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## 1. INTRODUCTION

The **Workplace Hazardous Materials Information System (WHMIS)** which came into effect on October 31, 1988, is a nation wide system to provide information about hazardous materials used in Canadian workplaces. Under Manitoba's **Workplace Safety and Health Act** the term **worker** includes students at the University of Manitoba. **WHMIS** addresses Canadian workers' "right to know" about safety and health hazards posed by materials used in the workplace. The purpose of WHMIS is to protect your health and safety by providing you with important information by identifying potential hazards which you may be exposed to in the workplace. WHMIS provides information for the safe storage, handling and disposal of hazardous materials.

Although the WHMIS legislation does not apply to household chemicals, when these are brought into or used in the workplace, WHMIS legislation applies.

The WHMIS hazard communication is possible through the following relationship illustrated in figure 1

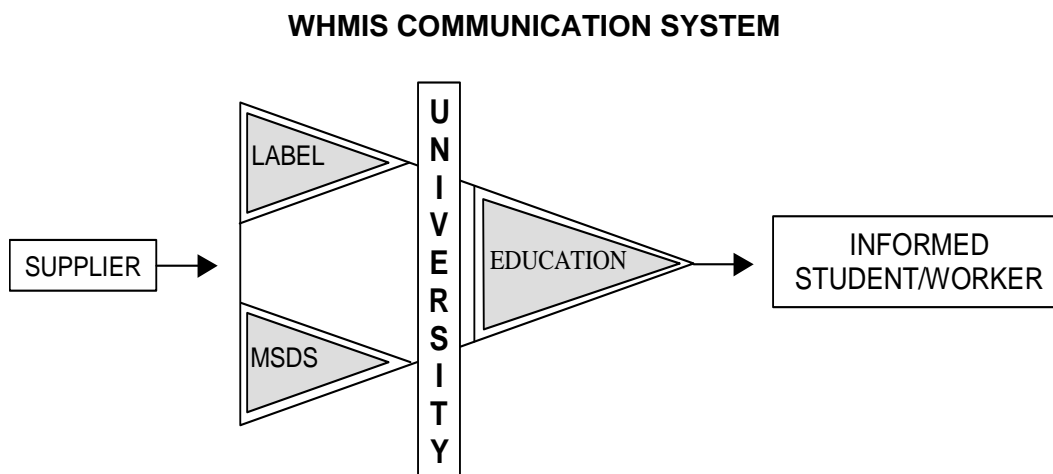


Figure 1.

The safety information on hazardous materials flows from the suppliers to the University of Manitoba and then on to the user faculty, staff and students/workers.

Exposure to hazardous materials may cause or contribute to a variety of health concerns such as irritation, burns, sensitization, heart ailments, lung, kidney and liver damage, birth defects, skin disease and cancer. Some materials also have the potential to cause fires, explosions and other serious accidents if they are not handled and stored properly.

**WHMIS** was developed in the 1980's, as a result of a tripartite effort of labour, industry and federal-provincial-territorial governments. The goal of WHMIS implementation is to reduce the occurrence of injury and illness caused by hazardous materials in the workplace. It is a unique system that represents a consensus of all three groups in the process.

**WHMIS** consists of three key elements:

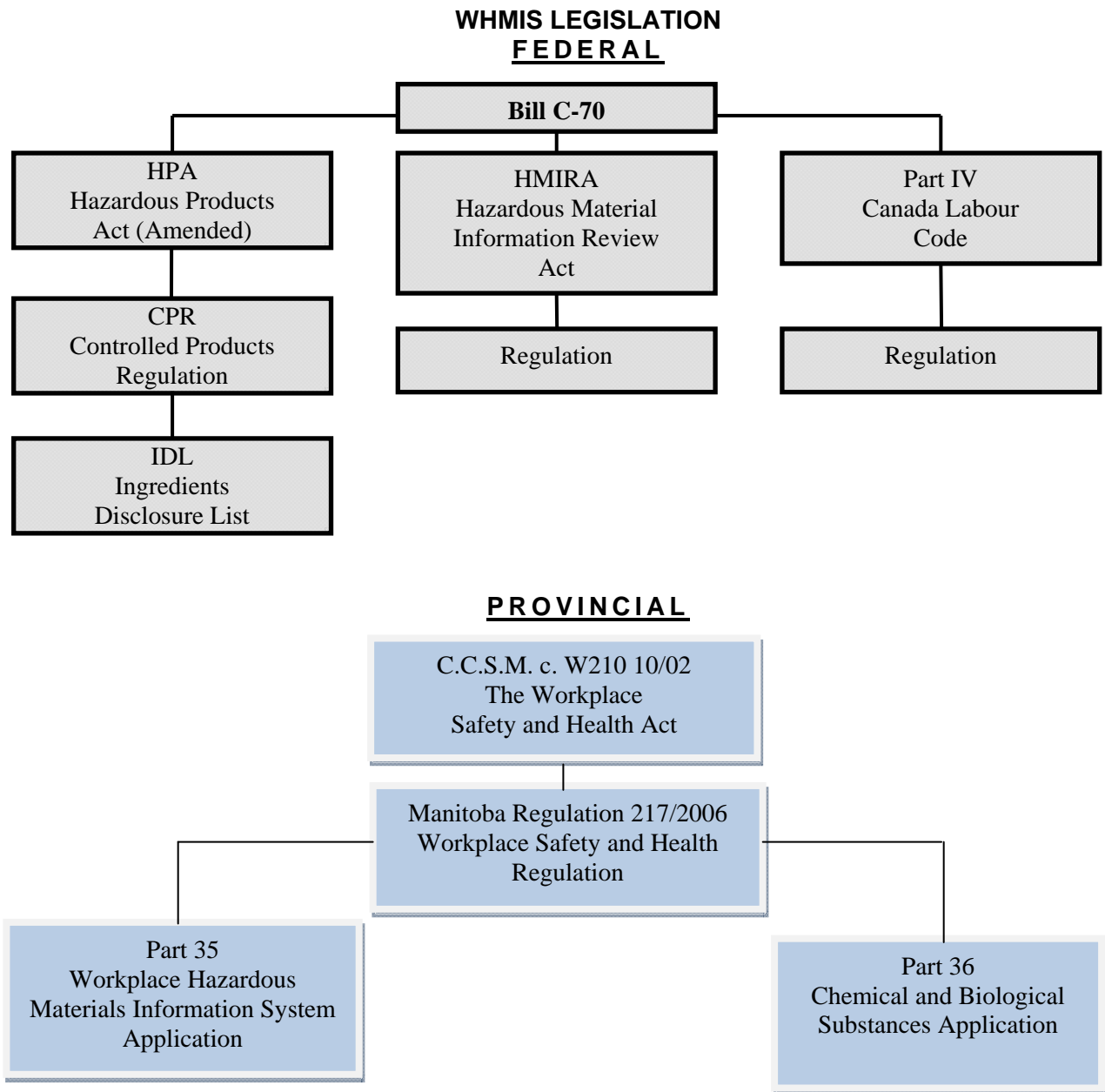
- **Labels** on containers of hazardous materials to alert you to the dangers of the product and basic safety precautions;
- **Material Safety Data Sheets (MSDS)** are technical bulletins which provide more detailed hazard precautionary information on the product;

WHMIS requires suppliers to label and prepare MSDS for products they manufacture, import, package or process (that meet the hazards criteria set out in the legislation).

- **Worker Education** - The University (as the employer) is required to set up programs to provide instruction on the content, purpose and significance of labels and MSDS. Education will provide training in safe work procedures in the use, storage and disposal of hazardous materials.

WHMIS is a Performance Based System - **Your** active participation is **required** for the system to function effectively.

As a student/worker working with or near hazardous materials you must be able to locate, obtain and use the information provided under WHMIS to protect yourself and others in the workplace.



**Figure 2.**

## 2. WHMIS LEGISLATION

WHMIS was implemented across Canada by a combination of federal and provincial legislation. Federal requirements deal with the sale and importation of hazardous materials. Provincial legislation covers the use, handling and storage of these materials.

### Federal Legislation

- 1) The federal **Hazardous Product Act (HPA)** as amended by **Bill C-70** (June 30, 1987) (Chapter 30 (1987) of the Statutes of Canada) requires the suppliers of hazardous materials to provide adequate labels and MSDS as a condition of sale and importation.
- 2) The **Controlled Products Regulation (CPR)**, issued under the authority of the **Hazardous Product Act**, contains requirements that specify the form and content of supplier labels, the type and arrangement of information on MSDS, conditions of exemptions and the detailed scientific criteria for determining whether or not a product falls into one or more hazard classes.

Any substance or material which meets any of the criteria for inclusion in one or more of WHMIS hazards classes as set forth in the CPR is termed a **Controlled Product**.

An **Ingredients Disclosure List (IDL)** established under the **HPA** contains the names of chemicals which must be disclosed on the MSDS if they are present in controlled products above a specified concentration.

- 3) The federal legislation, **Hazardous Materials Information Review Act (HMIRA)** allows manufacturers to protect legitimate confidential business information or "trade secrets" without compromising the information system. The regulations made under the **HMIRA** establish criteria against which the validity of claims for trade secret protection can be decided. The act (HMIRA) also establishes a self-financing Commission to rule on claims and appeals related to exemptions from disclosure of confidential business information.

Federal legislation applies WHMIS to employers and employees in workplaces under the federal labour jurisdiction by amending Part IV now known as Part II of the Canada Labour Code, and requires that employers ensure that labels, MSDS and worker education programs in the workplace are provided.

### Provincial Legislation

Under the Provincial Jurisdiction, all University of Manitoba workplaces are governed by the **Workplace Safety and Health Act (Continuing Consolidation of the Statutes of Manitoba, Chapter W210)**. Under the Workplace Safety and Health Act, the requirement for WHMIS is given as:

- 1) **Manitoba Regulation 217/2006 10/02 - Workplace Safety and Health Regulation.**

**Part 35 - Workplace Hazardous Materials Information System (WHMIS)** applies to every workplace where a controlled product is used, stored, produced or handled. The regulatory compliance requirements are specified in this part.

**Part 36 – Chemical and Biological Substances** applies to every workplace where a chemical or biological substance is present. This part specifies the employer's responsibilities to ensure that risk assessment of exposure to chemical or biological substance in the workplace is carried out, monitored and controlled measures are developed and in place for the mitigation of exposures. These would include safe work procedures (respecting the use, production, storage, handling and disposal of any chemical or biological substances), training of workers and compliance.

## Compliance and Enforcement

In Manitoba, the provincial Workplace Safety and Health division of Manitoba Labour and Immigration enforces WHMIS. Provincial safety officers from the Workplace Safety and Health division can inspect any workplace in Manitoba to ensure compliance with the WHMIS regulation. Labour Canada inspects federally regulated workplaces. Offenders may be prosecuted under the Hazardous Products Act, Canada Labour Code and Provincial Workplace Safety and Health Act.

### 3. INTERNATIONAL STANDARDS and HARMONIZATION of MSDS FORMATS<sup>1</sup>

When WHMIS came into effect in 1988, there were no standards for MSDS formats. Since then several new standards have appeared. A recent international standard was published by the ISO (International Organization for Standardization). This standard (ISO 11014 -1) – “Safety Data Sheet for Chemical Products – Part 1 Content and order of sections” – specifically defines: the general layout of MSDS, 16 headings with standardized wording, numbering and order of these headings, the information items required to complete an MSDS. The objective of this standard is to create consistency in providing information on safety, health and environmental matters for chemical products. The 16 - section MSDS headings in the ISO standard are essentially the same as those previously adopted by the American National Standards Institute (ANSI) ANSI Z400.1, International Labour Organization (ILO) and the European Union (EU). The format is generally referred to as ANSI or ILO 16-heading format. The format is acceptable in Canada if all the information required by the Controlled Products Regulation (CPR) is included along with a statement such as “This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR” in the “Regulatory Information” section.

