



Bishop's University Safety Policy

1.05 Hazardous Material (W.H.M.I.S.) procedure

Approved Date : March 22, 2011

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Prepared by : Joint Health & Safety Committee

1. Preamble

Bishop's University believes that the health and safety of its employees and its students is of the utmost importance. Not only do we want to protect the health and safety of our community, but we equally want to achieve such a goal by having everyone committed to the same goal: having the safest secure environment possible.

As you all know, the typical laboratory is home to a considerable range of chemicals requiring safe storage. Observations on a number of safety inspections within the University storage rooms and laboratories have revealed inappropriate chemical storage practices. The following information intends to offer guidance on the basic principles of safe chemical storage and segregation in our laboratories, and possibly other areas within the campus where chemicals are used. However, the guidance is certainly not intended to be exhaustive, and users of chemicals are reminded of the importance of consulting other sources (e.g. specific **Material Safety Data Sheets (M.S.D.S.)**) for more specific and detailed information.

2. Key Contacts

○ BUILDINGS AND GROUNDS

Director	B&G 117	2549
Administrative assistant	B&G 114	2650
B&G Foreman	B&G 116	2230
Cleaning	B&G 115	2233

○ DEPARTMENTAL CHAIRPERSONS

Biochemistry	JOH 329	2359
Biological Sciences	JOH 326	2460
Chemistry	JOH 218	2369
Physics	JOH 2	2372

○ DEPARTMENTAL TECHNICIANS

Biology	JOH 321	2364
Chemistry	JOH 219	2368

○ HUMAN RESOURCES

Director	MCG 106	2618
Generalist	MCG 130	2596
Officer	MCG 107	2643

○ SECURITY

Director	DEW	2711
Assistant Director	DEW	2711
Customer Service	DEW	2711
Lead Hand	DEW	2711

3. Objectives

- Ensure that safe storage practices are applied throughout campus grounds;
- Ensure that all people handling hazardous materials are aware of W.H.M.I.S. guidelines ;
- Protect all members of the academic community.

4. Scope

This policy shall apply to any member of Bishop's University according to the rights and obligations provided in the *Act respecting occupational health and safety* (AOHS) and in the *Act respecting industrial accidents and occupational diseases* (AIAOD). The current policy equally applies to the student community.

5. W.H.M.I.S.

5.1. General Information

W.H.M.I.S. was implemented by a combination of federal and provincial laws. The main objective of these laws was to give a uniform and comprehensive communication system for the safe management and use of hazardous materials in the workplace. Certain conditions must therefore be respected in order to attain such a goal: (1) Proper labelling of the containers of hazardous material containers; (2) Provide Material Safety Data Sheets (M.S.D.S.s) for every hazardous material; and (3) Employee participation in W.H.M.I.S. education and training. By complying with these conditions, we ultimately create a safer workplace for each and everyone of us.

W.H.M.I.S. uses classifications to group chemicals with similar properties or hazards. The Controlled Products (any product that can be included in any of the following classes) Regulations specifies the criteria used to place materials within each classification. Each class has a specific symbol (pictogram) to help people identify the hazard quickly.

5.2. W.H.M.I.S. Classes

Class A - Compressed Gas

Any material normally considered as a gas which is placed under high pressure or chilled, contained by a cylinder. Common examples include the following: compressed air, propane, chlorine, welding gases, etc.

Compressed gas may present additional hazardous properties. Propane is an excellent example as it is both a compressed gas and flammable.

Pictograms



Class B - Flammable and Combustible Material

Flammable and combustible materials may burn when exposed to either a heating source, a spark or a flame.

Flammable: the material will burn or catch on fire easily at normal temperatures (below 37.8°C or 100°F).

- Flammable gases: Compressed gases and Flammable
- Flammable liquids: Liquids with a flashpoint less than 100°F
- Flammable solids: Cause fire through friction or are readily ignitable and burn violently and persistently
- Flammable aerosols: Aerosol containers that have a severe fire hazard



Combustible materials: Must usually be heated before they will catch on fire at temperatures above normal (between 37.8 and 93.3°C or 100 and 200°F).

- Combustible liquids: Liquids with a flashpoint less than 200°F, but more than 100°F (fairly difficult to ignite)
- Reactive flammable materials: Materials that may suddenly start burning when it touches air or water, or may react with air or water to make a flammable gas.

