

## Department of Chemistry Safety Information

This document contains information presented under the following headings:

### 1. Overview of Safety Procedures for the Chemistry Department

#### a. Emergency Procedures

- i. Medical Emergencies and First Aid
- ii. Fire

#### b. Practicing Laboratory Safety

- i. Preparation
- ii. Good practices in the laboratory
- iii. Handling spills of chemicals
- iv. Waste chemical disposal

### 2. Sources of Information

### 3. Safety Information

- i. Compressed Gases
- ii. Flammables
- iii. Toxics
- iv. Corrosives

### 4. Accessing Material Safety Data Sheets on the Web

### 5. Form for posting

#### 1a. Emergency Procedures

**EMERGENCY PHONE 25555**

##### i) **MEDICAL EMERGENCY**

Be prepared to administer first aid according to the following guidelines.

#### **BASIC RULES**

1. Wash chemicals on the skin or in the eye as quickly as possible with cool water. Continue washing for at least 20 minutes.
2. If medical help is required, have the supervisor or a senior laboratory worker take charge in the laboratory and accompany the injured person to University Health Services, second floor Students' Union Building, or to Emergency at the University Hospital, 112 Street and 83 Avenue for medical help 3. If transport to medical help or an ambulance is required, call **25555**, give your name, building and room number. Campus security know the campus well and will arrive rapidly with trained personnel.
4. Reassure the injured person and watch for signs of shock (paleness, trembling, fainting).

## ACTIONS FOR SPECIFIC ACCIDENTS

### Chemicals on the skin

Wash the contact area immediately with cool water or soap and water for **20 minutes**. Remove contaminated clothing.

### Splashes in the eye

Immediately flood the eye with a gentle stream of cool water for **20 minutes**. It may be necessary to hold the eye open. Accompany the person to University Health Services, second floor Students' Union Building, or to Emergency at the University Hospital, 112 Street and 83 Avenue for medical help. Phone **25555** if transportation is required.

### Glass in the eye

Gently hold a gauze pad on the eye to prevent the eyelid from opening and take the person to University Health Services, second floor Students' Union Building, or to Emergency at the University Hospital, 112 Street and 83 Avenue for medical help. Phone **25555** if transportation is required

### Cuts

**Minor cuts:** Wash with cool water and soap to remove chemicals, then cover with a band aid.

**Major cuts:** Wash with cool water, cover with a gauze pad and take the person to University Health Services, second floor Students' Union Building, or to Emergency at the University Hospital, 112 Street and 83 Avenue for medical help. Phone **25555** if transportation is required.

If it is possible that glass is still present in the wound, wash the wound with cool water, cover it lightly with a gauze pad, and take the person to University Health Services, second floor Students' Union Building, or to Emergency at the University Hospital, 112 Street and 83 Avenue for medical help. Phone **25555** if transportation is required.

### Ingestion of Chemicals

Give lots of water or milk to drink and **immediately** take the person to University Health Services, second floor Students' Union Building, or to Emergency at the University Hospital, 112 Street and 83 Avenue for medical help. Phone **25555** if transportation is required.

### Burns

Place gauze soaked in ice water or cold tap water on the burned area. As quickly as possible replace with a pad filled with wet ice. Replace whenever the ice melts. If the burn is serious, take the person to University Health Services, second floor Students' Union Building, or to Emergency at the University Hospital, 112 Street and 83 Avenue for medical help. Phone **25555** if transportation is required.

### Shock or Fainting

Have the person lie down. Loosen tight clothing, cover the person with a blanket, and talk to them reassuringly. If symptoms persist, call **25555** for transport and accompany the person to University Health Services, second floor Students' Union Building, or to Emergency at the University Hospital, 112 Street and 83 Avenue for medical help.

## ii) FIRE

### Escape route

Know the escape route from your laboratory or office in case of fire emergency. The routes are posted in the hallways of the building.

### Location of Fire Alarm

Look for the fire alarm nearest to your laboratory or office so that you know where to find it should you have to raise the alarm about a fire.

### Sound of Fire Alarm

The sound of the fire alarm in the Chemistry Buildings is a high pitched siren interrupted by a voice announcing "A fire emergency has been declared. Leave the building immediately by the nearest exit"

### Location of Fire Extinguisher

Fire extinguishers are located close to the doors of all laboratories. Examine the extinguisher and read the instructions for its use printed on it.

