

The NMR laboratory Laboratory Safety Protocols and procedures Manual

1. Safety Training

- a) Individual training is required to access this laboratory and use its facilities. The training comprises reading this manual and a short orientation by Dr. Shipley or his designate. Key access requests will not be approved until these are completed and documented.
- b) Safety training is required for all people working in laboratories. Please visit the Health, Safety and Environment website to register for relevant courses.
<http://www.hse.ubc.ca/>
- c) It is the responsibility of each supervisor to make sure that their personnel have taken the relevant courses. At minimum, all personnel must have passed the UBC Okanagan WHMIS & Basic Chemical Safety course.

2. Safety equipment and access

- a) Whenever possible, ensure that the lab is kept clean, tidy and clutter-free.
- b) Learn the location and operation of the safety equipment in the laboratory.
- c) Help maintain access to safety equipment must be maintained at all time. Do not block access with carts or bins.
- d) Note the location of the fire extinguishers, first aid kit and eyewash stations. The nearest accessible eyewash station and first aid kit are one floor up in the undergraduate chemistry teaching laboratories. There is a fire extinguisher in the hallway.
- e) The UBCO emergency phone numbers are posted. In case of an emergency, phone ext. 78111.
- f) Non-serious injury: Mon-Fri 8:30-4:30: visit the first aid room in Arts 223.
- g) Serious injury: Call 9-1-1.

3. Clothing

- a) Open toed shoes or short are not permitted.
- b) Do not wear loose-fitting clothing when working with open flames.
- c) Long hair must be tied back.
- d) You must wear a lab coat and gloves if you or anybody else in the laboratory is handling corrosive, toxic, carcinogenic, or otherwise hazardous or unknown materials.
- e) Safety glasses or goggle are encouraged if there is a splash hazard or projectile risk in the vicinity.
- f) It is strongly encouraged that individuals protect themselves from work place hazards by wearing a lab coat, safety eyewear and gloves (PPE).
- g) For PPE related information consult:

Canadian Centre for Occupational Health and Safety (CCHOS): explains the advantages and disadvantages of different PPE choices. www.cchos.ca/oshanswers/orevention/ppe

UBC Chemical Laboratory Safety Manual: Chapter 6 covers hazard controls including PPE options.

Best Glove: Helps you chose the best glove for your use www.bestglove.com

WorkSafeBC: Provides guidelines and information on choosing and using PPE. www2.worksafebc.com/topics/PPE/PPEBasics-Types

4. Food and beverage

- a) Eating or drinking is not allowed in the laboratory
- b) Storage of food or drinks in the laboratory is not allowed.

5. Working with Chemicals

- a) Before handling lab chemicals, look up the MSDS for the chemical online at: <http://riskmanagement.ubc.ca/health-safety/chemical-safety/materials-safety-data-sheets>
- b) Unknown solutions and chemicals should be treated as hazardous and the maximum level of personal protective equipment should be worn.

6. Clean up and disposal of chemicals and glass

- a) Dispose of chemical waste in accordance with the UBC policy. As this is an analytical facility, it is not set up for waste disposal. Dispose of samples appropriately in your primary laboratory space.
- b) Glass waste and any other sharp materials (needles, razor blades) must be disposed of in designated glass waste, or sharps waste containers.
- c) Though extremely unlikely in this laboratory, report all sizable spills to your supervisor and UBC-O Health, Safety and Environment (HSE)
- d) Familiarize yourself with the attached UBC chemical spill procedures. The closest available spill kits are one floor up, in the undergraduate teaching laboratories.

7. Strong magnetic fields

Though the cryogenic magnet is actively shielded, there are locations in the room with measurable magnetic fields.

- a) No persons with pacemakers can enter the room. Pacemakers are sensitive to magnetic fields, and can malfunction near a large magnet.
- b) Magnetic objects, such as keys, tools, paperclips, jewelry, and coins, should be left on the shelf to the left of the door before approaching the magnet.

- c) Credit cards, debit cards, student cards, cassette tapes, floppy disks, or anything that use magnetic memory can be erased by proximity to the magnet. Leave your wallet, purse, or man purse on the shelf to the left of the door.