Comparison of Canadian MSDS requirement with other standards			
WHMIS		ANSI / EU / ILO / ISO Standards	
Section	Headings suggested in CPR Schedule	Section	Heading
1	Product Information	1	Product and Company Identification
2	Hazardous Ingredients	2	Composition/Information on Ingredients
3	Physical Data	3	Hazards Identification
4	Fire and Explosion Hazard	4	First Aid Measures
5	Reactivity Data	5	Fire Fighting Measures
6	Toxicological Properties	6	Accidental Release Measures
7	Preventive Measures	7	Handling and Storage
8	First Aid Measures	8	Exposure Controls/Personal Protection
9	Preparation Information	9	Physical and Chemical Properties
		10	Stability and Reactivity
		11	Toxicological Information
		12	Ecological Information
		13	Disposal Considerations
		14	Transport Information
		15	Regulatory Information
		16	Other Information

Recently, a concerted effort by an international team of hazard communication experts towards harmonization resulted in a system called **GHS -“Globally Harmonized System of Classification and Labeling of Chemicals”**. **GHS** is meant to be an international standard system that defines and classifies hazards, communicates health and safety information on labels and material safety data sheets in standard formats to be used around the world. More information on GHS can be obtained from the following:

<sup>1</sup> Canadian Centre for Occupational Health and Safety, Hamilton, Ontario (CCOHS)

[http://www.unece.org/trans/danger/publi/ghs/ghs\\_welcome\\_e.html](http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html)

[http://www.hc-sc.gc.ca/ahc-asc/intactiv/ghs-sgh/index\\_e.html](http://www.hc-sc.gc.ca/ahc-asc/intactiv/ghs-sgh/index_e.html)

For the latest report on Canadian activities regarding GHS implementation see the page "Implementation of GHS – Canadian Activity" at:

[http://www.hc-sc.gc.ca/ahc-asc/intactiv/ghs-sgh/com/gencom/doc/ghs-canada\\_06-sgh\\_e.html](http://www.hc-sc.gc.ca/ahc-asc/intactiv/ghs-sgh/com/gencom/doc/ghs-canada_06-sgh_e.html)

#### **4. WHMIS AT THE UNIVERSITY OF MANITOBA**

The Environmental Health and Safety Office (EHSO) identified University departments and units where controlled products are used, stored or handled. WHMIS was implemented in each of these Departments/Units through WHMIS Departmental Coordinators appointed by the Deans/Department Heads/Directors at the request of the Vice-President (Administration). The EHSO provides an advisory role, resource base and central coordination for WHMIS at the University. It also provides a "Train the Trainer" type WHMIS training to the WHMIS departmental Coordinators.

#### **Responsibilities**

The **EMPLOYER** (Senior Investigator, Department Head, Dean, Director, and President) must:

- Provide safe working conditions - proper facilities and environments
- Maintain a complete and accurate inventory of all Controlled Products in the workplace.

*The **inventory shall:***

- a) clearly identify the workplace;*
- b) list the name of each controlled product and the location of its MSDS;*
- c) identify the maximum quantity of each controlled product likely to be present in the workplace at any time in the workplace in the one year following the completion of the inventory; and*
- d) the date of completion of the inventory and the name(s) of the person(s) who completed it.*

The University has a web based inventory database system called Environmental Health and Safety Assistant (EHSA) managed by the University's Environmental Health and Safety Office. It is designed for Departments, Principal Investigators and Supervisors and their personnel and students to maintain an inventory of controlled products in their workplace. For more information contact EHSO at 474-6633

*An **employer shall** prepare a notice of change of an inventory:*

- a) within 15 days of a controlled product being first introduced or being found in the workplace; or*
- b) within 60 days of a controlled product ceasing to be used, stored or handled in the workplace.*

The University has a web based inventory database system called Environmental Health and Safety Assistant (EHSA) operated by the University's Environmental Health and Safety Office which is for the use of Departments, Principal Investigators and Supervisors and their personnel and students. For more information contact EHSO at 474-6633

***A copy of the most recent inventory must be available/posted in the workplace.***

- Ensure that all Controlled Products in the workplace are labelled in a specified manner and the Material Safety Data Sheets (MSDS) are readily available.
- Provide training necessary to work with Controlled Products, educate workers about risks and keep a written record of worker education program. Integrate WHMIS training into the curriculum and make it a prerequisite for Good Laboratory/Work Practice.
- Prepare Standard Operational Protocols (SOP).

Refer to the **University of Manitoba Controlled Products Standard** for information about design standard for facilities with Controlled Products and for more information on the responsibilities. The document is available on the web at: [http://www.umanitoba.ca/admin/human\\_resources/ehso/geninfo/cps.html](http://www.umanitoba.ca/admin/human_resources/ehso/geninfo/cps.html).

The **Worker** (Faculty, Support Staff and Students) must:

- undergo all training,
- understand the risks of the project,
- use safety equipment and practices,
- follow the prepared Standard Operational Protocols (SOP),
- inform the Employer of any deficiencies in facilities or Standard Operational Protocols (SOP) e.g. missing labels, MSDS; malfunctioning of a fume hood.

The **Suppliers** have three important responsibilities under WHMIS:

1. The determination of whether a product is a controlled product, and if it is, what is its WHMIS classification;
2. Ensure that the packages of controlled products are labelled in accordance with WHMIS;
3. Supply MSDS to employers to whom they sell controlled products.

## 5. WHAT MATERIALS ARE CONTROLLED UNDER WHMIS?

The WHMIS regulation applies to controlled products which are used, stored and handled at any workplace covered by the **Workplace Safety and Health Act**. The University of Manitoba has more than 50,000 controlled products located in various laboratories at both the Fort Garry and the Bannatyne Campuses. Controlled products are also used in clinics, cleaning, printing, painting, photography and maintenance (Physical Plant) applications.

A **Controlled Product** is any hazardous substance or material that meets or exceeds the criteria for inclusion in one or more of the following **WHMIS hazard classes**. There is no universal list of products to allow you to see if a material is subject to WHMIS. Although the WHMIS legislation does not apply to household chemicals, when these are brought into or used in the workplace, WHMIS legislation applies.

### WHMIS HAZARD CLASSES

#### **Class A**      Compressed Gas

A compressed gas is a material which is a gas at normal room temperature (20°C) and pressure, and is kept: (i) under pressure or, (ii) as a dissolved gas under pressure or, (iii) as a gas liquefied by compression or refrigeration, **e.g. cylinders of acetylene, oxygen, nitrogen, hydrogen, helium, neon, argon, chlorine, anhydrous ammonia, hydrogen chloride, and fire extinguishers.**

#### **Class B**      Flammable and Combustible Material

Flammable and combustible materials include solids, liquids or gases, which will ignite and continue to burn in air if exposed to a source of ignition. There are six divisions in Class B:

- **Division 1: Flammable Gas** – *A product, material or substance falls into this division if it is a compressed gas (Class A) and at normal atmospheric pressure forms a flammable mixture with air: (a) when in a concentration of 13% or less by volume, or (b) over a concentration range of at least 12% by volume; e.g. hydrogen, methane, propane.* Normal atmospheric pressure means an absolute pressure of 101.325 kilopascals (1 atmosphere) at 20°C.

- **Division 2: Flammable Liquids** - Liquids with a flashpoint less than 37.8° C; e.g. gasoline, turpentine, diethyl ether, methanol, benzene, toluene, ethanol. Flashpoints are determined by both enclosed test systems (termed “closed-cup”) and non enclosed test systems (termed “open- cup”). Flash points determined by closed-cup methods tend to be lower than by open-cup.
- **Division 3: Combustible Liquids** - Liquids with a flashpoint 37.8° C or more but less than 93.3°C; e.g. kerosene, diesel fuel, bunker C, creosote. Combustible materials are less easily ignited than flammable materials.
- **Division 4: Flammable Solids** – A product, material or substance is included in this division if it: (a) causes fire through friction or through retained heat during processing or manufacturing (b) can be ignited readily and when ignited burns vigorously and persistently to create a hazard (c) ignites readily and burns with a self-sustained flame at a rate of more than 0.254 cm (1/10 inch) per second along its major axis, when tested in accordance with method set out in CPR (a simple measurement of the rate of burn of the substance along the horizontal axis)(d) meets the criterion for flammable solids (Division 1 of Class 4) of the Transportation of Dangerous Goods Regulations; e.g. white phosphorous, magnesium, beryllium, hafnium powder, zirconium, sodium, potassium.
- **Division 5: Flammable Aerosols** – A product, material or substance is included in this division if it is packaged in an aerosol container and when tested in accordance with test method in Schedule VI of the CPR, produces a flame projection or flashback. Most aerosols contain flammable propellants, e.g. propane, butane and isobutane contained in aerosol containers.
- **Division 6: Reactive Flammable Material** – A product, material or substance is included in this Division if it: (a) is spontaneously combustible and liable to spontaneous heating under normal conditions of use or liable to heat in contact with air to the point where it begins to burn, (b) produces a flammable gas or becomes spontaneously combustible on contact with water or water vapour. Materials that may become spontaneously combustible in air, e.g. aluminium alkyl compounds, celluloid, lithium borohydride, or in contact with water, e.g. metallic sodium, lithium amide and lithium aluminium hydride

**Class C      Oxidizing Material**

A product, material or substance is included in this Class if : (a) it causes or contributes to combustion of another material by yielding oxygen or any other oxidizing substance whether or not the product itself is combustible, (b) it is an organic peroxide containing bivalent O-O structure: e.g., sulphuric acid, perchloric acid, inorganic peroxide such as hydrogen peroxide, and sodium peroxide, nitrates, nitrites, bromates, chlorates, dichromates, chlorine, hypochlorites (e.g., "Javex"), perchlorates, permanganates, persulphates, organic peroxide such as benzoyl peroxide, organic peroxy esters and organic hydroperoxides.

**Class D      Poisonous and Infectious Material**

**Division 1: Materials Causing Immediate and Serious Toxic Effects**

These materials are immediately dangerous to life and health. Criteria for inclusion in this division deal mainly with the capability to cause acute lethal effects - a situation that occurs to animals tested immediately or within 14 days following a single dose exposure to a toxic material. Products that cause such effects have low LC<sub>50</sub> and LD<sub>50</sub> values. This division has two subdivisions:

- A) **Very Toxic Material**- e.g. potassium cyanide, strychnine, hydrogen cyanide, hydrogen sulphide, carbon monoxide, bromine, phosgene.
- B) **Toxic Material** - e.g. sodium fluoride, formaldehyde.

### **Division 2: Materials Causing Other Toxic Effects**

This includes materials which can cause ill health effects that are not immediate; e.g. eye, skin or lung irritation and long-term effects in persons or animals such as chronic toxic effects sensitization, allergies, asthma, cancer, and organ damage or other serious illness or disease. Usually the effects result from repeated exposure to the substance in the workplace over a long period of time. Less common chronic toxic effects are reproductive toxicity, teratogenicity, embryotoxicity and mutagenicity. There are two subdivisions in this division – **A: Very Toxic Material** and **B: Toxic Material**. Assignment to subdivisions depends on the capability of the product to cause an adverse effect and the type of effect. **Examples - benzene, chloroform, toluene, carbon tetrachloride, asbestos, lead, mercury, cadmium, ammonia, some photographic chemicals.**

### **Division 3: Biohazardous Infectious Material**

This subdivision includes any organisms and the toxins produced by these organisms such as viruses, bacteria, rickettsia, fungi, protozoa and helminths that have been shown to cause disease or are reasonably believed to cause disease in either humans or animals. **Examples - anthrax (in meat handling, tanning), salmonella, hepatitis B virus, fungi, moulds etc., contaminated blood and pathogenic bacteria cultures.**

Organisms which cause disease in animals are of concern to WHMIS particularly where transmission of the disease may occur from animals to persons. Such diseases are termed “zoonoses”, e.g., **psittacosis, Q-fever, trichonosis and rabies.**

As for WHMIS, biohazardous infectious materials are normally the materials that contain organisms likely to cause disease and which are supplied or obtained, and stored, handled or used for the reason that the organism is present. Thus, they include: (a) *cultures, concentrates or other form of production of such organisms;* (b) *diagnostic specimens such as blood, feces, sputum, urine, organs or body tissue that contain such organisms.*

Biohazardous infectious materials within the meaning of Division 3 will not normally include: (i) plants, animals, foods, soils or goods (e.g., isolation linen) that may be incidentally contaminated with disease causing organisms, unless considered diagnostic specimens; (ii) any organism which is unlikely to cause human disease or animal disease of veterinary importance.

Organisms are assigned to one of four risk groups on the basis of capability of an organism to cause disease in people – the classification system of the World Health Organization is used. An organism is considered to be biohazardous within the meaning of Division 3 if it falls into risk group 2, 3 or 4. The risk group classification is based on the risk factors – (a) pathogenicity of the organism; (b) availability of effective treatment; (c) modes of transmission and host range of the organism; and (d) availability of effective preventive measures. The four risk groups are:

Risk Group 1 (low worker and community risk) - A microorganism that is unlikely to cause significant human disease; e.g., *Bacillus subtilis*, *Escherichia coli* (non-toxicogenic strains).