Class C - Oxidizing Materials

Chemicals that readily give off oxygen or any other oxidizing substances which can in turn cause, contribute or stimulate a combustion. There may be a spontaneous reaction at either room temperature or under slight heating. Oxidizing materials may : (1) Cause a fire when in contact with flammable or combustible materials; (2) May speed up and intensify a fire; (3) Cause non-combustible materials to burn rapidly or finally; (4) may react with some chemicals to produce toxic gas.

Examples:

- **Gases** Ozone
- **Liquids** Nitric acid, Hydrogen peroxide, Sodium hypochlorite
- **Solids** Potassium permanganate, Sodium nitrite



The organic peroxide family is extremely hazardous because it equally has combustible characteristics as well as the ability to provide oxygen to a fire, the reaction resulting in a strong explosion.

Class D - Poisonous and Infectious materials

Division 1: Materials Causing Immediate and Serious Toxic Effects

Such materials are highly poisonous and an immediate threat to life and health. Whether inhaled, swallowed or absorbed through the skin, a single exposure may cause breathing difficulty, nausea, dizziness, headaches, serious injury and even death in severe cases.



Division 2: Materials Causing Other Toxic Effects

Their effects are not immediate as are Division 1 Materials, but a small and repeated exposure to toxic materials over a long may lead to very serious consequences such as cancer, sensitization causing allergies, reproductive and pregnancy problems, and finally, skin, eyes and lung irritation. These are called chronic effects.



Division 3: Biohazardous Infectious Materials

These materials are organisms (and their toxins) that produce different diseases in people or animals. Are included in this division germs (e.g. bacteria), viruses, fungi and parasites. It also includes cultures and diagnostic specimens (e.g. blood, organs or body tissue) suspected of containing such organisms. Workers should assume that every sample is dangerous, therefore wearing proper protection at all time and work in designated areas.



Class E - Corrosive Material

Corrosive materials may cause severe burns to the skin and eyes or, if inhaled, to the tissues of the respiratory tract. It can also attack clothes or other materials, such as metal. Common corrosives include acids, bases and other materials such as chlorine, nitrogen dioxide and ammonia gas.



Class F - Dangerously Reactive Materials

A substance will be included in Class F if it:

- can react vigorously with water, afterwards releasing a toxic or flammable gas ;
- becomes self-reactive (explode) as a result of shock, friction or an increase of temperature or pressure ;
- can undergo vigorous polymerization (chemical reaction that



releases a large and potentially dangerous amount of heat), decomposition (breakdown) or condensation (water is released).

Most of the materials described as "unstable" can equally be extremely hazardous. A high level of awareness is recommended when handling highly reactive compounds.

5.3. Hazardous materials not included in W.H.M.I.S.

Nine different categories of materials are not covered by W.H.M.I.S. but safety information is available to workers under other laws.

1. Consumer restricted products (labelled following the rules of the Hazardous Products Act)
2. Explosives (as defined by the Explosives Act)
3. Cosmetics, drugs, food or devices (as defined by the Food and Drug Act)
4. Pest control products (pesticides, herbicides, insecticides, etc) (as defined by the Pest Control Products Act)
5. Radioactive materials (as defined by the Nuclear Safety and Control Act)
6. Wood and products made of wood
7. A manufactured article
8. Tobacco or products made of tobacco
9. Hazardous wastes

5.4. Material Safety Data Sheets (M.S.D.S.'s)

M.S.D.S.s are designed to provide more detailed information on potential hazards and must be readily available in order to protect all users or employees who may be exposed to such hazards. This document summarizes information such as chemical data, physical data, toxicity, health effects and safe working procedures whenever handling a controlled product. It supplements the information found on the label of each chemical products.

In Canada, the program known as W.H.M.I.S. establishes the requirements for M.S.D.S.s in workplaces and is administered federally by Health Canada under the *Hazardous Products Act, Part II* and the *Controlled Products Regulations*. W.H.M.I.S. and M.S.D.S. requirements are also enforced by provincial Ministries or Departments of Labour.

According to Canada's *Controlled Products Regulations*, nine categories of information must be present on an M.S.D.S.:

1. Product Information: Product identifier (name, chemical formula, synonyms), the name of supplier/manufacturer with addresses and phone number in case of an emergency, and material uses.