### Action in Case of Hearing the Fire Alarm

If you hear the fire alarm, immediately close any gas taps being used in your laboratory and close any open windows. Quickly leave and closing the door behind you. Descend to the first floor using the stairs not the elevators and leave the building by the nearest exit.

### Action if Fire Occurs in your Laboratory

If a small quantity of liquid in a beaker catches fire, immediately cover the beaker with a watch glass or place a larger beaker over it. If the burning liquid has spilled on the bench, or there is a small fire which you can safely put out using a fire extinguisher follow these steps:

- remove the fire extinguisher from its holder
- pull the pin to break the plastic seal
- with your back to the exit, aim the extinguisher at the base of the fire
- pull the trigger
- sweep the extinguisher from side to side until the fire is extinguished.

If it becomes unsafe to fight the fire, immediately leave the laboratory, closing the door behind you and pull the nearest fire alarm.

When a fire alarm in the Chemistry Department is activated, it automatically brings campus security personnel and the City of Edmonton Fire Department and Fire Engine to the East Doors.

## 1b Practicing Laboratory Safety

### i). PREPARATION

1. Know where the emergency equipment is in the laboratory

- Fire extinguisher
  - Eye wash
  - First aid box
  - Safety Shower
2. Think about the experiment you are going to perform
    - Look at the chemicals you will use and make sure that you know the hazards of each. If you are not familiar with them, read the Material Safety Data Sheet. How to access these sheets is indicated in a later section.
    - Think about the hazards of the steps in your experiment. Should it be set up in the fume hood?

## ii). GOOD PRACTICES IN THE LABORATORY

1. Always wear eye protection
2. Wear a lab coat
3. Wear appropriate gloves when necessary
4. Wear covered shoes, not sandals
5. Use a face shield or work behind the fume hood if there is a risk of an explosive reaction
4. Do not eat, drink or store food in the lab
5. Never pipette by mouth
6. Long hair and loose clothing should be confined with rubber bands
7. Wash hands before leaving the laboratory
8. Know the hazards of the chemical before using it
9. Never work alone

## iii). HANDLING SPILLS OF CHEMICALS

Spill kits are available in all storerooms. They consist of a plastic pail containing goggles, a pair of rubber gloves and a bottle of Spill Mix. The Spill Mix is a mixture of equal weights of sodium carbonate (to neutralize any acid present), clay cat litter (sodium bentonite, to absorb any liquid) and dry sand (to moderate any reaction). On the side of the pail there is a detailed procedure for handling spills. This is also given below

### **Procedures to Follow if a Hazardous Chemical is Spilled.**

1. Assess the hazard.
2. Get help and seal off the area.
3. If the chemical has contacted anyone's skin, get that person to water immediately and wash the affected area.
4. Cover liquid spills with Spill Mix (available in all storerooms) until all liquid is absorbed.
5. As necessary, protect yourself from fumes or contact with the chemical.
6. Scoop the residue into a plastic pail.
7. Place the pail in a fume hood.
8. Depending on the chemical spilled, dispose of the residue appropriately.

For acids and bases, add water to the pail, test the pH, neutralize if necessary and pour the supernatant liquid into the drain.

For flammable liquids, allow to evaporate in the fume hood.

For solids, package in a plastic container, label clearly with the name of the chemical spilled and take to the storeroom, WB for disposal.

9. Document the incident and give a copy to Margaret-Ann Armour in W3-35 and to Tom Brisbane in E3-44

#### iv). DISPOSING OF WASTE CHEMICALS

- Organic liquids should be poured into the red waste containers
- Do not pour any organic solvents into the drain
- Waste solids should be packaged and labelled for disposal
- Do not throw any chemical waste into garbage containers either in the lab or in the hallways
- If you have any questions about waste disposal see Margaret-Ann Armour in W3-35 or Tom Brisbane in E3-44
- Place broken glass in the yellow garbage containers in the centre hallways. Do not place any chemical or other type of waste in these containers. Chemicals should be removed from the glass before placing it in the yellow bin.

## 2. Sources of Information

These books and others on all aspects of laboratory safety are available in W3-37. Please either consult the books in that room, or return them as quickly as possible after use. There are copies of a red covered waste disposal manual there also. These can be taken for use in your laboratory.