Risk group 2 (moderate worker risk, limited community risk) – A pathogen that can cause human disease but is unlikely to be serious hazard to workers or the community. Workplace exposure may cause serious infection, but effective treatment and preventive measures are available and the risk of spread of the pathogen is limited; e.g., *Salmonella*, *Trichinella spiralis*, Mumps virus.

Risk Group 3 (high worker risk, low community risk) – A pathogen that usually produces serious human disease but the pathogen does not ordinarily spread by casual contact from one infected person to another; e.g., *Brucella* spp., HIV, *Blastomyces dermatitidis*.

Risk Group 4 (high worker and community risk) – A pathogen that usually produces very serious human disease, often untreatable, and may be readily transmitted from one individual to another directly or indirectly; e.g., Ebola virus, Lassa virus. Marburg virus.









**Class E**      **Corrosive Material**

This class includes products that corrode aluminium, steel or skin under specified test conditions. **Examples: chromic acid, sulphuric acid, nitric acid, sodium hydroxide, hydrofluoric acid, some household cleaners, water treatment chemicals and photographic chemicals.** This class also includes anhydrous corrosive gases such as **ammonia, hydrogen fluoride, hydrogen chloride, hydrogen iodide and hydrogen bromide.**

**Class F**      **Dangerously Reactive Material**

Products which undergo vigorous polymerization, decomposition or condensation, become self-reactive under conditions of shock or an increase in pressure or temperature, or react vigorously with water to release a toxic gas; e.g., **1,3-butadiene** undergoes hazardous self-polymerization unless inhibitors are added, **copper and mercury azides, acetylides, ether peroxides, benzoyl peroxide, picric acid and isopropyl nitrate** can be explosive under shock, **calcium carbide** reacts with water to release acetylene gas.

## 6. WHMIS HAZARD SYMBOLS

The symbol represents...	The Symbol means...	And that you should...
 <p><b>Class A – Compressed Gas</b></p>	<ul style="list-style-type: none"> <li>▪ It is a gas kept under pressure.</li> <li>▪ Heat may cause the container to explode.</li> <li>▪ A drop or impact may cause the container to explode.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Handle with care, do not drop.</li> <li>▪ Keep away from heat or potential sources of ignition.</li> <li>▪ Store in a designated area.</li> </ul>
 <p><b>Class B – Flammable and Combustible Material</b></p>	<ul style="list-style-type: none"> <li>▪ The material is a potential fire hazard.</li> <li>▪ It may burn at relatively low temperature.</li> <li>▪ Sparks, flame or friction could ignite it.</li> <li>▪ May burst into flame spontaneously in air or release a flammable gas on contact with water.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Keep the material away from heat sources and other combustible materials.</li> <li>▪ Never smoke when working with or near the material.</li> <li>▪ Store in a cool, fire-proof area.</li> </ul>
 <p><b>Class C – Oxidizing Material</b></p>	<ul style="list-style-type: none"> <li>▪ The material is a fire or explosion risk near flammable or combustible material.</li> <li>▪ May burn skin or eyes on contact.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Keep the material away from combustible materials and store in designated areas.</li> <li>▪ Keep the material away from sources of ignition.</li> <li>▪ Never smoke when working near the material.</li> <li>▪ Wear the proper protective equipment, including eye, face and hand protection and protective clothing.</li> </ul>
<p><b>Class D – Poisonous and Infectious Material</b></p>		
 <p><b>Division 1 – Materials causing Immediate and serious toxic effects</b></p>	<ul style="list-style-type: none"> <li>▪ The material is a potentially fatal poisonous substance.</li> <li>▪ It may be fatal or cause permanent damage if it is inhaled, swallowed or absorbed through skin.</li> <li>▪ May burn skin or eyes on contact.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Handle the material with extreme caution.</li> <li>▪ Avoid contact with the skin or eyes, use proper protective clothing.</li> <li>▪ Avoid inhaling by working in well-ventilated areas and/or wearing respiratory equipment.</li> <li>▪ Wash thoroughly after using.</li> <li>▪ Store in designated areas only.</li> </ul>
 <p><b>Division 2 – Materials causing other toxic effects</b></p>	<ul style="list-style-type: none"> <li>▪ The material is poisonous but not immediately dangerous to health.</li> <li>▪ It may cause death or permanent damage as a result of repeated exposure over time.</li> <li>▪ May be a skin irritant.</li> <li>▪ May be a sensitizer causing allergic reaction.</li> <li>▪ May cause cancer.</li> <li>▪ May cause birth defects or sterility.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Avoid skin and eye contact by wearing all protective equipment necessary including eye, face and hand protection and protective clothing.</li> <li>▪ Avoid inhaling by working in well-ventilated area and/or using respiratory equipment.</li> <li>▪ Store in designated areas.</li> </ul>
 <p><b>Division 3 – Biohazardous Infectious Material</b></p>	<ul style="list-style-type: none"> <li>▪ May cause a serious disease resulting in illness or death.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Take every measure to avoid contamination.</li> <li>▪ Handle the material only when fully protected by the proper, designated equipment.</li> <li>▪ Handle the material in designated places only.</li> </ul>
 <p><b>Class E – Corrosive Material</b></p>	<ul style="list-style-type: none"> <li>▪ Causes severe eye and skin irritation.</li> <li>▪ Causes severe tissue damage with prolonged contact.</li> <li>▪ May be harmful if inhaled.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Keep containers tightly closed.</li> <li>▪ Avoid skin and eye contact by wearing all necessary protective equipment, including eye, face and hand protection and protective clothing.</li> <li>▪ Avoid inhaling by using in well-ventilated areas only and/or wearing the proper respiratory equipment.</li> </ul>
 <p><b>Class F – Dangerously Reactive Material</b></p>	<ul style="list-style-type: none"> <li>▪ The material is very unstable.</li> <li>▪ May react with water to release a toxic or flammable gas.</li> <li>▪ May explode as a result of shock, friction or increase in temperature.</li> <li>▪ May explode if heated when in a closed container.</li> <li>▪ Undergoes vigorous polymerization.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Keep material away from heat.</li> <li>▪ Open containers carefully; do not drop.</li> <li>▪ Store the material in a designated cool, flame-proof area.</li> </ul>

## 7. EXEMPTIONS

Some products already covered by other labelling legislation are exempted from federal WHMIS requirements for labels and MSDS. These include:

### **PARTIALLY EXEMPTED**

- consumer products ( a product, material or substance included in Part II of Schedule I of the Hazardous Products Act (Canada) and packaged as a consumer products in quantities normally used by a member of the general public);
- cosmetics, food, drugs or devices (within the meaning of the Food and Drugs Act (Canada)) ;
- explosives (under the Explosives Act (Canada));
- pesticides (under the Pest Control Products Act (Canada));
- radioactive materials (under the Nuclear Safety and Control Act (Canada));
- hazardous waste - employers (e.g. U of M) must still have some means of identification and a document addressing composition, hazards and safe measures and worker education about safe-procedure. In the U of M, this is handled through the direction of the Environmental Health and Safety Office according to the protocol established in the Waste Disposal Chart;
- fugitive emissions

### **COMPLETELY EXEMPTED**

- wood and products made from wood;
- tobacco and products made from tobacco;
- a manufactured article (i) that is formed to a specific shape or design during manufacture, (ii) that has a shape or design that determines its use in whole or in part and (iii) that under normal use, will not release or otherwise cause a person to be exposed to chemicals emanating from it;
- products being transported or handled in accordance with the requirements of the Transportation of Dangerous Goods Act.

Buyers/Users of these products must comply with all labelling requirements prescribed under the above acts and regulations. Employers are still required to educate employees about the hazards, safe handling, storage and disposal of such materials. In addition, a workplace label must be applied if the product is decanted into another container.

## 8. WHMIS LABELS

Under WHMIS all controlled products at the workplace must have WHMIS labels.

The purpose of a WHMIS label is to identify the product as controlled and alert workers or handlers to the hazards and safe handling procedures. A WHMIS label is just a first alert, the amount of information in it is limited by its size. The MSDS provides more detailed information.

Labelling requirements differ depending on whether the products are in supplier or workplace containers; whether the containers contain laboratory products, laboratory samples for analysis or non-laboratory products; and the size of the containers.

Two types of labels prescribed under WHMIS legislation are:

1. **the Supplier Label** which is intended for use with controlled products distributed to workplaces in Canada;
2. **the Workplace Label** which is to be used in some circumstances during the storage, handling and use of the controlled products in Canadian workplaces. The legislation also provides for the use of **means of identification** other than workplace labels in situations where such labels are not practical.

## SUPPLIER LABELS

The supplier who may be a manufacturer, importer, packager or processor affixes a Supplier Label to the container of a controlled product. For controlled products imported by the University without the intermediary of a Canadian supplier, the University is responsible for attaching a Supplier Label.

A Supplier Label must be in both English and French and the information must be within a distinctive crosshatched WHMIS border.

Labels on **supplier containers of controlled products greater than 100 millilitres in volume** must have the following seven categories of information:

1. **Product Identifier**: The name of the product which may be the common name, trade name, generic name, brand name, code name or code number. This name must be the same as the name appearing in the Material Safety Data Sheet.
2. **Supplier Identifier**: The name and address of the supplier.
3. **Hazard Symbols**: Hazard symbols representing the WHMIS hazard classes under which the product is regulated. These alert you to product hazards.
4. **Reference to the MSDS**: A statement advising that an MSDS is available for more detailed information.
5. **Risk Phrases**: Short phrases describing the hazards to supplement the information provided by the symbols.
6. **Precautionary Statement**: Precautions to be taken when using, handling or being exposed to the product.
7. **First Aid Measures**: These statements indicate immediate first aid measures that can be taken by the victim or others in case of an accident or emergency.

### **Containers of Volume 100 mL or less**

A supplier label for a controlled product in a container of size 100 mL or less is required to have only the first four pieces of information, **1 - 4**, listed above.

### **Products from a Laboratory Supply House**

If the product container originates from a laboratory supply house, is intended for use solely in a laboratory, and is of a capacity less than 10 kg, the label must include: **1. Product Identifier; 2. Reference to MSDS; 3. Risk Phrases; 4. Precautionary Measures; and 5. First Aid Measures.**

### **Laboratory Sample**

"Laboratory Sample" indicates a sample of a controlled product that is intended solely to be tested in a laboratory, is held in a container holding less than 10 kg, and for which an MSDS has not been available or prepared. The definition does not include a controlled product used in the laboratory to test other materials or controlled products for educational or demonstration purposes. A supplier label must include:

1. **Product Identifier;**
2. **Supplier Identifier;**
3. **Chemical or Generic Name and Concentration of any Hazardous Ingredient;**
4. **The words "Hazardous Laboratory Sample";** and
5. **Emergency Telephone Number.**

Where a laboratory sample is intended for research and development, the label should include the statement: **"Research and Development Sample - For Laboratory use only"**.

The Supplier Label must be prepared and attached to containers of controlled products at the University in the following situations:

1. **Controlled products imported from another country where the University is the importer.**
2. **Controlled products produced at the University and sent to another Canadian workplace.**

## **WORKPLACE LABELS**

There are no WHMIS requirements for the design of a workplace label. However, it is important that the label is easily identified and readable, and placed where it can be seen by the workers, in the language of choice at the workplace. Hazard symbols and hatch-mark WHMIS border are optional. The Workplace Label must be attached to the containers of controlled products:

1. **Produced and used in the University workplaces;**
2. **Decanted or transferred from the original supplier container to a workplace container;**
3. **On which the supplier label has become illegible or has been accidentally removed.**

A Workplace Label is less detailed than a supplier label but must contain the following information:

1. **Product Identifier or Product Name;**
2. **Safe Handling Information;**

This section will contain precautions that must be taken to minimize the risks of adverse health effects and injury. This would include any personal protective equipment such as a particular type of gloves, goggles, face shield, respirators, etc., to be worn, or other control measures to be taken.

