group.
* Copies of the signed document will be retained by the Principal Investigator of the receiving group and the Chair of the releasing group’s department. A copy will also be sent to EHS with the releasing group’s completed Laboratory Close-Out form.

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# Appendix C: COMMON CHEMICAL INCOMPATIBILITIES

The following list is a quick reference of incompatibilities of many chemicals commonly encountered in the laboratory. It is not a comprehensive list of all possible combinations and chemicals. For details on any chemical, check the MSDS.

|  |  |
| --- | --- |
| Chemical | Incompatibilities for Chemical Storage |
| Acetic Acid | Aldehydes, bases, carbonates, chromic acid, ethylene glycol, hydroxides, metals, oxidizers, perchloric acid, peroxides, permanganates, phosphates, xylene, nitric acid |
| Acetic Anhydride | Acids, alcohols, bases, finely divided metals, oxidizers, reducing agents |
| Acetone | Inorganic acids, amines, hydrogen peroxide, oxidizers, plastics |
| Acetylene | Copper metal, halogens, mercury, potassium, silver, oxidizers |
| Alkalis | Acids, carbon dioxide, chlorinated hydrocarbons, chromium, flammable liquids, mercury, oxidizers, salt, sulphur, water |
| Ammonium Nitrate | Acids, alkalis, chlorates, fine organic powders, metals, nitrates, oxidizers, sulfur |
| Aniline | Inorganic acids, dibenzoyl peroxide, hydrogen peroxide, oxidizers |
| Azides | Acids, heavy metals, oxidizers |
| Bromine | Acetaldehyde, acetylene, alcohols, alkalis, amines, benzene, butadiene, butane and other petroleum gases, ethylene, fluorine, hydrogen, ketones, finely divided metals, sodium carbide, sulfur, turpentine |
| Calcium Oxide | Acids, ethanol, fluorine |
| Carbon (activated) | Alkalis, oxidizers, calcium hypochlorite, halogens |
| Carbon Tetrachloride | Benzoyl peroxides, ethylene, fluorine, oxygen, silanes |
| Chlorates | Acids, ammonium salts, carbon, metal powders, sulfur, finely divided combustibles and organics |
| Chromic Acid | Acetic acid, acetone, alcohols, alkalis, ammonia, bases, camphor, flammable liquids, glycerine, turpentine |
| Chlorine | Acetylene, ammonia, benzene, butadiene, ethylene and other petroleum gases, hydrazine, hydrogen, hydrogen peroxide, iodine, sodium hydroxide, turpentine, other petroleum components, finely divided metals |
| Chlorine Dioxide | Ammonia, hydrogen, hydrogen sulfide, mercury, methane, phosphine, phosphorous, potassium hydroxide |
| Copper | Acetylene, calcium, hydrogen peroxide, oxidizers |
| Cyanides | Acids, alkalis, strong bases |
| Flammable Liquids | Ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide, halogens |
| Fluorine | Ammonia, halocarbons, halogens, ketones, metals, organic acids, hydrocarbons, other combustible material |
| Hydrazine | Inorganic acids, hydrogen peroxides, oxidizers |
| Hydrocarbons | Acids, bases, oxidizers |
| Hydrochloric Acid | Alkali metals, amines, bases, copper, copper alloys, aluminium, moisture |
| Hydrofluoric Acid | Ammonia, glass, organics, sodium |
| Hydrogen Peroxide | Acetylaldehyde, acetic acid, acetone, alcohols, aniline, carboxylic acids, flammable liquids and combustible material, metals and their salts, nitric acid, nitromethane, organics, phosphorous, sodium, sulfuric acid |
| Hydrogen Sulfide | Acetylaldehyde, oxidizers, sodium |
| Hypochlorites | Acids, activated carbon |
| Iodine | Acetylaldehyde, acetylene, ammonia, hydrogen, sodium |
| Mercury | Acetylene, aluminium, amines, ammonia, calcium, fulminic acid, lithium, oxidizers |
| Nitrates | Sulfuric acid, other acids, nitrites |
| Nitric Acid (Conc.) | Acetic acid, acetonitrile, amines, ammonia, aniline, bases, benzene, brass, chromic acid, copper, cumene, flammable liquids and gases, formic acid, heavy metals, hydrogen sulfide, ketones, organic substances, sodium, toluene |
| Nitrites | Acids, nitrates |
| Nitroparaffins | Amines, inorganic bases |
| Oxalic Acid | Mercury, oxidizers, silver, sodium chlorite |
| Oxygen | Acetylaldehyde, alkalis, ammonia, carbon monoxide, ethers, flammable gases, liquids & solids, hydrocarbons, phosphorous |
| Perchloric Acid | Acetic acid, acetic anhydride, alcohols, aniline, bismuth and bismuth alloys, combustible materials, dehydrating agents, ethyl benzene, hydroiodic acid, hydrochloic acid, grease, iodides, ketones, other organic materials, oxidizers, pyridine |
| Peroxides, Organic | Acids (inorganic, organic) |
| Phosphorous | Air, alkalis, oxygen, reducing agents |
| Potassium | Acetylene, acids, alcohols, carbon dioxide, carbon tetrachloride, halogens, hydrazine, mercury, oxidizers, selenium, sulfur |
| Potassium Chlorate | Acids, ammonia, combustible materials, fluorine, hydrocarbons, metals, organic substances, sugars |
| Potassium Perchlorate | Acids, alcohols, combustible material, fluorine, hydrazine, metals, organic materials, reducing agents |
| Potassium Permanganate | Benzaldehyde, ethylene glycol, glycerol, sulfuric acid |
| Selenides | Reducing agents |
| Silver | Acetylene, ammonia, ammonium compounds, fulminic acid, oxalic acid, oxidizers, ozonides, peroxyformic acid |
| Sodium | Acids, carbon tetrachloride, carbon monoxide, hydrazines, metals, oxidizers, water |
| Sodium Nitrate | Acetc anhydride, acids, metals, organic matter, peroxyformic acid, reducing agents |
| Sodium Nitrite | Ammonium nitrate and ammonium salts |
| Sodium peroxide | Acetic acid, acetic anhydride, benzene, benzaldehyde, carbon disulfide, ethyl acetate, furfural, gylcerin, hydrogen sulfide, metals, methyl acetate, peroxyformic acid, phosphorous |
| Sulfides | Acids |
| Sulfuric Acid | Flammable and combustible liquids, potassium chlorate, potassium perchlorate, potassium permanganate, like compounds of sodium and lithium |
| Tellurides | Reducing agents |

