

Standard Operating Procedure

**Acquisition, Use, Storage and Disposal of Chemicals at
PERFORM****PC-SOP-GA-003-v03**Revision History

Version	Reason for Revision	Date
01	New SOP	20-sept-2012
02	Change in management and responsibility and minor changes throughout the SOP. New sections on transport of cryogenics between buildings and chemical storage have been added	27-Oct-2014
03	Revision and minor changes in training mandatory	10-Aug-2017

Summary

The content of this standard operating procedure (SOP) provides guidelines for acquisition, use, and disposal of chemicals in a safe and environmentally sound manner at the PERFORM Centre of Concordia University

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I. Definition of terms and Abbreviations

Laboratory workers	Individuals who operate in the clinical analysis laboratory and similar spaces containing chemical and/or potentially hazardous substances.
Principal investigator (PI)	Head researcher that is responsible for all aspects of a given research project or program at PERFORM.
Supervisor	Knowledgeable person regarding all or an aspect of a project or program and is familiar with PERFORM's best practices that is responsible for ensuring that junior users conduct their activities in a safe manner and within scope of the project.
Personal protective equipment (PPE)	Specialized clothing or equipment worn for protection against health and safety hazards. Lab coats, gloves, safety goggles, face shields, long pants, closed toe shoes etc.
Workplace Hazardous Materials Information System (WHMIS)	The workplace hazardous materials information system (WHMIS) is a component of the hazard communication scheme in laboratory. WHMIS regulations set out requirements for workers training, hazardous materials labeling, and provision of Material Safety Data Sheets (MSDSs).
Safety Data Sheets (SDS)	A Safety Data Sheet (SDS) is a document that contains information about physical and health hazard products, advice about safety precautions and appropriate response in case of emergency.
EHS	Concordia University Environmental Health & Safety
GHS	Globally Harmonized System
Laboratories	Various laboratories in the clinical analysis suite

2. Introduction

2.1 Background

Before working with any chemicals at PERFORM all laboratory workers are required to have an orientation tour from the clinical analysis supervisor or designate at the PERFORM Centre. WHMIS training should be provided by Concordia's EHS office. As a note, WHMIS aligned with globally harmonized system of classification and labelling chemicals (GHS). Therefore, in December 1st 2018, WHMIS 2015 is mandatory. Before that date, both WHMIS 1988 for lab personal and WHMIS 2015 are required. Another training obligatory is Hazardous Waste Disposal training provide by EHS for all individuals generating hazardous waste on university property and for those supervising others who generate hazardous waste on university property. All generators of hazardous waste are required to follow specific rules and regulations regarding safe handling, storage, and disposal of laboratory hazardous waste.

2.2 Purpose

This SOP defines the safe practices of acquiring, using, storing and disposing of chemical products in the PERFORM Centre.

2.3 Scope

This SOP applies to all users and employees responsible for safe acquisition, use, storage and disposal of chemical products at the PERFORM Centre. It does not discuss biological or radioactive waste which is handled differently from the procedures outlined in this SOP.

2.4 Responsibility

It is the responsibility of the laboratory workers to use chemical or hazardous materials in a safe and responsible manner, to participate in risk elimination and programs about hazardous material. It is the responsibility of the PI/supervisor to ensure any of their research team (staff, students, collaborators, etc.) obtains the necessary instruction and designation from the clinical analysis supervisor to comply with PERFORM SOPs. It is the responsibility of the clinical analysis supervisor or the designate to ensure that all users of the facility have completed the proper training to be able to work in a safe manner, and have the required information available to do their jobs safely. Finally, it is the responsibility of the assistant director, research development & strategic initiatives to ensure that a safety program is in place, and that inspection of facilities is conducted regularly to ensure compliance with Concordia University regulatory requirements.

2.5 Relevant documents

This SOP is governed by the following Concordia University policies and SOPs:

- VPS 40 "Environment Health and Safety"

- VPS 41 “Policy on safety glasses and eye protection practices”
- VPS 47 “Policy for the management of hazardous materials”
- VPS 48 “Hazardous Materials Spill Response Policy”
- PC-SOP-CA-001 “Clinical Analysis Suite-Access, Use and Safety Rules”
- PC-POD-GA-001 “PERFORM Centre Booking System for Facilities and Equipment”
- Biohazard Safety Manual:
- <http://www.concordia.ca/content/dam/concordia/services/safety/docs/BiosafetyManual.pdf>
- PC-SOP-GA-009 “Emergency Response Procedures at the PERFORM Centre”

Please refer to these policies and manuals, or contact Concordia EHS office for further clarifications.