3. **Reference to the MSDS.**

## **OTHER MEANS OF IDENTIFICATION**

In circumstances where a workplace label may not be practical, WHMIS allows other forms of identification that includes:

- **Placard:** for a controlled product that is not in a container and stored in bulk, and has fugitive emissions
- **Codes – colours with letters or numbers:** for a product in transfer (pipes, conveyor belts, or continuous-run container) or in reaction vessels, and substances undergoing tests and analyses in laboratory
- **Signs, labels or any means of clear identification:** for a product transferred to a new container which is to be used only in the lab, and hazardous waste produced in the workplace
- **Diagrams or process flow charts:** forms of identification must contain information equivalent to workplace labels. The workers must be instructed about the particular system used in the workplace.

## PREPARING A SUPPLIER OR WORKPLACE LABEL

When preparing a label, use a pen or marker with permanent ink. The labels available from the University Environmental Health and Safety Office are shown in Figure 3 and a sample supplier label is shown in Figure 4.

Locate the MSDS for the product and look for the information needed in completing the label.

1. Under the heading "Product Identifier" on the label, print the name of the product as it appears on the MSDS.
2. Attach hazard symbol(s) or print the WHMIS hazard class of the material.
3. Under the "Precautionary Measures", "Risks" and "First Aid Measures", check appropriate statements corresponding to those found in the MSDS.
4. Attach the label to the container in a visible location. Self-adhesive acetate or transparent tape can be used to cover the label if there is a chance of liquid spilling over the label and making it illegible.
5. In some cases it may be necessary to attach the label to a tag and fasten it to the container.

## SAMPLE OF WHMIS LABELS

**UNIVERSITY OF MANITOBA**

**PRODUCT IDENTIFIER:**

**PRECAUTIONARY MEASURES:**

- Avoid prolonged or repeated exposure
- Avoid any exposure – readily absorbs through skin
  - corrosive     skin, eye or lung irritant
  - toxic     carcinogen
  - Wear chemical safety goggles or face mask
  - Wear chemically resistant gloves
    - latex     vinyl     \_\_\_\_\_
- Inhalant Hazard –
  - wear respirator
  - confine handling to a fume hood
- Flammable – avoid potential ignition sources
- Potential Explosive
- Contents under pressure     Asphyxiant

**FIRST AID**

- Contact with skin and eyes – Flush with water for 15 minutes then seek medical attention
- Inhalation – Remove to fresh air and seek medical attention
- Ingestion – Rinse mouth with water and seek medical attention

**REFER TO MATERIAL SAFETY DATA SHEET FOR MORE INFORMATION**

**WORKPLACE LABEL**

**PRODUCT IDENTIFIER**

SAFE HANDLING/PERSONAL PROTECTION

See MATERIAL SAFETY DATA SHEET

HA 136

**University of Manitoba**

**Workplace Label**  
Product Identifier

**Hazard (s)**  
*check all that apply*

- Flammable
- Oxidizer
- Toxic/poisonous
- Corrosive
- pH: \_\_\_\_\_
- Reactive/explosive
- Sensitizer/allergen
- Biohazard
- Carcinogen
- Mutagen
- Teratogen
- Skin/eye/lung irritant
- Other *specify*: \_\_\_\_\_

**Safe Handling /Personal Protection**

- No inhalation
- No ingestion
- No skin/eye contact
- No chronic exposure
- Gloves
- Glasses/goggles
- N-95 Respirator
- Half Face Respirator with Organic Vapor Cartridges
- Other: \_\_\_\_\_

Name: \_\_\_\_\_ Dept: \_\_\_\_\_

Phone #: \_\_\_\_\_ Date: \_\_\_\_\_

**Refer to Material Safety Data Sheets for more info**

## Sample supplier label

**Risk phrases:** Phrases that explain the nature of the hazard and the risks involved in misusing the product, beyond the risks conveyed by the symbols

**Product identifier:** Identification of the material by chemical name, common name, generic name, trade name, brand name, code name or code number

**Hazard symbol or symbols:** Symbols that correspond to the classes and, where applicable, divisions under which the controlled product falls; the symbols immediately alert label readers to the product hazards

### JET BLACK SPRAY PAINT

### PEINTURE À VAPORISER "JET BLACK"

**RISK PHRASES**



- Spray may catch fire if directed at open flame
- Gives off flammable vapours when drying
- Respiratory and eye irritant
- Danger of cumulative effects

**PRECAUTIONARY MEASURES**

- Keep in a cool place
- Do not store with oxidizers
- Do not spray near ignition source
- Wear safety glasses for normal use
- Wear gloves if skin contact may occur
- If used in poorly ventilated area, wear respirator

**FIRST AID MEASURES**

- If gets in eyes, flush with water for 15 minutes and call doctor immediately
- If gets on skin, wash with soap and water
- If breathing difficulties develop, remove from exposure and call physician immediately

**INDICATION DES RISQUES**

- Les vapeurs peuvent s'enflammer si dirigés vers une flamme ouverte
- Dégage des vapeurs inflammables en séchant
- Irritant pour les yeux et les poumons
- Risque d'entraîner des effets cumulatifs

**MESURES DE PRÉVENTION**

- Tenir au frais
- Ne pas conserver en présence d'agents oxydants
- Ne pas vaporiser près d'une source d'ignition
- Porter un appareil de protection pour les yeux
- Porter des gants
- En cas d'utilisation dans une zone à ventilation insuffisante, utiliser un appareil respiratoire approprié

**MESURES DE SECOURS D'URGENCE**

- En cas de contact avec les yeux, rincer avec de l'eau pendant 15 minutes et appeler un médecin immédiatement
- En cas de contact avec la peau, laver avec de l'eau et du savon
- S'il y a apparition de problème respiratoires, retirez de la zone d'exposition et appeler un médecin immédiatement

**Refer to material safety data sheet for further information**  
**Pour plus d'information, consulter la fiche signalétique**

**CORPUS INFORMATION SERVICE**  
 1450 Don Mills Rd., Don Mills, Ont. M3J 1X7  
 416/445-6641

**Reference to the MSDS:** A statement to the effect that an MSDS is available, reminding label readers of the more comprehensive source of information

**First aid measures:** Phrases explaining the measures to be taken in case of an acute exposure

**Precautionary measures:** The essential measures to be taken when using, handling or working in the presence of a controlled product

**Supplier identifier:** Name of the supplier of the controlled product

The label shown above is a sample label only.

Figure 4

## Workplace Hazard Information Placards (WHIPs)

In addition to WHMIS labelling requirements for controlled products used at the University, there are other signage requirements for the location where they are stored, used or decanted.

To meet the intent of the Manitoba Fire Code and the requirements of Workplace Safety and Health Act, laboratories and rooms where controlled products are stored, used or decanted must have a hazard warning placard posted at the entrance in order to provide hazard and emergency contact information. Further, under the Workplace Safety & Health Act, it is a worker's right to know the hazard or exposure to a hazard when working with or in proximity of chemicals, biological agents, radioactive materials or lasers or other regulated products or processes. The University Environmental Health and Safety Office, in consultation with Departments, developed the "Workplace Hazard Information Placard (WHIP)". These placards identify the possible hazards in a room or lab with controlled products and emergency contact information. **EHSO will produce a placard for lab users in a standardized format and post in a special holder.** To receive a placard, the responsible person (Principal Investigator/Supervisor/Designate) for the laboratory/worksites should complete the [Room/Lab Signage Information Form](#) and forward it to EHSO (474-6633, Fax 474-7629). The placard will be produced based on the information provided on the form and will be good for one year. To renew the placard, the form does not have to be filled out again. Send an e-mail to [signage@cc.umanitoba.ca](mailto:signage@cc.umanitoba.ca) either indicating no changes or the amendments to be made to the placard (ex: contact information). EHSO will affix a new renewal date to the placard or produce a new placard.

**UNIVERSITY OF MANITOBA**

BUILDING		ROOM	
<b>ENTRANCE REQUIREMENTS</b>			
<b>Authorized Personnel Only</b>			
<b>No FOOD or DRINK</b>			
<b>PERSONAL PROTECTIVE EQUIPMENT (PPE)</b>			
* REQUIRED      * REQUIRED      * REQUIRED      * COMMONLY USED			
REFER TO CONTROLLED PRODUCT MSDS FOR SPECIFIC PERSONAL PROTECTIVE EQUIPMENT			
<b>SPECIFIC HAZARDS</b>			
MAX: 50 L	MAX: 20 L	MAX: 5 Kg	MAX: 500 g
MAX: 3 Kg	MAX: 5 L		
<b>EMERGENCY CONTACTS</b>			
Name	TELEPHONE <sup>1</sup>	OFFICE NUMBER	
Principal Investigator	474-XXXX	XXX	
Assistant 1	474-XXXX	XXX	
Assistant 2	474-XXXX	XXX	
DATE: July 15, 2008			
1 - After normal working hours, call Security Services at "555" "8555" using cell phone with Rogers Wireless or MTN or dial 474-9341. MSDS are located in room: XXX First Aid Kits in room: XXX			
For information on lab signage, contact Environmental Health and Safety Office at 474-6633. Prepared by: Your name here			

Example 1 of WHIP

**UNIVERSITY OF MANITOBA**

BUILDING		ROOM	
<b>Caution - Radioisotope Area</b>			
<b>Basic Level</b>			
<b>No FOOD or DRINK</b>			
This sign may only be removed by Radiation Safety Staff (786-3633 or 786-3399)			
<b>PERSONAL PROTECTIVE EQUIPMENT (PPE)</b>			
* REQUIRED      * REQUIRED      * REQUIRED      * COMMONLY USED			
* REQUIRED WHEN WORKING WITH RADIOACTIVE CHEMICALS			
REFER TO CONTROLLED PRODUCT MSDS FOR SPECIFIC PERSONAL PROTECTIVE EQUIPMENT			
<b>SPECIFIC HAZARDS</b>			
MAX: 8 L	MAX: 7 L	MAX: 20 L	MAX: 20 L 12 Kg
<b>EMERGENCY CONTACTS</b>			
Name	TELEPHONE <sup>1</sup>	OFFICE NUMBER	
Principal Investigator	474-XXXX	XXX	
Assistant	474-XXXX	XXX	
DATE:			
1 - After normal working hours, call Security Services at "555" "8555" using cell phone with Rogers Wireless or MTN or dial 474-9341. MSDS are located in room: inside First Aid Kits in room: XXX			
For information on lab signage, contact Environmental Health and Safety Office at 474-6633. Prepared by: Your name here			

Example 2a of WHIP

The placards for radioisotope areas are double sided. This side is displayed when the quantity of radioactive material used or stored is **more** than 100 exemption quantities (EQ) requiring a trefoil on the Specific Hazards section of the Placard.

**UNIVERSITY OF MANITOBA**

BUILDING		ROOM	
<b>Caution - Radioisotope Area</b>			
<b>Basic Level</b>			
<b>No FOOD or DRINK</b>			
This sign may only be removed by Radiation Safety Staff (786-3633 or 786-3399)			
<b>PERSONAL PROTECTIVE EQUIPMENT (PPE)</b>			
* REQUIRED      * REQUIRED      * REQUIRED      * COMMONLY USED			
* REQUIRED WHEN WORKING WITH RADIOACTIVE CHEMICALS			
REFER TO CONTROLLED PRODUCT MSDS FOR SPECIFIC PERSONAL PROTECTIVE EQUIPMENT			
<b>SPECIFIC HAZARDS</b>			
MAX: 8 L	MAX: 7 L	MAX: 20 L	MAX: 20 L 12 Kg
<b>EMERGENCY CONTACTS</b>			
Name	TELEPHONE <sup>1</sup>	OFFICE NUMBER	
Principal Investigator	474-XXXX	XXX	
Assistant	474-XXXX	XXX	
DATE:			
1 - After normal working hours, call Security Services at "555" "8555" using cell phone with Rogers Wireless or MTN or dial 474-9341. MSDS are located in room: inside First Aid Kits in room: XXX			
For information on lab signage, contact Environmental Health and Safety Office at 474-6633. Prepared by: Your name here			

Example 2b of WHIP

This is the reverse side of 2a. This side indicates the room/lab is permitted to use radioactive material and is displayed when there is **less** than 100 EQ of radioactive material which does not require the trefoil symbol.