8. Inert gas asphyxiation

This laboratory has sufficient cryogenic inert gasses to asphyxiate persons in the room. Because of this the laboratory space has been equipped with air sensors that will trigger both rapid air exchange and an alarm system (flashing red light and audible alarm) in the case of low oxygen concentrations in the room.

- a) If the alarm is triggered, exit the room immediately and contact both security and Dr. Shipley.
- b) Do not stay in the room, even if you believe that it is a false alarm. Nitrogen and helium are colorless and odorless.

9. Laboratory security

- a) If you are the last person to leave the lab or office, ensure that the door locked behind you.
- b) If you are working alone after regular business hours, you must follow the UBCO protocol outlined by Health, Safety and Environment (<http://www.ubc.ca/okanagan/hse/safety/general.html>).

10. Contact information:

- a) In case of an emergency please contact campus security: ext. 78111 and/or Health Safety and Environment Advisor: ext. 78624

Persons responsible for the lab include:

Paul Shipley: ph. 250-807-8749 or 250-860-2685

- b) Other non-emergency contact information is on the red UBC “Emergency procedures and information” sign posted at the lab entrance door.

11. Safety Concerns:

- a) All accidents, incidents, near misses and work related injuries must be reported to your supervisor. Ensure that an incident report form is filled out and filed with UBC-O Health, Safety and Environment (HSE) . Forms can be found at <http://www.ubc.ca/okanagan/hse/safety/accidents.html>

- b) If your supervisor is not available, or you are not comfortable asking your supervisor a health, safety or environment related question, contact one of the following people for assistance:

Shelley Kayfish, B.Sc., CRSP, CRM

Director, Health, Safety and Environment

Tel: 250.807.8621

Fax: 250.807.9591

E-mail: shelley.kayfish@ubc.ca

Tel: 250.807.8656

Fax: 250.807.9591

E-mail: cherie.michels@ubc.ca

Dave Cavezza, B.Sc., RK

Health, Safety and Environment Associate

Tel: 250.807.8821

Fax: 250.807.9591

Cherie Michels, M.Sc.

Health, Safety and Environment Advisor

APPENDIX:

UBC Okanagan chemical spill procedures:

All UBC personnel who work with or in proximity to chemicals or other harmful substances must be prepared to respond to an accidental release or spill. Four components are required for effective response to a spill: Written safe work procedures, clean-up material (i.e. spill kit), personal protective equipment (PPE) and knowledgeable, well-trained staff. These requirements are consistent with the requirements of the BC Worker's Compensation Act, Occupational Health and Safety Regulation, 1999, s. 5.101 – 5.103. Individuals working with hazardous materials are required to take the chemical safety course, offered by Health Safety and Environment, which trains personnel on how to effectively respond to a spill. Spill clean-up procedures and a spill-kit checklist are provided below to aid in the development of departmental procedures and kits. For further information, contact Health Safety and Environment Manager at (250) 807-8624.

PRELIMINARY PROCEDURES

1. Ensure own personal safety and that of other personnel in the vicinity of the spill.
2. Ask yourself: "Can the spill be controlled or cleaned up by on-site personnel (i.e., the appropriate equipment, personal protective equipment and trained personnel are available)?"

If NO, EVACUATE and CALL 911 (Kelowna Fire Department).

If YES,

- a) Control any risk of injuries before taking action

- b) The “responsible person” (person who had possession, charge or control of a substance immediately before its spilled [BC-Environmental Management Act, Spill Reporting Regulation]) must act quickly to:

- I. CONTAIN
- II. CONTROL
- III. CLEAN UP the spill
- IV. DECONTAMINATE the spill area
- V. DETERMINE whether spill is reportable to an external agency (contact Health Safety and Environment at (250)-807-8624)

Spill may be cleaned up and the area decontaminated using the following procedures:

GENERAL PROCEDURES

1. Notification/Evacuation

- a) Notify other people in the vicinity of the spill.
- b) Inform the supervisor.
- c) Evacuate and post warnings in the area if necessary.

2. Reportable Spill

- a) Determine if the spill is a reportable spill. (contact Health Safety and Environment at (250) 807-8624)

3. Hazards of Spilled Material

- a) Before responding to the spill, obtain:
 - i. Name of the chemical(s)
 - ii. Quantity spilled, and
 - iii. Hazards of the chemical (review MSDS).