3 Procedure

3.1 Acquisition of chemical products

3.1.1 Purchases of chemical or hazardous materials shall be done through Concordia central stores <http://cscis.concordia.ca/>. Purchases may only be done by people who have the necessary authorization to purchase chemicals through opening an account with central stores.

3.1.2 Chemicals purchased for PERFORM will arrive barcoded to PERFORM at the clinical analysis suite (PC 2.233) from Concordia central stores and the chemical inventory will be updated by Concordia’s chemical inventory technician. On the rare occasion that samples, gifts, specialized chemicals have been delivered directly to PERFORM then the PI, clinical analysis supervisor or their designate will inform the chemical inventory technician to barcode the chemicals and update the inventory. They have to make sure that barcode ID has been registered with Concordia University’s chemical inventory assistant to update the chemical inventory of PERFORM.

3.1.3 Safety Data Sheets provides information about hazardous products, advice about safety precautions and appropriate response in case of emergency. After reception of the chemicals the PI, clinical analysis supervisor or the designate will verify the SDS. To find a SDS sheet from Chemwatch, use this link <http://www.concordia.ca/campus-life/safety.html>. Take notice that if there is a new information concerning hazardous, SDS will be update in 90 days and the supplier must communicate by writing to the customer if the product were sold within this 90 day period. No requirement to inform customers from past purchasers. Section 16 of the SDS provides revision date.

3.1.4 Compressed gases such as carbonic gas and nitrogen gas will arrived at the loading dock of PERFORM. Facilities coordinator is responsible to transport gases into the laboratory.

All PERFORM inventory will be logged and viewed in the central stores database (<http://cscis.concordia.ca/>). A user name and a password are needed to login, ask the clinical analysis supervisor or the technician of chemical inventory at Loyola Campus.

3.1.5 Transport of chemicals between buildings / campuses:

Transport of any hazardous substances should be transported using a cart and spill tray or by hand using a secondary container such a chemical resistant bucket. In addition, containers should be secured in an upright position to prevent spillage and they should be protected from heavy jolting or colliding with one another. They should not be carried up the stairs due to the risk of tripping and spilling. Freight elevators must be used for moving chemicals between floors. Passenger elevators must not be used for this purpose. Do not transport incompatible chemicals together on the same cart. All chemical containers require a label identifying the contents in accordance with WHMIS regulation. Transport in personal car is strictly forbidden.

Note: Certain compressed/liquefied gas cylinders or containers are subjected to the Transportation of Dangerous Goods (TDG) Legislation; be aware of the rules/exemptions before shipping any cryogenic materials by road transportation. If unsure, please contact EHS (ehs@concordia.ca) for information.

3.2 Use of chemical products in the laboratory environment

3.2.1 It is the responsibility of laboratory workers to handle chemical materials in a safe manner to protect themselves and those around them. First, they must read and understand the SDS, and apply controls if required. Then end-users must also protect themselves as per PERFORM SOP PC-SOP-CA-001 “Clinical Analysis Suite-Access, Use and Safety Rules” and Concordia policy VPS- 41 “Policy on safety glasses and eye protection practices”. This means wearing laboratory coats, closed toe shoes, safety glasses and working under a fume hood.

3.2.2 In order to prevent harmful health effects, hazards must be eliminated, reduced or controlled. Such control methods include:

- Elimination of the danger at the source
- Consult the SDS and understand all the hazards associated with the material
- Substitution with a less hazardous material
- Use a fume hood and limit exposure
- Administrative controls: training, restricted access, SOPs
- Wearing PPE

3.2.3 Workplace labels are required on containers of controlled products on site and on containers in which the product has been transferred from a supplier's container. Workplace labels must provide the following information: product name, safe handling precautions including pictograms, supplier information and reference to the SDS (if available).

3.2.4 It is the responsibility of the clinical analysis supervisor or the designate to provide the appropriate waste containers and their corresponding waste disposal labels for handling chemical

waste. They will maintain an inventory on site that will handle the needs of the end users. Complete hazardous chemical waste disposal request form.