# Workplace Hazard Information Placards: WHIP

Environmental Safety and Health Office

Fort Garry Campus: 191 Frank Kennedy Centre. Tel: 474-6633, Fax: 474-7629

Bannatyne Campus: T248/249 Basic Science Bldg., Tel: 474-6633, Fax: 789-3906

[http://www.umanitoba.ca/admin/human\\_resources/ehso/](http://www.umanitoba.ca/admin/human_resources/ehso/)

**Prior to entering a room, you can use the information on the WHIP placard to help you make safe choices.** Be aware that these placards may not cover all hazards that can be encountered in the University community. Assess the risk and contact your supervisor if you are unsure of a situation. **Here is an explanation of the information provided on a WHIP:**

## Building Room identification

Entrance Requirements that must be followed by everyone entering the room.

Recommended Personal Protective Equipment (PPE) is bordered in yellow  
**Required PPE in Red**  
**"R" required PPE when working with radioactive materials**

Consider what you are planning to do in the room when deciding what you need to wear

**BUILDING** | **ROOM**

UNIVERSITY OF MANITOBA

**Caution - Radioisotope Area**  
**Basic Level**  
**No FOOD or DRINK**

**PERSONAL PROTECTIVE EQUIPMENT (PPE)**  
 = REQUIRED WHEN WORKING WITH RADIOACTIVE CHEMICALS

Full Goggles	Safety Glasses	Lab Coat	Disposable Gloves	Rubber Gloves
Face Shield				

**SPECIFIC HAZARDS**

Flammable Liquid MAX: 8 L	Poison MAX: 7 L	Toxic MAX: 20 L	Corrosive MAX: 20 L 12 Kg	Rayonnement Danger Radiation
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**EMERGENCY CONTACTS**

Name	TELEPHONE	OFFICE NUMBER
Prime Investigator	474-XXXX	XXX
Assistant	474-YYYY	YYY

DATE: \_\_\_\_\_  
 Prepared by: Your name here

Hazards in the room, when unattended should be Contained or Well Marked.

**Poison**      **Rayonnement Danger Radiation**      **Liquid Nitrogen**      **Biohazard**      **Ultraviolet Light**      **Lumiere Ultraviolet**      **X-Ray**      **Rayon-X**

**Laser**

*Look for signs and warning symbols* For labs that contain Lasers, Ultraviolet Light, Magnetic Fields and X-ray, you should contact the responsible person(s) for these rooms to obtain information.

**Responsible User/contact for room:**  
 Explain what you plan to do and ask about hazards associated with their materials in the room.

The new Workplace Hazard Information Placards (WHIP) posted by the Environmental Health and Safety Office (EHSO) are based on the information that the room occupants provide on the WHIP application form:

[http://www.umanitoba.ca/admin/human\\_resources/ehso/geninfo/signage.html](http://www.umanitoba.ca/admin/human_resources/ehso/geninfo/signage.html)

## 9. The Material Safety Data Sheets (MSDS)

A Material Safety Data Sheet is a technical document that provides more detailed hazard, precautionary and emergency information on the product. The MSDS is meant to supplement the alert information contained in the Supplier or Workplace Labels.

In the workplace, a MSDS must be present for each hazardous material regulated under WHMIS, which is present in the workplace. The MSDS must be located close to the work area and accessible to all workers who may be exposed to a controlled product. Suppliers must send an MSDS for every new controlled product they sell to the University. The University (department or unit) has to develop an MSDS for each controlled product produced or imported directly (Suppliers have to develop MSDS in both official languages but the purchaser may request data sheets in either or both official languages).

An example of the format of a MSDS is shown on the following pages. Although the WHMIS legislation does not specify a particular format or design of a MSDS, minimally, the MSDS must provide all the information required in the **nine categories** set out in the regulations. No section of the MSDS can be left blank. If information for a section is not available or not applicable the MSDS must indicate that fact; the abbreviation N/A is not acceptable. An MSDS must not be more than three years old from the date of preparation or revision.

It is against regulations to use a controlled product without the appropriate MSDS on hand. Therefore, one should make sure that the MSDS is available and consult it before using that product. In the event of an emergency, as in the case of an accident where a person requires medical attention due to overexposure of a controlled product, a copy of an MSDS should be provided to the attending medical personnel.

The following pages include the various sections of an MSDS and a brief explanation of the corresponding relevant technical information.

### **MINIMUM REQUIRED INFORMATION ON MSDS**

#### **SECTION 1: PRODUCT IDENTIFICATION AND USE**

This section identifies the material by trade name, brand name, code name or number specified by the supplier, chemical name, common name or generic name. The name of the material should be the same as it appears on the container label.

The name, address and emergency telephone number of the product's manufacturer, and if different, supplier, is included in this section. The intended use of the product, for which the information supplied is solely applicable, is also mentioned. For example, a solvent meant for use in degreasing tanks may pose a significant risk to workers if it is used as a manual cleaning solvent because of its volatility.

#### **SECTION 2: HAZARDOUS INGREDIENTS**

All potentially hazardous ingredients of the material and the approximate concentration of each ingredient must be listed in this section. This section also states the toxicity of each ingredient. When a material contains ingredients that are registered as trade secret, a registration number assigned by the Hazardous Materials Information Review Commission will appear in place of the ingredients; hazards and safety information, however, must be reported. In the event of medical emergency the company must disclose the identity of the ingredients to a medical professional (nurse or doctor).

# Material Safety Data Sheet

## Section 1 - Product Identification and Use

Product Identifier			
Product Use			
Manufacturer's Name		Supplier's Name	
Street Address		Street Address	
City	Province	City	Province
Postal Code	Emergency Phone Number	Postal Code	Emergency Phone Number

## Section 2 - Hazardous Ingredients

Hazardous Ingredients	%	Product ID	CAS Number	LD <sub>50</sub> of Ingredient (Specify Species & Route)	LC <sub>50</sub> of Ingredient (Specify Species & Route)

## Section 3 - Physical Data

Physical State		Odor and Appearance			Odor Threshold
Vapor Pressure (mm HG)	Vapor Density (Air=1)	Evaporation Rate	Boiling Point (°C)	Freezing Point (°C)	
pH	Specific Gravity	Density (g/ml)		Coefficient Water/Oil Dist.	

## Section 4 - Fire and Explosion Data

Flammability <input type="checkbox"/> Yes <input type="checkbox"/> No		If yes, under which conditions?	
Means of Extinction			
Special Procedures			
Flashpoint (°C) and Method		Upper Flammable Limit (% by volume)	Lower Flammable Limit (% by volume)
Auto Ignition Temperature (°C)		TDG Flammability Classification	Hazardous Combustion Products
Explosion Data	Sensitivity to Impact		Sensitivity to Static Discharge

## Section 5 - Reactivity Data

Chemical Stability <input type="checkbox"/> Yes <input type="checkbox"/> No		If yes, under which conditions?	
Incompatibility with other substances <input type="checkbox"/> Yes <input type="checkbox"/> No		If so, which ones?	
Reactivity, and under what conditions			
Hazardous Decomposition Products			

Product Identifier				
<b>Section 6 - Toxicological Properties</b>				
Route of Entry	Skin Contact <input type="checkbox"/>	Skin Absorption <input type="checkbox"/>	Eye Contact <input type="checkbox"/>	Inhalation <input type="checkbox"/> Ingestion <input type="checkbox"/>
Effects of Acute Exposure to Product				
Effects of Chronic Exposure to Product				
LD <sub>50</sub> of Product Specify Species & Route	LC <sub>50</sub> of Product Specify Species and Route	Exposure Limits	Irritancy of Product	Sensitization to Product
Carcinogenicity	Teratogenicity	Mutagenicity	Synergistic Products	
<b>Section 7 - Preventive Measures</b>				
Personal Protective Equipment				
Gloves (specify)		Respiratory (Specify)	Eye (Specify)	
Footwear (Specify)		Clothing (Specify)	Other (Specify)	
Engineering Controls (Specify eg. Ventilation, enclosed process)				
Leak and Spill Procedure				
Waste Disposal				
Handling Procedures and Equipment				
Storage Requirements				
Special Shipping Information				
<b>Section 8 - First Aid Measures</b>				
Specific Measures				
<b>Section 9 - Preparation Date of MSDS</b>				
Prepared by (Group, Department, etc.)			Phone number	
			Date	

## CHEMICAL IDENTITY AND CONCENTRATION

Chemical identity is the name of the substance (ex. acetone). A substance may be a pure substance or it may be a mixture of a number of substances. Each of the substances making the mixture is called an ingredient. The concentration refers to the percentage of an ingredient contained in a substance; this may be expressed either as the ratio of the ingredient's weight to the total weight of the substance (w/W%), weight to total volume (w/V%) or volume to total volume of the substance (v/V%). If the substance is a mixture, the chemical identity and concentration of each ingredient that meets the criteria for disclosure will be listed in this section. The information is important because it can alert you to a hazard and the need to exercise caution.

### CAS NUMBER

The CAS registry number is a unique identification number assigned to each chemical by the Chemical Abstracts Service (CAS) Division of the American Chemical Society. This unique number can be used to confirm the chemical identity or obtain more information about the ingredient.

### PIN

The Product Identification Number (PIN) is a four digit number for pure chemicals or groups of chemicals used for materials during transportation to assist with locating hazard information. PIN's can be of UN (United Nations) or NA (North American) origin.

### LD<sub>50</sub> SPECIES AND ROUTE

The LD<sub>50</sub> ("Lethal Dose 50") of an ingredient is the amount of the ingredient that, when administered in a single dose to a group of test animals by a defined route (e.g. ingestion or absorption through skin) will kill 50% of the test population of animals. The LD<sub>50</sub> values are obtained from animal studies and are expressed in **milligrams per kilogram of the body weight**. Remember that the **lower the LD<sub>50</sub>, the greater the toxicity** because less of the ingredient is required to kill the test population.

### LC<sub>50</sub> SPECIES AND ROUTE

The LC<sub>50</sub> ("Lethal Concentration 50") of an ingredient is the concentration of the ingredient in air which when inhaled by a group of test animals for a certain length of time (usually 4 hours), will kill 50% of those animals. LC<sub>50</sub> is expressed in parts of material per million parts of air by volume (ppm) for gases and vapours and as milligrams per cubic metre of air (mg/m<sup>3</sup>) for dusts and mists as well as for gases and vapours.

Both LD<sub>50</sub> and LC<sub>50</sub> are obtained from animal studies and the MSDS must indicate the species of animal tested and the route by which the hazardous ingredient was administered. Note that these values refer to pure ingredients. In a material, which is a mixture, the ingredients are present in the stated percentage concentration only.

## SECTION 3: PHYSICAL DATA

This section describes the physical properties of the substance and helps in the identification of the substance. However, more importantly, safe handling is ensured when you know beforehand how the material will behave at a different temperature or pressure or when it is exposed to water, air or light, etc. A correct interpretation of the properties listed in this section can alert you to the possible hazards.

## PHYSICAL STATE

This indicates whether the material is a solid, liquid or gas at room temperature (20°C) and atmospheric pressure. The physical state of a substance is a good indicator as to how the substance may enter the body. Gases mainly enter the body by inhalation. Liquids that evaporate to form a vapour, or are atomized to form a mist can enter the body by inhalation. Liquids and solids can enter the body by skin contact (absorption) and also by ingestion.

## ODOUR AND APPEARANCE

The description of odour (e.g. sweet, fruity, almond-like, strong, mild, faint, irritating, etc.) and appearance (e.g. colour, greasy, soft, powder, granules, flakes, gelatinous, viscous, thick, paste, etc.) of a substance may also aid in its identification i.e., allows you to make sure that you are handling the correct material. Hazards posed by granular or powdery material would be different from those posed by lumps of solid of the same substance; as an example, granular sodium is more reactive than a piece of sodium, zinc dust is more reactive than granular zinc.

## ODOUR THRESHOLD

The odour threshold is the lowest concentration of the material in air that can be smelled. Normally this is expressed in parts per million (ppm) or in mg/m<sup>3</sup>. Odour threshold may be used in evaluating the material's warning properties. **A substance has good warning properties if the odour threshold is less than 1/10 of the exposure limit and poor warning properties if it is three times, or more, above exposure limit.** Odour thresholds should be used with caution in evaluating warning properties because individual sensitivities to odour vary and some odourant substances (e.g. hydrogen sulphide), may desensitize the sense of smell.

## SPECIFIC GRAVITY

Specific gravity is the weight of a given volume of material compared to the weight of an equal volume of water at the same temperature. Water at 4°C has a specific gravity of 1.00 and is used as a standard against which specific gravity of other liquids are measured. Insoluble materials with specific gravity greater than 1.00 will sink in water (example: mercury – specific gravity 13.555). Flammable liquids which have specific gravities less than 1.00 and are water insoluble, e.g. benzene, which has a specific gravity 0.88, will float on water, which is an important piece of information in cleaning up spills or fighting fire.

