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INTRODUCTION

Safety is of utmost importance in our laboratories. Although work in the laboratory is planned so that exposures to potentially hazardous chemicals will not happen, an accidental spill can happen at any time. The purpose of this SOP is to outline the steps necessary to manage a chemical spill or splash. With appropriate equipment, procedures and training, most spills can be prevented, and any spills that do take place can be handled safely and effectively.


SCOPE

This SOP is applicable to staff and students in the event of a chemical spill or splash.

RESPONSIBILITY AND ACCOUNTABILITY

Although laboratory workers are trained and knowledgeable in the safe use and handling of chemicals in the laboratory, each worker must establish safe work practices to minimize the risk of chemical spillage from occurring. They must also be adequately prepared to handle a chemical spill. The inability to handle a spill no matter how minor the problem, could seriously endanger the safety and health of the laboratory worker and others, and the environment.

All laboratories should have a **chemical spill kit** on site in an accessible place, clearly labelled and ready for use. In the event of a chemical spill, it is the responsibility of the person handling the chemical to ensure that recommended spills handling procedures are followed. Knowledge of the basic guidelines involving chemical spills and splashes go a long way toward meeting that responsibility. All spill accidents must be reported to the Faculty/Centre Safety Committee and UTM OSHE Unit.

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POTENTIAL HAZARDS

The laboratory worker should not attempt to handle any chemicals unless they are properly trained in handling chemical spills because of the potential hazards involved. Chemicals can be radioactive, toxic, corrosive, flammable, explosive or carcinogenic. The nature of a spill, whether minor or major, is determined by the risk of the chemical spilled, the volume and the location of the spill.


Another common concern over chemical accidents and spills is short term toxicity. Acutely toxic contaminants such as cyanide and chlorine gas released from chemical spills pose an immediate threat to worker health. Chronic or long term toxicity such as exposure to carcinogens may result in cancer 10 or 20 years after the time of the spill although exposure does not result in short-term health problems.

The potential for slipping and falling over uncovered spills such as acids which can cause the floor to be very slippery is also a potential hazard.

PERSONAL PROTECTIVE EQUIPMENT

Refer to the Safety Data Sheet (SDS) which will list the personal protective equipment recommended for use with the chemical spilled.

- a) Eye and face protection: Chemical splash goggles together with a face shield provide protection to the face and neck if there is a potential for eye injury such as an explosion or implosion (pressure or vacuum) hazard.
- b) Skin and body protection:
 - Buttoned long-sleeved laboratory coat with a chemical splash apron (made of rubber, Viton® or neoprene). Check compatibility of the apron with the spilled chemical.
 - Disposable chemical-resistant Viton®, nitrile or natural rubber gloves (based on compatibility of the gloves with the spilled chemical, read the SDS!)


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- Check gloves for leaks before use. If necessary, wear a second pair for double protection.
- PVC boots.
- Wear closed toed shoes and long sleeved clothing to protect the feet and arms.
- Shoe covers.
- c) Respirators: Respirators protect against specific types of substances only and in certain concentration ranges. Each type has its limitations. Use of the correct one for the chemicals involved. If required (esp. when vapours and fumes are likely to be emitted) the user must be appropriately trained and test-fitted. Test the respirator for failure (such as filter clogging, odour break through etc.) before use. Some of the protections are:
 - Particle-removing air purifying.
 - Gas and vapour-removing air purifying.
 - Air supplying.

PRECAUTIONS

With proper planning, the effects of a spill can be minimized. Also, the extent of the required pre-cautions is partially determined by the size and the resultant hazard from the spill. Therefore, planning for a spill emergency forms an integral part of preparing for safe work practices with chemicals.

- Attend to any injured or contaminated people first.
- Protect yourself and others – keep a safe distance from the spilled chemical - cordon off the spill area to prevent additional worker and environment contamination.
- If a volatile, flammable chemical is spilled, ventilate the area and extinguish any open flames (e.g. Bunsen burner). Due to the possibility of sparks, do not operate light switches, telephones, or fire alarms.
- Avoid inhaling vapours from the spill.
- Think, plan clean up carefully.
- Consult SDS and determine appropriate clean up procedures for the chemical.


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- Decide if you can safely handle the spill. Do not take unnecessary risks.
- If unsure, consult Faculty/Centre Safety Committee, CMC or UTM OSHE Unit.
- Get help if the spills involves:
 - Large liquid volume
 - Strong odour/vapour
 - Worker injury or exposure
 - Very hazardous material
 - Hazardous conditions (e.g. explosion, fire, radiation, toxicity, etc)
- Wear appropriate personal protective equipment.
- Wash your hands before leaving the laboratory.