3.2.5 The PI, clinical analysis supervisor or designate will order the appropriate waste containers and labels from EHS office by email at hazardouswaste@concordia.ca

3.2.6 Fill out the information on waste labels after placing the first waste in the container with the following: the contents without abbreviations, identification of the hazard, the percentage, indicate trace of component, and the barcode if applicable.

3.2.7 Attach the labels to the waste containers so that they are visible when the containers are collected. Ensure that the containers are properly closed, labelled and stored in an area designated by the clinical analysis supervisor in the laboratory until they are ready for pick-up.

3.2.8 Do not place incompatible waste containers next to each other. For information on incompatible chemicals, please refer to section 7.4 in the Laboratory Safety Manual http://www.concordia.ca/content/dam/concordia/services/safety/docs/EHS-DOC-001_LaboratorySafetyManual.pdf

3.2.9 After performing their experiments, the laboratory workers will separate their liquid from solid wastes into the following containers, and update the labels on each container as described below:

3.2.9.1 Coomassie/destain

3.2.9.2 General non-reactive toxic aqueous solutions

3.2.9.3 Non-halogenated organic solvents

3.2.9.4 Halogenated organic solvents

3.2.9.5 Specialized wastes (e.g. ethidium bromide, EtBr)

3.2.9.6 For oxidative/reactive substances or heavy metal substances, a specific container will be provided which meets the needs of that material as advised by the Concordia chemical safety officer.

3.2.10 Solid waste such as resins, polyacrylamide gels, and agarose gels impregnated with EtBr and plastic ware or vials that are contaminated with chemical materials will be collected in labelled solid waste containers. Laboratory workers must fill out the label with the corresponding waste identification for that container, immediately after the first waste placed in the container.

3.2.11 Solid waste such gloves, tips, tubes will be collected in a different container. Heavily chemically contaminated sharps will be disposed of using specialized sharps containers. Such white sharps containers are not to be used for biological sharps waste (biohazard red container). Laboratory workers must fill out the label with the corresponding waste information

for that container.

3.2.12 Laboratory workers should only fill a waste container to a maximum of 80% allowing 20% for expansion. Overfilled or leaking containers cannot be accepted for transport to waste room areas. Containers must be firmly closed once ready for pick up and disposal.

3.3 Storage of chemicals

It is always preferable to refer to the SDS for the storage requirements of individual chemicals. However, as a rule, separate the different chemical classes from each other:

- flammable or combustible liquids
- toxic chemicals
- oxidizing agents
- corrosive chemicals
- compressed gases
- water-reactive chemicals

The chemicals must be stored in such a way that will not allow them to mix with one another if a container breaks e.g. secondary containment. Chemicals should not be stored in fume hoods. Do not leave open bottle solvent under the fume hoods as it goes directly outside of the building, ensure to close solvent properly after each usage. Always store and use the minimum quantity of chemicals that are necessary for the laboratory. Do not store incompatible materials together. Dangerous combinations includes:

- Acids + Bases
- Flammables + Oxidizers
- Water Reactives + Aqueous Solutions

Other considerations:

- Segregate corrosives from flammables.
- Segregate strong oxidizers from everything.
- Most organic reactives must be segregated from inorganic reactives (metals).
Segregate reactives from flammables

The table in APPENDIX I can be used for general guidelines in terms of storage compatibility. However, you should always consult the SDS for storage requirements of the specific material to verify its compatibility. Maintain good housekeeping practices and minimize clutter.

3.3.1 Flammable and combustible liquids

- Should be stored in a flammable storage (fire-resistant) cabinet safety, spark-proof fridges or freezers.

- Cabinet should be vented from the bottom (with duct and joints also being fire resistant) or capped if not vented
- No ignition sources should be present
- Storage areas must be well ventilated
- Only one flammable storage cabinet per lab without prior approval
- Not compatible with oxidizers (e.g. ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide, calcium hypochlorite, and halogens). Remember, oxidizing substances (“O-O”) provide oxygen to fire.