4. Clean-Up Procedures

- a) Perform clean up procedures only if:
 - i. All hazards have been identified and assessed;
 - ii. The appropriate spill control material, equipment and protective clothing are available (see PPE Checklist and Spill Kit Checklist);
 - iii. Personnel are familiar with equipment and clean-up procedures;
 - iv. More than one person is in the lab and available to participate;
 - and
 - v. No ignition sources are present.

- b) Put on the appropriate protective clothing, obtain spill kit and cautiously enter the spill area.
- c) Turn off any device, instrument, or machine that could exacerbate the spill.

5. Follow the SPECIFIC PROCEDURES according to the type of spill.

SPECIFIC PROCEDURES

1) FLAMMABLE SOLVENTS

DO NOT attempt to clean up a solvent spill if there is an ignition source present.

- a) Turn off any device, instrument, or machine that could exacerbate the spill. Use caution if any device is not spark-proof and the spill includes flammable materials.
- b) Follow General Procedures Step 1-4.
- c) Apply solvent absorbent (Spill X-S, Solusorb or equivalent product) from the perimeter inward, covering the total spill area.
- d) Mix thoroughly with plastic scoops until material is dry and no evidence of free liquid remains.
- e) Transfer the absorbed solvent to an appropriate disposal container that is compatible with the spilled solvents and seal the container.
- f) Contact the Health Safety and Environment Office at 807-8624 for directions concerning disposal of the container and its contents.
- g) Complete UBC Incident/Accident form and send to Health Safety and Environment, and the Department/Unit Head.

2) ACIDS

Except Hydrofluoric and Perchloric Acids (see below)

- a) Follow General Procedures Step 1-4.
- b) Slowly apply acid neutralizer (Spill X-A, Neutrasorb or equivalent product) from the perimeter of the spill, inward. Note: The quantity of neutralizer will vary with the concentration of the acid.
- c) Carefully mix with brushes and scoops to obtain homogenous mixture.
- d) When foaming subsides, check pH of a homogeneous sample of the mixture.
- e) Add a scoopful (about 5 mL) of the treated material to about 100 mL of water.
- f) Test pH with pH paper.

- g) If pH is not between 3 and 10, add more neutralizer. When the acid has been sufficiently neutralized, pick up treated material with scoops and transfer to a disposal container.
- h) Seal container appropriately, and label.
- i) Decontaminate and wash spill site surfaces with soapy water and wet sponge.
- j) Contact Health Safety and Environment for directions concerning disposal of the bag and its contents.
- k) Complete UBC Incident/Accident form and send to the Health Safety and Environment Office, and the Department Head.

3) CAUSTICS (BASES)

- a) Follow General Procedures Step 1-4.
- b) Slowly apply neutralizer to caustics (Spill X-C, Neutrakit-2 or equivalent product) from the perimeter of the spill, inward. Note: The quantity of neutralizer will vary with the concentration of the caustic.
- c) Carefully mix with brushes and scoops to obtain homogenous mixture.
- d) When foaming subsides, check pH of a homogeneous sample of the mixture.
- e) Add a scoopful (about 5 mL) of the treated material to about 100-mL of water.
- f) Test pH with pH paper.
- g) If pH is not between 3 and 10, add more neutralizer. When the caustic has been sufficiently neutralized, pick up treated material with scoops and transfer to a disposal bag container. Seal container appropriately and label.
- h) Decontaminate and wash spill area surfaces with water and wet sponge.
- i) Contact the Health Safety and Environment Office for directions concerning disposal of the bag and contents.
- j) Complete UBC Incident/Accident form and send to Health, Safety and Environment and the Department Head.

4) HYDROFLUORIC ACID

- a) Follow General Procedures Step 1-4.
- b) Wear protective clothing (lab coat, gloves and goggles) including HF respirator.
- c) Slowly apply solid calcium carbonate from the perimeter of the spill, inward. When the hydrofluoric acid has been absorbed, mix thoroughly with a plastic scoop. Note: The quantity of neutralizer will vary with the concentration of the acid.
- d) Add a scoopful (about 5 mL) of the mixture to about 100mL of water.
- e) Test the pH with pH paper. When the pH is between 7 and 10, scoop the neutralized material into a plastic container of water.