## VAPOUR PRESSURE

Vapour pressure is the pressure exerted by a saturated vapour above its own liquid (or volatile solid, e.g. iodine, naphthalene, moth balls, camphor) in a closed container at 20°C (unless a different temperature is specified). This is measured in millimetres of mercury (mm-Hg) where one atmosphere equals 760 mm-Hg.

For comparison, at 20°C, the vapour pressure of water, ethanol, methanol, acetone and diethyl ether are 17.54, 43.89, 128, 181.7 and 380 (mm-Hg) respectively. Vapour pressure is a measure of the tendency of the material to form a vapour, the higher the vapour pressure the greater the ease with which the material will evaporate. **Materials with high vapour pressures can be hazardous in enclosed, non-ventilated areas.**

## VAPOUR DENSITY

Vapour density is the weight of a given volume of a vapour or gas compared to the weight of an equal volume of air.

Vapour density of air is 1.0. Gases or vapours lighter than air have vapour densities less than 1.0. For example, hydrogen, helium and methane will rise in the air. Those with vapour densities more than 1.0, for example, chlorine, carbon dioxide, acetone (2.0), diethyl ether (2.56), are heavier than air and will collect in low lying areas or enclosed places, along or under floors, in sumps, sewers, manholes, ditches, trenches. These create fire, explosion or health hazards. These trends will also be affected by changes in temperature, turbulence and time. This information is useful when determining position of baffles in fume hood and orientation of the exhaust duct in flammable liquid storage cabinets.

## EVAPORATION RATE

The evaporation rate is a measure of how quickly the material becomes a vapour in air at a specified temperature, usually normal room temperature (20°C). The rate is given in comparison to a chemical that evaporates fairly quickly, generally n-butyl acetate, but other chemicals such as ether are also used. The chemical used for comparison must be listed. Compared to n-butyl acetate, which is assigned a rate of 1.0, evaporation rates can be classified as:

- FAST evaporating if greater than 3.0, e.g. - methyl ethyl ketone (MEK), 3.8; acetone, 5.6 hexane, 8.3; diethyl ether, 37.5.
- MEDIUM evaporating if ranging from 0.8 to 3.0, e.g. - 95% ethanol, 1.4; VM&P naphtha, 1.4; methyl isobutyl ketone, 1.6.
- SLOW evaporating if less than 0.8, e.g. - xylene, 0.6; isobutyl alcohol, 0.6; normal butyl alcohol 0.4; water, 0.3; mineral spirits, 0.1.

## BOILING POINT

This is the temperature at which a liquid becomes a gas at normal atmospheric pressure (760 mm-Hg). At this temperature, the vapour pressure of the liquid is equal to the surrounding atmospheric pressure. Of course, below this temperature liquids can still evaporate to form a vapour. As the liquid approaches the boiling point, the change from liquid to vapour or gas is very rapid and the vapour concentration in the air can be very high. The boiling point of a liquid is important because of the sudden volume change of the product and the extent of its presence in air. Flammable materials with low boiling points present special fire hazards, example - gasoline, 38°C; diethyl ether, 35°C, pentane, 35-36°C.

## FREEZING POINT

Freezing point is the temperature at which a substance changes its physical state from liquid to solid, at normal atmospheric pressure. This information is important for storage and handling purposes. Volume changes may occur at the freezing point and the frozen material may cause its container to rupture. A change of the physical state could also alter the hazardous nature of the material.

## pH

pH on a numerical scale from 0 to 14 is a measure of acidity or basicity (alkalinity) of a material when dissolved in water. pH of 7 represents neutrality (pure water) at 20°C. pH values lower than 7 represent acidity; greater than 7 represents alkalinity. Corrosive acidic solutions will have a value ranging from pH 0-3; and corrosive basic solutions will have a pH in the range of 11-14. The pH scale is logarithmic and a difference of one pH unit represents a factor of 10. Both strong acids and bases (alkalies) are corrosive to the skin and eyes.

## COEFFICIENT OF WATER/OIL DISTRIBUTION

The coefficient of Water/Oil distribution is the ratio of the solubility of the material in water to its solubility in oil (in lab test n-octanol is used as "oil"). A value of less than 1 indicates that the material may be more soluble in oils and greases than in water; such a material is more likely to be absorbed by the skin. A value of greater than 1 indicates better solubility in water; such a material could be absorbed by the mucosal tissue of the eyes and lungs. This material can be useful in selecting personal protective equipment (respirators, masks, coveralls etc.) and assessing first aid requirements.

## PERCENT VOLATILE

This number indicates the percentage of a liquid or solid (by volume) that will evaporate at ambient temperature (unless some other temperature is stated). For example, gasoline and mineral spirits (paint thinner) is 100% volatile since over a period of time each will evaporate completely. This information is important because it alerts you to the potential for releasing harmful vapour into the air and creating a fire or health hazard. In such a situation special ventilation and storage controls may be required.

## SECTION 4: FIRE OR EXPLOSION HAZARD

This section describes the potential fire hazards posed by the material and the conditions under which the material may be flammable, as well as the type of fire extinguisher to be used to put out the fire.

### CONDITIONS OF FLAMMABILITY

Conditions under which the material will burn or explode are stated here. The information presented here is useful for taking proper measures in using, storing or disposing of the material.

### MEANS OF EXTINCTION

This section describes the appropriate means of extinguishing a fire involving the material, e.g., the type of fire extinguisher to use. The wrong approach can make the situation worse. Some burning substances can react with water and may best be smothered with "carbon dioxide", "foam" or "dry chemical" fire extinguisher. In most fires, the greatest danger is from toxic smoke produced that can quickly fill the work area.

### FLASH POINT AND METHOD

Flash Point (FP) is the lowest temperature at which a liquid gives off enough vapour to form an ignitable mixture with air over its surface in the presence of a source of ignition (such as an open flame or spark) under specified test conditions. Flash points are determined in both enclosed (closed-cup) and non-enclosed (open-cup) test systems; flash points measured by closed-cup methods tend to be lower than by open-cup. For a given test method, **the lower the flash point of a material, the greater is the potential fire hazard.**

Compare diethyl ether (FP:  $-45^{\circ}\text{C}$ ), gasoline (FP:  $-42^{\circ}\text{C}$ ), acetone (FP:  $-17.8^{\circ}\text{C}$ ), Ethyl alcohol (FP:  $12.8^{\circ}\text{C}$ ).

### FLASH BACK

Flash back occurs when a trail of flammable vapour is ignited by a distant flame, spark or other ignition source. The flame travels back along the trail of vapour to its source. The result could be a serious fire or explosion.

## FLAMMABLE LIMITS IN AIR

- **Upper Flammable or Explosive Limit (UFL or UEL)** - The highest concentration of a material in air that will ignite or explode if it contacts an ignition source (spark, electric arc, flame or high heat). At concentrations higher than the UEL, the mixture is too rich to burn or explode.
- **Lower Flammable or Explosive Limit, (LFL or LEL)** - The lowest concentration of a material in air (% volume in air) that will burn or explode in the presence of an ignition source. At concentration lower than the LEL, the mixture is too lean to burn. The lower explosive limit is particularly important, because if this value is low, it will require only a small amount of the flammable/combustible liquid vaporized in air to form an ignitable mixture.
- The concentration range between the upper and lower flammability limits, where the gas or vapour is flammable, is known as the **flammable or explosive range**. The larger the range the greater the potential hazard. For example, the flammable or explosive range for acetone in air is 2.6% to 12.8% (26,000 ppm to 128,000 ppm); for diethyl ether 1.9% to 48%.

## AUTOIGNITION TEMPERATURE

The lowest temperature at which a flammable gas or vapour mixture in air will ignite without a spark or an open flame. This is an important piece of information in areas where gases or vapours may be exposed to high temperatures or hot surfaces. For example, with an autoignition temperature of 100°C, a steam line or a glowing light bulb may ignite carbon disulphide; diethyl ether (autoignition temperature, 160°C) can be ignited by the surface of a hot plate.

## HAZARDOUS COMBUSTION PRODUCTS

The burning of a substance may give off products that may be hazardous. In that case such products will be listed here. This information alerts the user to these possible harmful materials. The information is especially useful for emergency response and fire fighting personnel.

## EXPLOSION DATA (SENSITIVITY TO MECHANICAL IMPACT AND STATIC DISCHARGE)

The information in this section indicates whether or not the material will burn or explode on shock or mechanical impact (e.g. dropping the container or jarring the container during transport) or as a result of friction as in scooping up spilled material. Metal azides and acetylides, organic nitrates, and organic peroxides are shock sensitive.

Information on how readily the material can be ignited by static discharge or electric spark is also given in this section.

*There are limits established for storage of flammable liquids according to national and local Fire Codes. Refer to University of Manitoba "Flammable Liquids Storage Policy", Appendix B in the "Controlled Products Standard".*

## SECTION 5: REACTIVITY DATA

This section provides information on the stability of the material and the likelihood of its dangerous reaction with other chemicals. The information is significant for handling procedures, storage arrangements and, along with data in Section 4, may be useful in prevention and the control of fire and explosions.

## CHEMICAL STABILITY

A chemical is unstable if, in the pure state, or as it is produced or transported, it will vigorously polymerize, decompose or become self-reactive under the physical conditions of mechanical shock, vibration, pressure, temperature, or when exposed to light, air or water. These reactions may generate a lot of heat, may generate enough pressure to burst a container, or may be explosive.

Chemicals that can decompose, peroxidize or polymerize often contain additives called inhibitors or stabilizers which reduce or eliminate the possibility of hazardous reactions. Copper and mercury azides and acetylides, some organic peroxides and organic nitrates are chemically unstable. The information in this section indicates whether the substance is stable or not, and under what conditions. It is essential that the material is stored and handled to avoid conditions that may cause an adverse reaction.

## INCOMPATIBILITY

Two substances are incompatible, if on combination, they react dangerously and produce toxic, corrosive or flammable substances, excessive heat or explosion. For example: **1.** Strong acids are incompatible with bases **2.** Sodium is incompatible with water **3.** Flammables are incompatible with toxics and with oxidizers **4.** Oxidizers are incompatible with reducers (*a substance that chemically reduces other substances by donating an electron*). A common example is "Javex" (bleach) and household ammonia, which when mixed, produces explosive chloramines. On contact with acids, hypochlorite emits highly toxic fumes of chlorine and chlorides. Incompatible substances must be handled and stored with care to prevent accidental mixing by spillage or breakage.

## REACTIVITY

This section lists specific conditions under which the product can become reactive, such as high temperature, pressure and exposure to light, air or moisture. For example, a monomeric substance, which is stable in the presence of an inhibitor, may violently polymerize if the inhibitor content is reduced and may cause the container to break and the contents to be spilled.

## HAZARDOUS DECOMPOSITION PRODUCTS

This section lists any hazardous substances produced when the material decomposes as a result of ageing, heating, burning or reaction. Organic peroxides are formed on ageing of ethers and unsaturated cyclic compounds, formation of irritant gases and chemical asphyxiants occur on combustion of some materials (carbon monoxide is produced by the decomposition of acetone).

*The stability, incompatibility and reactivity are very important points to consider in terms of storage and using/handling of hazardous materials. The University's 'Controlled Product Standard' provides guidelines on standard practices for the use and storage of controlled products.*

## SECTION 6: TOXICOLOGICAL PROPERTIES

This section contains health hazard information and describes the possible health effects, which may result from overexposure to the material.

### ROUTE OF ENTRY

All primary routes of entry of the material into the body are listed here so that effective measures against exposures can be taken. Three primary routes of entry into the body are: ingestion, skin or eye absorption and inhalation.

**Ingestion** - This means taking the material into the body by mouth (swallowing). Ingestion of toxic materials may occur by transfer from contaminated fingers as a result of eating and drinking in a contaminated work area. Good personal hygiene as well as other protective measures are required to prevent ingestion.

**Absorption** - Some chemicals may contact the eye and the skin and be either absorbed into the body or cause local dermal effects (skin or eye irritation or burn). Many organic chemicals are absorbed through the skin and the mucosal membranes, e.g., phenols, amines, alkyl lead compounds and pesticides. Absorption through the skin can occur rapidly if the skin is cut or abraded. Skin protection is required to prevent dermal hazard absorption.