3.3.2 Toxic chemicals

- Should be stored in a cool, dry, well-ventilated area, out of direct sunlight and away from heat
- Always keep the smallest amount necessary in laboratory
- Always consult the MSDS for storage requirements of the specific toxic material

3.3.3 Oxidizing agents

- Should always be stored separately from flammable materials, organic chemicals, dehydrating agents or reducing agents
- Oxidizing agents should be stored in a fire-resistant, cool, and well-ventilated area

3.3.4 Corrosive chemicals

- Should be stored in a well-ventilated area to prevent a buildup of vapors and excessive corrosion
- Should be stored in vented corrosion-resistant storage cabinets
- Acids should be segregated from bases for storage
- Secondary trays (polyethylene, Teflon, neoprene, or nitrile) should be used to contain any potential spill
- Organic acids (e.g., glacial acetic acid) should be segregated from inorganic acids

3.3.5 Compressed gases

- Should be stored in a cool, dry area, away from flammable materials, ignition sources, excessive heat and potential sources of corrosion
- Should be stored in storage cages when not used
- Should be securely fastened to a wall anchor or bench top to prevent falling at anytime
- Cylinder cap should always be on whenever the cylinder is not in use
- Oxygen cylinders should be stored separately from flammable gases
- Flammable gases (e.g. propane) should be stored in a designated area or outside buildings

- Should always use a cylinder cart to move cylinders around

3.3.6 Water-reactive chemicals:

- Should be stored in a cool, dry, well-ventilated area, out of direct sunlight and away from heat
- Should not be stored with flammable or combustible liquids
- Should be stored away from any source of moisture and preferably isolated by a waterproof barrier
- Can be stored in desiccators

3.4 Disposal of chemical waste

3.4.1 Refer to hazardous waste disposal guidelines at: <http://www.concordia.ca/campus-life/safety/Hazardous-Waste-Disposal/chemical-waste.html>

3.4.2 To request a pick-up the PI, clinical analysis supervisor or designate will contact EHS at hazardouswaste@concordia.ca at the same time, request for replacement waste containers and disposal labels will be made.

3.4.3 EHS personnel will pick up the chemical waste containers upon request, and will be available to do standard pick-ups at PERFORM on weekdays.

Unknown hazardous material of any kind cannot be accepted for disposal. Should the end user not be able to identify their waste, an analysis will be performed at the end user's expense.

3.5 Disposal of chemical containers

3.5.1 Solvent bottles, glass or plastic, which are used to store solvents CANNOT BE RECYCLED. However, empty solvent bottles CAN BE REUSED to collect chemical waste, as long as they are in good conditions and properly identified as waste. If not, these bottles must be rinsed 3 times with tap water and discarded residual water into an appropriate chemical container. Remove/deface the original product label and indicate "RINSED", place the rinsed container beside the regular garbage inside the lab. Always perform this procedure in a working fume-hood or well-ventilated area.

3.5.2 Expired, empty or defective bottles of solid chemicals will be managed through the chemical waste disposal program. Prior to request for disposal, note the barcode of the bottle or remove and tape it to the waste form (APPENDIX II). The chemical inventory technician will removed item from the chemical inventory. EHS is responsible for the removal of waste from the PERFORM testing facilities to the locked waste room in PC01.240 (the loading dock). EHS will manage the space provided therein until such time that it can be removed by a certified waste disposal company.

3.5.3 Chemical waste containers are provided free of charge from EHS, liquid waste containers are available 4L (narrow mouth), 10L, 20L sizes. For solid waste containers it is 4 L (wide mouth) and 20L sizes.

3.5.4 Clean broken glass or disposable laboratory glassware can be disposed in a broken glass cardboard box provided by EHS.

3.5.5 Glass, needles and other sharps contaminated with chemicals must be disposed of in the proper puncture-proof waste containers.

3.6 General procedures for dealing with chemical spills

The spill of any hazardous materials can pose a significant safety or health hazard to persons in the immediate vicinity due to the properties of hazardous materials (toxicity, volatility, flammability, explosiveness, corrosiveness, etc.) Therefore, it is imperative that each research group clearly establishes within their SOPs the types of spills that can safely be handled by lab personnel solely.