- f) Let stand until the white solid settles out of solution. Decant the solution to the drain with at least 50 volumes of water.
- g) Package the solid residue in a plastic bag, seal and label.
- h) Contact the Health Safety and Environment Office for directions concerning disposal of the bag and contents.
- i) Complete UBC Incident/Accident forms and send to Health Safety and Environment and the Department Head.

5) PERCHLORIC ACID

- a) Follow General Procedures Step 1-4.
- b) Slowly apply acid neutralizer (Spill X-A, Neutrasorb or equivalent product) from the perimeter of the spill, inward. Note: The quantity of neutralizer will vary with the concentration of the acid.
- c) Mop up with wet rags or paper towels. Contaminated paper or rags (combustibles) must be kept wet to prevent combustion upon drying.
- d) Wipe up spill site with wet rags.
- e) Place wet rags or towels in a plastic bag, seal and put into a flammable waste disposal can (non-metal).
- f) Contact Health Safety and Environment for directions concerning disposal of the bag and contents.
- g) Complete UBC Incident/Accident form and send to Health Safety and Environment and the Department Head.

6) MERCURY

(Report the spill to a supervisor; if necessary, contact the Health Safety and Environment Office for further assistance.)

- a) Evacuate all personnel from area if spill is extensive, or if room is small and ventilation is poor.
- b) Wear appropriate personal protective equipment such as lab coat; rubber, latex or vinyl gloves; plastic boot protectors; splash goggles; and half-mask respirator with approved cartridge for mercury vapours (self-contained breathing apparatus may be required if spill is large, temperature is elevated, and/or site of spill is in a confined space with poor ventilation).
- c) Ventilate area as much as possible. Mark off spill area with signs, barriers or tape.
- d) Pool mercury using stiff paper or plastic sheet to carefully manoeuvre beads of mercury into one large pool.
- e) Pick up mercury using a glass pipette with a rubber bulb OR a glass filter flask equipped with a trap and a vacuum source such as a large rubber bulb, water aspirator, vacuum tap or vacuum pump.

- f) Transfer liquid mercury to glass (preferable) or plastic bottle of the smallest size possible equipped with a tight fitting lid. Label 'Waste Mercury'.
- g) For picking up tiny droplets on uneven surfaces, use Merconvap wipes.
- h) Decontaminate spill area by using one of the following methods:

Dust area of spill with sulphur powder, then sweep mercury/sulphur mixture into wide-mouth jar equipped with tight fitting lid,

OR

Use Zinc pieces (pre-rinsed in dilute hydrochloric acid) to act as magnets to pick up mercury droplets, then place zinc/mercury pieces into wide-mouth jar with a tight fitting lid. Label the jar, "Mercury Clean-up Materials"

- i) The final clean up steps include:
- j) Cracks spread Sulphur or spray MERCONVAP® solution into cracks or under low cabinets and leave as a cover to inhibit evaporation of any mercury that is not visible or accessible.
- k) Monitoring of Spill Area – Contact the Health Safety and Environment Office to determine whether monitoring of the spill area is required. (Mercury levels should be < 0.05 mg/m³)
- l) Remove All Personal Protective Equipment Before Leaving Room - Decontaminate or Dispose of as “Waste Mercury Materials”.
- m) Place all labelled mercury containers into a solid container and label appropriately i.e. 'Waste Mercury' or "Mercury Clean up Materials".
- n) Contact the Health Safety and Environment Office for directions concerning disposal.
- o) Complete UBC Incident/Accident form and send to Health Safety and Environment and the Department Head.

Any questions or concerns can be directed to UBC-O Health, Safety and Environment (HSE):

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My supervisor has reviewed the information in this manual with me and answered any workplace health, safety or waste disposal related questions I had.

_____ Signature	_____ Name (Please Print)	_____ Date
_____ Supervisor Signature	_____ Name (Please Print)	_____ Date

NMR laboratory orientation has been completed with either Dr. Shipley or his designate

_____ Signature	_____ Paul Shipley	_____ Date
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