**Inhalation** - This means taking the material into the body by breathing it in. Very tiny blood vessels in the lungs are in constant contact with the air you inhale. Airborne contaminants can be easily absorbed through this tissue. In the occupational environment, substances are likely to exist in an airborne state as fumes, dust, fibres, mists, vapours or gases. This is the most common route of entry. Inhalation hazards often require air contaminant controls such as ventilation, fume hoods or, when not available, respiratory protection.

**Injection** – In addition of the three primary routes of entry described above, there is another way - a substance can enter some part of the body through injection, by means of a needle or high-pressure orifice. Although infrequent in industry, there are instances of needle-stick injuries associated with bloodborne pathogens and preventive measures are required.

## **EFFECTS OF ACUTE EXPOSURE**

These refer to adverse health effects on a human or animal body with symptoms ranging from headache, coughing, skin rash, and nausea and vomiting to loss of consciousness, coma and death. These can develop rapidly and come quickly to a crisis resulting from short-term exposure to the material either as a single exposure or multiple exposures within a short time (24 hours or less). For example, an acute exposure to carbon monoxide or cyanide can, depending on the dose, induce symptoms such as headache, dizziness, coma and death.

## **EFFECTS OF CHRONIC EXPOSURE**

These refer to adverse health effects on a human or animal body resulting from repeated exposure (daily or weekly) to the substance over a relatively long period of time or from a single exposure with symptoms that develop over a long period of time, or that recur frequently. As for example, recurrent exposure to low levels of carbon monoxide may initiate or enhance heart problems particularly in persons with predisposing conditions of heart ailments; repeated exposure to free silica in air may cause lung disease (silicosis).

## **EXPOSURE LIMITS**

These are maximum limits of exposure to an airborne substance as recommended by various bodies such as ACGIH (American Conference of Governmental Industrial Hygienists), NIOSH (National Institute of Occupational Safety and Health) or as legislated by a health and safety regulatory agency.

Exposure limit is the maximum concentration in air of a hazardous substance (in the form of a gas, vapour, dust, fibre, mist, and fume) to which nearly all workers without personal protective equipment can be repeatedly exposed without adverse health effects. Because individual susceptibilities may vary, some may be affected more seriously by the aggravation of a pre-existing condition.

Exposure limits are intended for use as guidelines in the control of potential health hazards and are not fine lines between safe and unsafe exposures. In Manitoba, the ACGIH Threshold Limit Values (TLVs) are referenced as a source of help in determining Occupational Exposure Levels (OELs). The three types of exposure limits (TLVs) are:

- **TWA (Time Weighted Average):** The maximum average airborne concentration of a material to which workers may be exposed for a 8 hour work day or 40 hour work week.
- **STEL (Short Term Exposure Limit):** The maximum airborne concentration of a material to which a worker may be exposed for a period up to 15 minutes without suffering from adverse health effects (A maximum of four such periods per day, with at least 60 minutes between exposure periods, provided that the daily **TWA** is not exceeded).
- **C (Ceiling Limit):** The maximum airborne concentration of a material to which a worker may be exposed at any time. This limit should not be exceeded even instantaneously. The ACGIH publishes annually the **“Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices”** that explains and documents TLVs.

Exposure limits are expressed in ppm for gases and vapours and as mg/m<sup>3</sup> for dusts, fumes and mists.

### **IRRITANCY OF PRODUCT**

Information is provided here about the capability of the material to cause localized effects such as inflammation, irritation, reddening, itching, blistering or swelling at the site of contact on the eye, skin or respiratory system. The effects are normally reversible. Acids, caustics, amines, ketones, trichloroethylene, ammonia and nitrogen dioxide are some of the examples. This information is useful in selecting skin and eye protective equipment.

### **SENSITIZATION TO THE PRODUCT**

Information is given here about whether the product is a sensitizer i.e., it may cause allergic reactions. Initially, exposure to a sensitizer may cause little or no reaction in persons or test animals, but after repeated exposure, some individuals develop an allergy. Subsequent exposures to the same substance at a much lower concentration than before produces an allergic response such as skin rash (dermatitis) or an asthmatic-like attack depending on the route of exposure. Examples are: isocyanates in polyurethane foam operations and in paint spraying operations, cutting oils, and some laboratory solvents. Skin and respiratory protection is necessary to prevent sensitization of workers handling such products.

### **CARCINOGENICITY**

Information is given here on the cancer-causing properties of the product. Examples of such products are: benzene, arsenic, beryllium, chromium(VI) oxide, carbon tetrachloride and vinyl chloride.

Effective control measures must be taken to minimize the risk of exposure to carcinogens e.g. working in a fumehood.

### **TERATOGENICITY AND EMBRYOTOXICITY**

Teratogenicity and embryotoxicity can be defined as the capability of a product to cause physical damage to the developing embryo or fetus when a pregnant female is exposed to that product at a concentration that has no adverse effect on the female. The embryonic stage of development of the fetus is particularly at risk of injury from such a product. Examples of teratogens are: thalidomide, rubella infections, dimethyl mercury and ionizing radiation.

### **REPRODUCTIVE TOXICITY**

This is the ability of a material to adversely affect the reproductive system causing mutations, birth defects and sterility. This has implications for the capability to produce offspring as well as for teratogenicity and embryotoxicity. Examples are: lead, halogenated hydrocarbons, polynuclear aromatic compounds, cadmium, ethylene glycol, vinyl chloride, dibromochloropropane, carbon disulphide and ethylene oxide.

## MUTAGENICITY

The capability of the material to cause mutation (genetic changes) in living cells. Changes in reproductive (germ) cells may result in heritable genetic effects, changes in the somatic (body) cells may be associated with increased risks of other effects such as cancer. Examples of mutagens are: ethidium bromide, perchloroethylene and aflatoxins. Since both parents contribute to the child's genetic complement, exposure of either parent to mutagens can affect the offspring.

Much of the information on carcinogenicity, teratogenicity and embryotoxicity, reproductive toxicity and mutagenicity is based on data from experiments on animals and may or may not apply to humans. The information is intended to give you guidance on taking specific precautions.

## SYNERGISTIC MATERIALS

Included in this section are materials that interact with the controlled product to produce a toxic effect greater than the combined toxic effects of the material and the controlled product acting separately. For example, exposure to asbestos and cigarette smoke has been shown to produce a risk of lung cancer far greater than the sum of the risks of exposures to each agent alone.

## SECTION 7: PREVENTIVE MEASURES

This is probably the most important section to you since it tells you how to protect yourself and others from potential hazards. On the basis of information in Sections 1-6, this section provides directions for provisions of measures to protect workers' health and safety during transportation, storage, use, handling and disposal of the product, as well as emergency procedures in the event of accidental release of the material.

The information includes two general ways of controlling hazards - **engineering controls** (e.g. general dilution ventilation, local exhaust ventilation as in laboratory hoods, process enclosure, process equipment design, etc.) and **personal protective equipment (PPE)** (e.g. chemically resistant gloves, apron, suit or coveralls, the type of material whether neoprene, butyl, polyvinyl chloride (PVC), polyvinyl alcohol (PVA), Viton(R)<sup>2</sup>, latex, nylon, polyurethane etc.; protective safety eye glasses, goggles, face shields; respirators).

**Often, it may turn out that the information in an MSDS, about personal protective equipment to be worn is given with the use of the material in a large industrial setting and an extreme case scenario in mind. Some statements such as "wear rubber boots, tyvek suits and self contained breathing apparatus" have to be taken in the context of the extent of possible exposure in relation to the amount of material used and the toxicity of the material. In case of doubt, always consult your supervisor.**

The section also deals with information on storage requirements, leak and spill clean-up procedure, handling procedures, equipment and waste disposal. Special shipping information (reference to sensitivity to shock, temperature etc.), TDG (Transportation of Dangerous Goods) Class and Division and Packing Group) are also included. The disposal of hazardous chemicals from the University laboratories and other workplaces is regulated by **MANITOBA CONSERVATION** regulations and **CITY OF WINNIPEG** By-laws. For information on the disposal of hazardous chemicals, laboratory biomedical wastes and handling procedures for chemical wastes contact the Environmental Health and Safety Office at 474-6633.

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<sup>2</sup> Viton(R) is a registered trademark of DuPont Dow Elastomers

## SECTION 8: FIRST AID MEASURES

This section describes the actions to be taken in case of acute overexposure to the material. **It is important that one should be aware of this first aid information before one starts working with the material.** The purpose of first aid is to minimize injury and future disability and the action taken in the first few minutes after an accident/overexposure can make a difference between a minor and a major injury. Everyone should know the location of facilities and equipment for providing first aid e.g. the eyewash unit and first aid station. **Specific first aid information for four categories: skin contact, eye contact, inhalation and ingestion are given here. Professional medical treatment should be obtained as soon as possible after an accident and a copy of the MSDS of the material should be given to the attending medical personnel.**

## SECTION 9: PREPARATION INFORMATION

Listed in this section is the name and phone number of the group, department or party responsible in the preparation of the MSDS and the date of preparation of the MSDS. **An MSDS is valid for three years from the date of preparation.** The employer (the University) must obtain or prepare a new MSDS when an old one expires so that a current MSDS is available at all times.

A sample MSDS is included in the Appendix.

### 10. LOCATION OF MSDS AT THE UNIVERSITY

The MSDS at University workplaces are available in hardcopy form from suppliers. WHMIS legislation requires that these MSDS must be available in the workplace. These MSDS should be available in binders filed in alphabetic order. The binders should be labeled prominently, placed in a conspicuous location and should be easily accessible at all times. If you cannot find an MSDS, ask your supervisor, instructor, departmental WHMIS coordinator, or departmental general office. You can also contact **Environmental Health and Safety Office (EHSO) (474-6633)**.

The University has been taking all measures to have MSDS available for all controlled products. The University is a subscriber to the Academic Support Program (ASP) delivered by the **Canadian Centre for Occupational Health and Safety (CCOHS)** in Hamilton, Ontario. (<http://ccinfoweb.ccohs.ca/asp>) Under this program the University has internet access to the following databases and resources: **MSDS and FTSS** databases – a collection of more than 240,000 current MSDS in English and French from suppliers and manufacturers; **CHEMINFO** – a database containing detailed profiles of more than 1,300 workplace chemicals, including health, fire and reactivity hazards and safe work practices; **RTECS<sup>®</sup>** (Registry of Toxic Effects of Chemical Substances) – a database providing critical toxicological information with citation on more than 140,000 common and rare chemical substances; **CHEMpendium<sup>™</sup>** – a comprehensive resource of chemical hazard information for workplace and the environment covering transport of hazardous materials, descriptions of chemical toxicity, fact sheets on the hazards and safe use of industrial chemicals and environmental contaminants, pesticide label text including Canada's Domestic/Non-Domestic Substances List (DSL/NDL); **IPCS INCHEM (Free Resource)** – a resource base providing access to hundreds of publications about chemicals from international organizations that cooperate with International Programs on Chemical Safety; **CHEMINDEX (Free Resource)** – a CCOHS developed database providing a convenient guide to information resources (e.g., Chemical names and synonyms and CAS registry numbers) on over 200,000 chemicals, **OSHLINE<sup>™</sup> with NIOSHTIC<sup>®</sup>** – a database providing comprehensive international coverage of documents on occupational health and safety and related fields; **HSELINE** – a database produced by UK Health and Safety Executive providing over 180,000 citations with abstracts to worldwide literature on occupational safety; **CISILO** – a bilingual, bibliographic database providing references to international occupational health and safety literature; **Canadiana** – a database providing references to occupational health and safety documents published in Canada, about Canadian subjects and by Canadian authors including selected TOXLINE<sup>®</sup> records, **Western Canadian enviroOSH Legislation Plus Standards** – provides access to complete text of all health, safety and environmental

legislation and critical guidelines and codes of practice for all Western Canadian provinces and territories, as well as Federal legislation that includes complete reference standards from the Canadian Standards Association (CSA), Canadian General Standards Board (CGSB) and the Workers Compensation Board of British Columbia, and **Fatality Reports (Free Resource)** for occupationally related fatalities. The databases are web accessible from networked University of Manitoba computers. If you require assistance on this, you can call LETS **HELP DESK at 474-7061**. Ask your supervisor about how to access MSDS on the computer network. Other Internet sites also provide a wide MSDS resource base. The University's Environmental Health and Safety Office's home page ([http://www.umanitoba.ca/admin/human\\_resources/ehso/](http://www.umanitoba.ca/admin/human_resources/ehso/)) has several links for MSDS created under Chemical Safety Program titled "MSDS on the Internet".