3.6.1 Training for handling a spill will be provided to all laboratory workers by Concordia EHS. If laboratory staffs are to clean up a chemical spill, they must be sure to:

3.6.1.1 Stay within their comfort zone

3.6.1.2 Be familiar with the hazards of the materials

3.6.1.3 Have been trained or have clean-up instructions available on the SDS or SOPs

3.6.1.4 Use appropriate PPE and necessary clean up equipment.

3.6.2 If the spill cannot be handled by lab personnel (large spill, highly toxic reagents, etc.), the staff should contact Security using the following procedure:

3.6.2.1 Advise and warn co-workers.

3.6.2.2 Evacuate and secure the area immediately.

3.6.2.3 Notify Security at 3717 or 514 848-3717

3.6.2.4 Provide the following information:

- Your name and location of spill
- Name of hazardous material
- Quantity involved
- Related health risks and precautions to be taken

3.6.2.5 Provide Safety Data Sheet (SDS) or appropriate documentation.

3.6.2.6 Assist Security or the Chemical Spill Resource Person as required.

Any spill (large or small) involving hazardous material must be reported by filling up an incident report. For more information concerning hazardous material spills, please consult the Concordia Emergency Management website: http://www.concordia.ca/campus-life/emergency.html#content-main_wysiwyg

3.6.3 PERFORM has spill kits for neutralizing acids/bases and for containing organic spills. Use the appropriate spill kit to contain/neutralize the spill.

3.6.4 If the spill can be thoroughly contained and cleaned up safely by PERFORM staff and the end-user, advise EHS on final disposal. (e.g. organic solvent contaminated absorbent pads and mats would need to sit in the chemical hood overnight to evaporate the solvent).

3.6.5 The PI, clinical analysis supervisor or the designate will report it to EHS and will fill out an incident report on the EH&S website: <https://www.concordia.ca/campus-life/safety/lab-safety/chemical-safety.html>

In the event of a small liquid nitrogen spill, most of cryogenics will turn into gases as soon as they are released free; evacuation may not be necessary if the area is well ventilated. However, if you begin to feel dizzy or lightheaded, shut off the cryogenic liquid, close the tank, and leave the area temporarily to get some fresh air. Let the area ventilate well before going back in.

APPENDIX I

Chemical Group Compatibility for safe storage

Chemical Group Compatibility for Safe Storage

Chemical Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Inorganic Acids		X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X		X	X		X
2. Organic Acids	X		X	X			X							X		X	X	X	X			X		X
3. Caustics	X	X			X		X	X					X	X	X	X	X	X		X		X		X
4. Amines	X	X			X		X	X			X		X	X	X	X	X	X						X
5. Halogenated Compounds	X		X	X										X			X							
6. Alcohols and Glycols	X						X							X		X								X
7. Aldehydes	X	X	X	X		X		X							X	X	X		X	X				X
8. Ketones	X		X	X			X												X	X				
9. Saturated Hydrocarbons																				X				X
10. Aromatic Hydrocarbons	X																			X				X
11. Olefins	X			X																X				X
12. Petroleum Oils																				X				X
13. Esters	X		X	X															X	X				
14. Polymerizable Compounds	X	X	X	X	X	X									X	X			X	X	X			X
15. Phenols			X	X			X							X		X			X	X				
16. Alkylene Oxides	X	X	X	X		X	X							X	X		X	X	X				X	X
17. Cyanohydrins	X	X	X	X	X		X									X			X					X
18. Nitriles	X	X	X	X												X								X
19. Ammonia	X	X				X	X						X	X	X	X	X			X				X
20. Halogens			X		X	X	X	X	X	X	X	X	X	X	X				X		X	X		
21. Ethers	X													X						X				
22. Phosphorus	X	X	X																X				X	
23. Sulfur (molten)								X	X	X	X					X						X		
24. Acid Anhydrides	X		X	X		X	X							X		X	X	X	X					

Unsafe storage combination

Safe storage combination



APPENDIX II

Hazardous Chemical Waste Disposal Request Form



Hazardous Chemical Waste Disposal Request Form

Full Chemical Name and Percentage (print clearly)	Physical State (liquid, solid)	Quantity (l, kg)	Container Size	Barcode (transcribe, DO NOT peel off)

Name: _____ Phone #: _____ Department: _____

Room#: _____ Date: _____ Send completed form to hazardouswaste@concordia.ca

APPENDIX III

SOP Training Record

SOP TitleAcquisition, Use, Storage and Disposal of Chemicals at PERFORM

SOP Code

Ownership	Document type	Area	SOP Number	Version
PC	SOP	GA	003	03

Training Record

Full Name	
Institution/PI	
Contact (e-mail or phone number)	

Signature

Sign here and return to SOP Custodian

Date