2. **Hazardous Ingredients:** Name of all hazardous chemicals (pure substances will have a **Chemical Abstract Service (CAS)** number), concentration and toxicity (TLV-Threshold Limit Value, TWA-Time Weighted Average) of each hazardous ingredient of a controlled product.
3. **Physical Data:** Product properties such as physical state (solid, liquid or gas), appearance/odour, freezing point, boiling point, specific gravity, vapour density, vapour pressure, solubility, etc.
4. **Fire or Explosion Hazard:** Indicates the stability of the substance and gives information on how likely the product is to ignite or explode under various conditions.
5. **Reactivity Data:** Information on the chemical stability, the hazardous decomposition, incompatibility with other substances and some reaction products.
6. **Toxicological Properties:** Routes of entry in the body, health effects following a repeated or chronic exposure to a specific chemical.
7. **Preventive Measures:** Provides information on protective clothing, spills and leaks, waste disposal, storage and handling procedures.
8. **First Aid Measures:** Provides information for the safe evacuation and immediate treatment of anyone overexposed to a controlled product.
9. **Preparation Information:** Name and phone number of the person or group who prepared the M.S.D.S., and the date of preparation.
10. **Transportation information and other information (special precautions or comments)**

Workers have to review the M.S.D.S. to make sure the information is still accurate each 3 years.

5.5. Worker education and training program

W.H.M.I.S. legislation requires that workers exposed to hazardous materials must be informed about the issues and dangers of such materials (this means workers must be aware and appropriately informed about M.S.D.S., labels and symbols) and receive adequate training to enable them to work safely (refers to the instruction of danger and appropriate safety measures). Employers must develop, implement and maintain worker education programs in order to instruct workers about the W.H.M.I.S. legislation. Anyone who works with hazardous material or could be affected by a leak or spill will require training. However, all workers won't need the same level of training as it depends on the nature of the work.

The training must include the following:

- Information on the requirements established with regard to supplier and workplace labels (content, purpose and significance) ;
- Information on the requirements of material safety data sheets (content, purpose and significance) ;
- Information on how products may affect the health and safety of workers;
- Procedures for safe work practices: storage, handling and disposal of hazardous materials ;
- Procedures in case spills or fugitive emissions involving a controlled product occur ;
- Procedures in case an emergency involving controlled products occur.

An appropriate implemented and maintained W.H.M.I.S. education and training program will create a safer and healthier work environment.

6. Chemical storage

6.1. General storage rules

- This procedure acts as a guideline to the different storage practices. Be sure to always read the M.S.D.S. to ensure that the storing rules remain effective.
- Ensure that all containers are labelled and in good condition. Date chemicals when they are purchased, especially peroxide formers.
- Storage areas must be dry and well ventilated.
- Do not store chemicals near heat sources or in direct sunlight.
- Minimum quantities of hazardous chemicals should be stored. Dispose of chemicals that are no longer required.
- Flammables must be stored in approved flammable liquid storage cabinets, or in approved explosion-proof refrigerators.
- Secure gas cylinders away from heat sources.
- Never store chemicals on the floor.
- Never store liquid or corrosive chemicals above eye-level.
- Chemical containers should be checked on a regular basis for leakage.
- All containers must have tightly sealed caps when not in use.
- Do not store chemicals in fume hoods. This will reduce the effectiveness of the hood and increase the risk of spills and interaction of incompatible chemicals.

6.2. Flammable, Combustible and Ignitable Materials

6.2.1. Flammable and Combustible Liquids

- Flammable and combustible liquids in laboratories may only be stored in either glass containers of 4L capacity or less, or metal or plastic containers of 20L or less.
- These types of liquids must be stored in CSA approved flammable storage cabinets. Keep cabinet doors closed at all times.

- Do not exceed one flammable storage cabinet per lab without prior approval.
- Heat-sensitive flammable liquids must be stored in explosion-proof refrigerators. Non-vented refrigerators or cold rooms are not to be used for the storage of flammable liquids.
- **Always separate flammables from oxidizing materials.**
- Cap tightly when not in use.
- Store only quantities actually needed.

6.2.2. Ignitable Liquids

- Store in an airtight container or bottle to prevent dispersal of dust. Store under an inert atmosphere or environment if necessary.
- Ignitable solids must be stored in CSA approved flammable storage cabinets. Keep cabinet doors closed at all times.