1. Merck Index thirteenth edition, Merck & Co., Whitehouse Station NJ 2001
2. Laboratory Health and Safety Guidelines, 4<sup>th</sup> edition, CIC 2003
3. Safety in Academic chemistry Laboratories, 7th edition, ACS, Washington , 2003
4. Catalogues, e.g. Lab safety supply
5. Handbook of Reactive Chemical Hazards, 4th edition, L. Bretherick, Butterworth-Heinemann, 1990
6. Hazardous Chemicals Information and Disposal Guide, 3rd edition, M.A. Armour, CRC Press, 2003
7. Handbook of Laboratory Waste Disposal, M.J. Pitt and E. Pitt, Wiley, NY, 1985
8. Hazards in the Chemical Laboratory, S.G. Luxon, Royal Society for Chemistry, London, 1992
9. Prudent Practices in the Laboratory: Handling and Disposal of Chemicals, National Academy Press, Washington, DC, 1996
10. IARC (International Agency for Research on Cancer) Scientific Publications and Monographs
11. Journal of Chemical Education, Safety Columns, Collected Volumes, ACS
12. Handbook of Laboratory Safety, CRC Press, Boca Raton, 1971

3.

### 3. Safety Information

#### i) COMPRESSED GASES

Important Points to remember when using compressed gases:

1. Transport cylinder in appropriate cart. Carts are available in WB Return the cart as soon as you have finished using it
2. Cylinder must be strapped to the bench
3. Use correct regulator: a different regulator is required for oxygen cylinders and corrosive gases
4. Do not completely empty cylinder
5. Mark cylinder "MT" and take to the storage area in the south corridor of the west wing basement. Chain the cylinder in place.

#### ii) FLAMMABLE SOLVENTS

Invisible vapor is a hazard

Do not use flammable liquids if there is an ignition source (e.g. an open flame) in the laboratory.

Sparks from electrical sources are also potential ignition sources

Examples of highly flammable solvents are:

Diethyl ether

Hexane (Skelly B, petroleum ether)

Acetone

Alcohols (methanol, ethanol)

Toluene

#### iii) TOXIC CHEMICALS

Toxic chemicals are defined as any substances which, when ingested, inhaled, absorbed or injected into the body in relatively small amounts, by their chemical action may cause damage.

The lethal dose to 50% of a test animal population ( $LD_{50}$ ) is often used as a measure of the toxicity of a compound and these numbers are frequently quoted in the literature. Very toxic compounds have an  $LD_{50}$  of less than 50 mg/Kg of body weight; compounds are defined as toxic if they have an  $LD_{50}$  greater than 50 mg/Kg and less than 500 mg/Kg, and care should be exercised with compounds having an  $LD_{50}$  of greater than 500 mg/Kg and less than 2500 mg/Kg.

#### iv) CORROSIVE CHEMICALS

The definition of a corrosive chemical is that it causes visible destruction or irreversible alterations to human tissue at the site of contact. Examples of corrosive chemicals are mineral and organic acids and bases, bromine and phenol.

## 4. Accessing Material Safety Data Sheets on the Web

Sigma/Aldrich

<http://www.sigma-aldrich.com/SAWS.nsf/msdshelp?OpenForm&Login=1>

You must log in:

Set up your own unique username and password

The first 'search box' is for checking for a chemical by product number. You need to

- select the brand (Sigma, Aldrich, Fluka, Riedel de-Haen, Supelco or RBI)
- enter the product (catalog) number, then click the 'Go' button to start the search
- if a successful search, the MSDS will be displayed (see below to print a copy)

The second search box is for checking for a chemical using 'Other Search Options'

- select product name, CAS number, molecular formula or full text
- enter the search term(s), then click the 'Go' button to start the search
- if a successful search, a results page will be displayed; select a product, then select MSDS

#### **To print the MSDS:**

- once the 'first' MSDS page has been displayed, select Print Preview (left part of screen, under Options)
- after the 'preview' MSDS web page has finished loading, print the MSDS

Note that some of the MSDSs are PDF files. Depending on the configuration of the computer you are using, PDF files may not be viewable via the web browser. They may have to be saved to disk, then viewed/printed using a program such as Adobe Acrobat Reader. It is free from: <http://www.adobe.com/products/acrobat/readstep.html> .