# Appendix D: RADIOISOTOPE TRANSFER ON CAMPUS

Radioactive transfers between laboratories or buildings on campus are exempt from the *Packaging and Transport of Nuclear Substances Regulations* provided that the transfer does not require the use of a vehicle on public roads. If this condition is met, then the following procedure applies:

1. Before transferring any radioactive material between floors, buildings or from one Radionuclide Permit Holder to another, the written permission of the Radiation Protection Officer is required.

2. Ensure that the radioactive stock(s) or sample(s) to be transported is in a leak-proof inner container.

3. Ensure that the inner container(s) is labeled with a radioactive warning sticker, the radionuclide, activity and assay date. Also ensure that the inner container is labeled with the university emergency contact name and phone number (i.e., Communication Control Centre – 780-492-5555).

4. Place the inner container(s) of radioactive material in a carrying case that is lined with absorbent material. The type of carrying case that is recommended is a Coleman-style Styrofoam cooler with a lid that snaps shut.

5. Place a copy of the inventory record(s) associated with the radioactive material inside of the carrying case.

6. Ensure that the laboratory/room where the radioactive material will be transferred to is on the Radionuclide Permit issued to the person that will take custody of the radioactive material.

7. The person that will be transporting the radioactive material must be listed on the Radionuclide Permit as an authorized user. Personnel must also carry a cell phone which can be used in the event of a spill of the radioactive material during transport.

8. A radioactive spill kit must accompany the transfer of the radioactive material.

9. Transfer the radioactive material to the new location.

10. Update the radioactive material inventory record to reflect the new storage location.