6.2.3. Solvents

- Solvents should be stored as flammable or combustible liquids. Additional precautions may be required in some cases (e.g. Ethers).

6.2.4. Fuels and oils

- Fuels are considered flammable liquids and should be stored as flammable liquids. Oils are typically less volatile and are considered combustible liquids.

6.3. Corrosive Chemicals

- **Acids and bases must not be stored together in the same cabinet or on the same shelf.**
- Store in acid resistant cabinets or on polyethylene trays if possible.
- Never store on shelves higher than waist level. Store away from high traffic areas.
- Corrosive compressed gases must be stored in a well vented area, preferably in a polyethylene tray with an edge high enough to contain a spill. Non vented metal cabinets can lead to a build up of vapours and excessive corrosion.

6.4. Reactive Chemicals

6.4.1. Storage - General

- Do not store large quantities of these chemicals in your work area.
- Completely isolate these chemicals from any sources of heat or moisture.
- Clearly label the area where reactive chemicals are stored.

6.4.2. Explosives

- Protect from shock, elevated temperature, light, ignition sources and other reactive chemicals.
- Store all explosive compounds in areas isolated from high-traffic areas and away from other combustible materials.
- Use a flammable storage cabinet.
- Clearly label the area where explosives are stored.

6.4.3. Water reactives

- Store in cool, water-proof area.
- Water reactives should be properly desiccated whenever possible.
- Do not store water reactive materials under the sink.
- Isolate water reactives from other reactive materials.
- Clearly label the area where water reactives are stored.

6.4.4. Air reactives

- Metallic dusts such as nickel and titanium should normally be stored in containers with some moisture.
- Other solids should be stored under an inert gas or liquid.
- Isolate from oxidizing agents
- Clearly label the area where air reactives are stored.

6.4.5. Oxidizers and Reducers

- **Do not store oxidizers and reducers together.**

- Use separate storage cabinets or shelves.
- Isolate oxidizers and reducers from other potentially reactive materials.
- Do not store oxidizers with flammable liquids.

6.4.6. Perchloric Acid

- Store in flammable storage cabinet, away from organic materials.
- Do not allow perchloric acid to come into contact with strong dehydrating agents (concentrated sulphuric acid, anhydrous phosphorous pentoxide) or organic materials.
- Check containers regularly for formation of crystals around the cap, or discolouration of the clear white solution (yellow discolouration indicates expiry). Any discolouration of the anhydrous acid requires its immediate disposal. If discolouration or crystal formation is noted, do not move bottle or attempt to remove the cap.

6.4.7. Peroxide Formers

- Store in air-tight, amber glass bottles, in a dark location and under inert atmosphere if possible.
- Test all ethers and peroxidizable compounds for peroxide concentration at regular intervals. If peroxide concentration are acceptable (below 10 ppm safe for most purposes), re-date the container and retest at the next scheduled test date. If the peroxide concentrations are not acceptable, or if crystals have formed in the bottle or around the cap, do not move the bottle or attempt to remove the cap. Contact the chair for the Joint Health & Safety Workplace Safety subcommittee for adequate disposal procedures.
- Opened containers should be used up or discarded within 6 months after they are first opened. Unopened containers should be stored no longer than one year.

6.5. Highly Toxic Materials

- Highly toxic, carcinogenic or mutagenic materials must be locked in a specific storage area (e.g. Cabinet or cupboard) with access limited only to authorized personnel.

6.6. Radioactive Materials

- Mark waste containers and storage facilities for radioactive materials with a radiation warning symbol.
- Store radioactive materials in a secure area.
- Ensure adequate shielding is in place.

6.7. Cryogenic Materials

- Store and use in well ventilated areas.
- Store in well insulated container designed to minimize loss of product from boil-off (e.g. Dewar flask).

6.8. Compressed Gases

- Store compressed gas cylinders in a cool, dry area, away from flammable gases or liquids.
- Always store gas cylinders in the **UPRIGHT** position. If possible, securely strap or chain the cylinders to a wall or bench top.