#### **Fisher Scientific**

[http://www.fishersci.ca/msds.nsf/By+MSDS+Name+\(English\)/\\$SearchForm?SearchView](http://www.fishersci.ca/msds.nsf/By+MSDS+Name+(English)/$SearchForm?SearchView)

Enter the name of the chemical, catalog number or CAS number

Click on the 'Search' button to start the search

Assuming a successful search, a list of one or more chemicals will be displayed

Click on the desired chemical to view its MSDS

#### **BDH**

<http://www.bdhinc.com/search/search-main.asp>

Click the button next to the desired search type

Click the MSDS button (under '... Information Type')

Type in your search term(s), then start the search

#### **J.T. Baker/ Mallinckrodt**

<http://www.jtbaker.com/cgi-bin/pasi.pl>

Follow the instructions on the screen to perform your search (search by chemical name or product number)

If a chemical name search is successful, you will see a list of products; click on the desired product

Scroll down the new page until you see 'Material Safety Data Sheet'

Click on that link to view the MSDS

#### **MSDSs for WHMIS D3 materials (i.e. biohazardous infectious materials)**

The Health Protection Branch (Canada) web page has MSDSs for some infectious materials/agents:

<http://www.hc-sc.gc.ca/hpb/lcdc/biosafety/msds/index.html> (note: the .../biosafety/... part is correct, i.e. no 'e')

If you want an MSDS from a specific company, try it's web site for on-line MSDSs. Alternatively, you can try a 'general MSDS web site' (each has MSDSs from many companies). Three examples of such web sites are given below. Another useful site is the Canadian Centre for Occupational Health and Safety. Pesticide MSDSs may be available on a general site such as 'MSDSonline'.

### **Three General MSDS Web sites:**

#### **Cornell University (USA)**

<http://MSDS.PDC.CORNELL.EDU/issearch/msdssrch.htm>

Enter the name(s) of the chemical for which you are searching

Click on the 'Execute Query' button

Up to 10 results are shown per page (if more than 10 'hits', 'click' to the next page, etc.)

Click on an appropriate link (i.e. name or number)

Includes some, but not all, of the MSDSs at the Vermont SIRI web site

#### **MSDSonline (USA)**

<http://www.msdsonline.com/>

Follow the instructions on the screen to perform your search

MSDSs may be directly from MSDSonline or a link may be provided to a manufacturer's web site

Some MSDSs are in PDF format (see footnote below)

#### **Vermont SIRI MSDS Collection (USA)**

<http://siri.org/msds/>

Follow the instructions on the screen to perform your search

Canadian legislation requires that an MSDS must have been created/revised within the past 3 years, however that is not a regulation in the USA, therefore, some MSDSs on the above three USA-based sites may not meet the Canadian 3-year restriction. In such a case, you may be able to find a more current MSDS by trying a different listed product or different source.

An MSDS may be available from the Canadian Centre for Occupational Health and Safety (CCOHS). The CCOHS database has detailed MSDSs for many products, and is particularly useful for 'formulated products' (mixtures or brand names). The CCOHS database can be accessed at the Office of Environmental Health and Safety (OEHS; 107 Education Car Park). You can phone the OEHS directly and explain that you want to have the CCOHS database checked for an MSDS (phone 1810 and the secretary will connect you with the appropriate person. In general, especially if you are checking on a reagent chemical, contact the OEHS only after other ways to obtain an MSDS have failed. Please avoid requesting that the OEHS search for more than two or three MSDS. If you need to check the CCOHS MSDS database for a number of chemicals, call the OEHS and make arrangements to go there to conduct the search yourself.

The following companies are just some of those with on-line MSDSs for their products:

**ICN biomedical**

<http://www1.icnpharm.com/bio/msds.nsf>

**Praxair**

[http://www.praxair.com/Praxair.nsf/X1/techce\\_safe?openDocument](http://www.praxair.com/Praxair.nsf/X1/techce_safe?openDocument)

**Roche(Boehringer Mannheim) biochemicals**

<http://biochem.boehringer.com/docxref.htm>

**Roche(Boehringer Mannheim) lab diagnostics**

<http://www.boehringer-mannheim.com/labdiag/us/ldpage.htm>

**5. Form for posting**

**\*\*\* PRINT, COMPLETE AND POST THIS FORM IN YOUR LABORATORY \*\*\***

**LOCATION OF EMERGENCY EQUIPMENT IN THE LAB IN WHICH YOU WORK**

**EMERGENCY TELEPHONE NUMBER: 25555**

**EQUIPMENT**

**LOCATION**

fire extinguisher

---

nearest fire alarm

---

safety shower

---

eye wash

---

first aid box

---

---

---