SPILL HANDLING PROCEDURES

Basics

- a) Worker injury (if any) must be taken care of FIRST, and spill clean up SECOND.
- b) Assess the spill, its hazards, and the danger to people in the vicinity quickly before taking action.
- c) In the event the spilled chemical is unknown, assume the worst and evacuate. The safety of those in the vicinity is top priority.
- d) Apply the “Three C” procedure:
 - i. Control the spill:
 - Immediate steps should be taken to control or stop the spill.
 - Do not leave the area unattended, cordon off the spill site.
 - ii. Contain the spill:
 - Contain the spilled chemical in as small an area as possible and prevent it from spreading.
 - iii. Clean up the spill:
 - Clean and decontaminate.

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Worker injury and contamination

- a) Minor injury: Rinse minor burns by chemicals or scalds with lots of cold tap water for at least 15 minutes. Treat with the laboratory First Aid kit.
- b) Eye contact: If chemical splash on eye, flush eye with plenty of water. Seek immediate medical attention.
- c) Serious injury or worker incapacitated: Send victim immediately to the UTM Health Centre to seek emergency medical attention.
- d) Chemical splashes on large area: Immediately remove chemical-soaked clothing and flush under the emergency shower for 15 minutes and obtain immediate medical help at the UTM Health Centre.

Handling spills


Laboratory workers who have had the appropriate training and the appropriate equipment can safely and effectively handle most of chemical spills that occur in the laboratory such as those involving one liter or less of liquid and or less than one kilogram of a solid. Refer to the SDS for recommended spill clean-up.

Do not attempt to handle a large spill of a hazardous chemical (corrosive, highly toxic, or reactive, emit fumes and vapors).

The Chemical Spill Kit

Spill kits should be easily available for use. Used items should be replenished and the contents checked on a monthly basis. The contents should include:

- a) Personal protection equipment:
 - Chemical-resistant gloves, e.g. nitrile rubber gloves.
 - Chemical splash goggles.
 - Face shield.
 - Protective apron.
 - PVC boots.

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b) Chemical absorbents, e.g.:

- Vermiculite.
- Zeolite.
- Powersorb spill pillow.

c) Chemical neutralising material, e.g.:

- Algosol, Neutrasorb, Spill-X-A-Acid (neutralises acid spills).
- Spill-X-C-Caustic, Neutracid-2 (neutralise caustic spills).
- Spill-X-Solvent, Solusorb (solvent neutraliser, act to reduce vapours, raise flashpoint).
- Hg Absorb sponge & powder (amalgamate mercury residue).
- Hg Vapour Absorbent (reduce concentration of vapour in hard to reach areas).

d) Plastic scoop, dust pan, broom or brush with plastic bristles.

e) Reagents for decontamination: (i) calcium carbonate, sodium hydrogen carbonate (for corrosive liquid spills).


f) Strong, heavy duty leak-proof waste bags, sealing tapes.

g) Hazardous waste labels, warning signs.

General Spill Clean-up Procedure

Minor chemical spill (chemical type and quantity which is not an immediate threat to health and does not result in contamination to body)

- a) Alert workers in the vicinity of the spill.
- b) Turn off open flames and heat sources if the spilled chemical is flammable.
- c) Ventilate area.
- d) Wear appropriate protective equipment.
- e) Avoid inhaling any vapours emitted from the spill.
- f) Confine and contain spill with appropriate absorbent material. Or sweep solid spills into a dustpan.
- g) If acid or base chemical, neutralise.
- h) Gather all solid contaminated material and put in a plastic bag. Seal and label.

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- i) If broken glass is present, use the scoop to place it in an appropriate plastic container and label.
- j) Clean and mop spill area with soap and water.
- k) Decontaminate the area, equipment and broom/brush/dustpan used.
- l) Dispose plastic bag as chemical waste

Major chemical spill or spills of hazardous or toxic chemicals

- a) To minimise exposure, alert people in the laboratory to evacuate.
- b) Turn off open flames and heat sources if the spilled chemical is flammable.
- c) Ventilate area.
- d) Cordon off affected area and post a warning sign at the entrance of the site to warn others while trained personnel arrive to clean up the spill.
- e) Call UTM OSHE Unit for assistance.

References	1. NUH Standard Operating Procedure: Handling Chemical Spills. 2. MIT Standard Operating Procedures on Spills of Hazardous Chemicals (G. R. Harrison Spectroscopy Laboratory)
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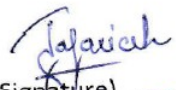
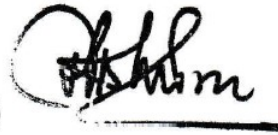


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