7. Suggested Shelf Storage Pattern

7.1. Inorganic

Sulfur, Phosphorus, Arsenic, Phosphorus Pentoxide	Arsenates, Cyanides, Cyanates	<p>INORGANIC ACIDS (EXCEPT NITRIC ACID)</p> <p><i>Store Nitric Acid away from other acids unless the acid cabinet provides a separate compartment for Nitric Acid.</i></p> <p>Acids are best stores in dedicates cabinets with corrosion resistant materials, paint and hardware.</p> <p>ACID CABINET</p>
Halides, Sulfates, Sulfites, Thiosulfates, Phosphates, Halogens, Acetates	Sulfides, Selenides, Phosphides, Carbides, Nitrides	
Amides, Nitrates (<i>except ammonium nitrate</i>), Nitrites, Azides	Borates, Chromates, Manganetes, Permanganates	
Metals, Hydrides (Store away from any water), (Store flammable solids in flammable cabinet)	Chlorates, Perchlorates, Chlorites, Perchloric Acid, Peroxides, Hypochlorites, Hydrogen Peroxide	
Hydroxydes, Oxides, Silicates, Carbonates, Carbon	MISCELLANEOUS	

7.2. Organic

Alcohols, Glycols, Amines, Amides, Imines, Imides	Phenol, Cresols	SEVERE POISONS
Hydrocarbons, Esters, Aldehydes	Peroxides, Azides, Hydroperoxides	SECURE CABINET
Ethers, Ketones, Ketenes, Halogenated Hydrocarbons, Ethylene Oxide	Acids, Anhydrides, Peracids	Alcohols, Glycols, Etc. Hydrocarbons, Esters, Etc.
Epoxy Compounds, Isocyanates	MISCELLANEOUS	Ethers, Ketones, Etc.
Sulfides, Polysulfides, etc.	MISCELLANEOUS	Organic Liquids with Flash Point < 37.8°C FLAMMABLES CABINET

8. Handling

- M.S.D.S. should **always** be read before using any hazardous materials.

9. Labelling

- All W.H.M.I.S. Controlled products must have a legible label. There are three types of labels, each requiring specific information.

I. Supplier Label (for laboratory use)

Found on original container. The minimum requirements are :

- Chemical Name ;
- Hazard Information ;
- Handling Information ;
- First Aid Information (often missing on US supplier containers) ;
- Reference to M.S.D.S. being available (often missing on US supplier containers).

II. Workplace Labelling (on secondary containers, or supplier containers to replace damaged or missing label)

Recommended for containers in use more than one (1) week. Minimum requirements are :

- Chemical Name ;
- Safe Handling Information ;
- Statement that an M.S.D.S. is available.

III. Other Means of Identification (on secondary containers)

Recommended only for containers in use for less than one (1) week. Minimum requirements are :

- Identifier
 - The chemical name as it appears on the supplier label is preferable ;
 - A name known to all users and workers in the area may be used ;
 - A chemical formula may be used only if the name of the chemical is virtually unknown, or

- Well-known acronyms may be used only if that identifier is normally used on supplier labels or literature (e.g. TRIS).
- W.H.M.I.S. label (pictogram), used to identify the known or expected hazards of the material.

10. Inventory

- Each department needs to submit an annual inventory of the materials ordered to the Joint Health and Safety Committee and to those responsible for ordering such materials within the specific department.
- The inventory list includes, for each item :
 - Department ;
 - Location (Building and Room Number) ;
 - Principal Investigator ;
 - Chemical Name (per supplier label) ;
 - Date (when was the item received) ;
 - Quantity (kg or L) ;
 - W.H.M.I.S. Class (primary hazard) ;
 - Location of Material Safety Data Sheets (M.S.D.S.).
- The Annual inventories allow for the following :
 - Check chemicals with limited shelf life
 - Remove surplus and old chemicals
 - Correct incompatible storage
 - Know what you possess
 - Cleanup containers & shelves

11. Ordering Materials

- Do not order more material than what is actually needed.
- Ordering a larger quantity of material because it is cheaper than the reasonable amount is often false economy. It takes up more valuable space, it presents a greater potential hazard and it may eventually become a disposal problem.
- Order only what you can use in twelve (12) months.

12. Policy review

- 12.1. The *Hazardous Material Policy* must be reviewed annually by the Joint Health & Safety Committee.

Policy adopted by
JOINT HEALTH & SAFETY COMMITTEE
TUESDAY MARCH 22, 2011