The Environmental Health and Safety Office also has a collection of Safety Videos and a resource library. These databases and the resource base make the university self sufficient with respect to the handling of MSDS and safety issues.

## 11. **WORKER EDUCATION**

The third element of WHMIS is the worker education program. WHMIS training requirements are designed to ensure that workers know and understand the hazard and safe handling information about controlled products in the workplace. Some aspects of WHMIS training are generic – they apply to workers generally and some are workplace specific. For example, a chemical laboratory, biomedical laboratory, dental clinics, physical plant operations (plumbing, spray painting, work in a confined space), agricultural work including use of pesticides and herbicides, animal care services, photography studio, printing press will have both generic and workplace specific training requirements.

The University of Manitoba has a 'Laboratory Safety Training Standard Procedure' under the University of Manitoba Health and Safety Policy 512:

[http://www.umanitoba.ca/admin/governance/governing\\_documents/operations/800.htm](http://www.umanitoba.ca/admin/governance/governing_documents/operations/800.htm)

[http://www.umanitoba.ca/admin/governance/governing\\_documents/staff/551.htm](http://www.umanitoba.ca/admin/governance/governing_documents/staff/551.htm)

Employers are required to provide training to all workers (including managers and supervisors, visiting scientists and scholars) who work with or in proximity to a controlled product. All employees must receive the basic/generic WHMIS Worker Education on a one-time basis, preferably as close to their employment date as possible. All employees must receive the workplace specific education on a continual basis as new products are introduced into their specific workplace and there is a change in work process, equipment and work conditions.

Once existing workers have been trained, there will be an ongoing requirement to train new workers and those who change jobs or work conditions or available hazard information. The regulation requires annual review of WHMIS training program that may necessitate refresher training. A change in work conditions or available hazard information may require more frequent reviews.

***WHMIS requires that workers shall be instructed in the following with regard to controlled products (including fugitive emissions\* or hazardous waste if they are controlled products):***

- **Content, purpose and significance of supplier and workplace labels;**
- **Content, purpose and significance of Material Safety Data Sheets;**

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\* "Fugitive emission" means a gas, liquid, solid, vapour, fume, mist, fog or dust containing a controlled product that escapes from process equipment, emission control equipment, or product or a device in the workplace

- **Procedures for the safe use, storage, handling and disposal of controlled products and for such products contained or transferred in piping systems, a process vessel, a reaction vessel and a tank car, tank truck, ore car, conveyer belt or similar conveyance;**
- **Procedures to be followed in case of an emergency involving a controlled product;**
- **Any other hazard information about the controlled products the employer is or ought to be aware of. This means the employer may need to search for more information than is available on the MSDS.**

An employer shall ensure, so far as reasonably practical, that the worker education program results in a worker being able to apply the information to protect the worker's health and safety.

A PowerPoint 'Generic WHMIS and Laboratory Safety Training' developed by EHSO and a committee of WHMIS Departmental Coordinators is available for using it as a template for creating individual site specific WHMIS training for different areas (see link: [http://www.umanitoba.ca/admin/human\\_resources/ehso/media/LabSafetyWHMIS.pdf](http://www.umanitoba.ca/admin/human_resources/ehso/media/LabSafetyWHMIS.pdf).)

This Handbook and MSDS's contain much of the information needed for generic WHMIS worker training.

#### WHMIS INFORMATION REQUIRED ???????

**If you require more information about WHMIS, consult your instructor/professor, supervisor or departmental WHMIS Coordinator. For additional information contact the Environmental Health and Safety Office at 474-6633.**

## **12. Workplace/Laboratory Inspections**

Identification of hazards, assessing the risks, finding safer alternatives including standard operating procedures is vital to keeping a laboratory/workplace safe and healthy. Regular inspection of workplace is a requirement under Workplace Safety and Health Act and Regulations and Due Diligence. Every laboratory/workplace should conduct regular inspections with a peer group (or a committee consisting of the Principal Investigator/Supervisor or designate and other responsible personnel) and record observations and corrections/mitigation. To help the University community using controlled products with this exercise, EHSO has developed a Self Inspection Checklist (SICL) that should be used.

EHSO has a **Combined Laboratory Inspection Program (CLIP)** that covers inspections mandated by relevant regulatory bodies for Chemical, Biological, Radiation, Animal Care and Fire & Life Safety areas. EHSO will conduct periodic inspections of all laboratories/workplace using controlled products and annual inspections of all animal use and radioisotopes use areas. For further information, visit EHSO web page:

[http://www.umanitoba.ca/admin/human\\_resources/ehso/rad\\_safety/Clip2.html](http://www.umanitoba.ca/admin/human_resources/ehso/rad_safety/Clip2.html).

EHSO will send a report of findings and corrective actions to Principal Investigators. A summary report is sent to the respective Head of the Department when a whole department is inspected. PI's are expected to respond promptly in writing to the EHSO describing the actions taken to mitigate hazards. Follow-up inspections may be conducted as necessary. In addition, regulatory bodies such as CNSC, CFIA and Public Health Agency of Canada (PHAC), Environment Canada, (Manitoba) Workplace Safety and Health and City of Winnipeg Fire Department may conduct inspections of controlled products use and storage areas.

### **13. REFERENCES**

WHMIS CORE MATERIAL: Workplace Safety and Health, 200-401 York Avenue, Winnipeg, Manitoba, R3C 0P8

Controlled Products Standard: University of Manitoba: Environmental Health and Safety Office

University of Manitoba Biosafety Guide: University of Manitoba, Environmental Health and Safety Office

Laboratory Biosafety Guidelines: Health Canada, 3rd Edition, 2004

Canadian Government Publishing Centre: Public Works and Government Services Canada, Ottawa, Ontario K1A 0S9 (for obtaining copies of government regulations).

#### **Web Sites:**

University of Manitoba Environmental Health and Safety Office:

[http://www.umanitoba.ca/admin/human\\_resources/ehso/](http://www.umanitoba.ca/admin/human_resources/ehso/)

Canadian Centre for Occupational Health and Safety (CCOHS), Hamilton Ontario:

<http://www.ccohs.ca>

Canadian Government Publishing Centre:

<http://www.publications.pwgsc.gc.ca>

Public Health Agency of Canada;

[http://www.phac-aspc.gc.ca/publicat/lbg-ldmbi-04/ch10\\_e.html](http://www.phac-aspc.gc.ca/publicat/lbg-ldmbi-04/ch10_e.html)

Public Health Agency of Canada – Office of Laboratory Security Biosafety Division:

<http://www.phac-aspc.gc.ca/ols-bsl/index.html>

For MSDS of biohazardous organisms:

<http://www.phac-aspc.gc.ca/msds-ftss/>

Health Canada, **WHMIS official national site:**

[http://www.hc-sc.gc.ca/ewh-semt/occup-travail/whmis-simdut/index\\_e.html](http://www.hc-sc.gc.ca/ewh-semt/occup-travail/whmis-simdut/index_e.html)

Manitoba Labour Workplace Safety and Health: <http://www.gov.mb.ca/labour/safety>

## APPENDIX “A”

### WHMIS TOXICITY CATEGORIES (based on studies of experimental animals)

Table 1

Materials Causing Immediate and Serious Toxic Effects

WHMIS CLASS	Descriptive Term	LD <sub>50</sub> (mg/kg)		LC <sub>50</sub> (4-hour inhalation)		
		Oral	Skin	Gas (ppm)	Vapour (ppm)	Dust (mg/m <sup>3</sup> )
D. Div. 1 Sub. A	Very Toxic	Below 50	Below 200	Below 2500	Below 1500	Below 500
D. Div. 1 Sub. B	Toxic	50-500	200-1000	No criterion	1500-2500	500-2500
	Essentially non-toxic	Above 500	Above 1000	Above 2500	Above 2500	Above 2500

Table 2

Materials Causing Other Toxic Effects (Chronic Toxic Effects)  
(refers to adverse effects observed after 90-day or chronic test on experimental animals)

WHMIS CLASS	Descriptive Term	Oral Dose (mg/kg) of body wt per day	Skin Dose (mg/kg) of body wt per day	Inhalation Route of Exposure		
				ppm	ppm	mg/m <sup>3</sup> )
D. Div. 2 Sub. A	Very Toxic	Not more than 10	Not more than 20	Not more than 25	Not more than 25	Not more than 10
D. Div. 2 Sub. B	Toxic	More than 10 but not more than 100	More than 20 but not more than 200	More than 25 but not more than 250	More than 25 but not more than 250	More than 10 but not more than 100

**D2A** - includes chronic toxic effects, carcinogenicity, reproductive toxicity, teratogenicity and embryotoxicity, mutagenicity of reproductive cells and sensitization of respiratory tract.

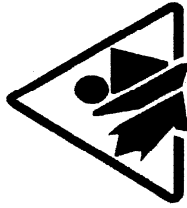
**D2B** - includes chronic toxic effects, mutagenicity of non-reproductive cells, skin sensitization and skin or eye irritation.











UNIVERSITY  
OF MANITOBA

# WHMIS

(WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM)



## APPENDIX "B"

HAZARD CLASSIFICATION	SYMBOL
<b>CLASS A - COMPRESSED GAS</b>  <b>CLASS B - FLAMMABLE AND COMBUSTIBLE MATERIAL</b> 1. FLAMMABLE GAS 2. FLAMMABLE LIQUID 3. COMBUSTIBLE LIQUID 4. FLAMMABLE SOLID 5. FLAMMABLE AEROSOL 6. REACTIVE FLAMMABLE MATERIAL	    
<b>CLASS C - OXIDIZING MATERIAL</b>  <b>CLASS D - POISONOUS AND INFECTIOUS MATERIAL</b> 1. MATERIALS CAUSING IMMEDIATE AND SERIOUS TOXIC EFFECTS  2. MATERIALS CAUSING OTHER TOXIC EFFECTS  3. BIOHAZARDOUS INFECTIOUS MATERIAL	        
<b>CLASS E - CORROSIVE MATERIAL</b>  <b>CLASS F - DANGEROUSLY REACTIVE MATERIAL</b>	

### WORKPLACE LABELS

These labels are applied at the workplace on controlled products or containers of controlled products when

- The original supplier label is missing or becomes unreadable,
- The material is decanted or transferred from the supplier's container to another container,
- The material is produced at the workplace for use within the workplace.

Workplace labels will include the following information

- Name/Identity of the Product**
- Safe Handling Information** - refers to any precautions that must be followed to minimize the risks of adverse health effect or injury. This also includes any personal protective equipment (PPE) e.g., type of gloves, eye or respiratory protection to be worn or other controls to be used through statements or pictograms (symbols)
- Reference to the MSDS.**

### SUPPLIER LABELS

Supplier labels on a controlled product must be in English and French and include the following information

- Product Identifier
- Hazard Symbol(s)
- Risk Phrase(s)
- Precautionary Measures
- First Aid Measures
- Supplier Identifier
- Reference to the availability of a Material Safety Data Sheet

This type of border (shown) is the indicator that the label identifies a controlled product.

### MATERIAL SAFETY DATA SHEET

A **MATERIAL SAFETY DATA SHEET** (valid for three years) will include information relating to each of the following categories

- Product Identification and Use
- Hazardous Ingredients
- Physical Data
- Fire and Explosion Data
- Reactivity Data
- Toxicological Properties
- Preventive Measures
- First Aid Measures
- Date and Source of MSDS

and any other hazard information of which the Supplier is aware or ought reasonably to be aware.

### FIRE / MEDICAL EMERGENCIES

**555** from 474, 789, 975, 977 exchanges or **#555** from a cell phone (MTS or AT&T)

or

**911** from other exchanges. If 911 is called you must also call Campus Security at **474-9341**

**CHEMICAL / BIOHAZARDS EMERGENCIES**  
**474-6633**

(8:30 am - 4:30 Mon. to Fri.). If busy or after hours, call **555**

**For further information on WHMIS, contact the ENVIRONMENTAL HEALTH AND SAFETY OFFICE at 474-6633.**

**MANITOBA WORKPLACE HEALTH HAZARD REGULATION 53/88** REQUIRES THAT A COMPLETE AND CURRENT CHEMICAL INVENTORY IS MAINTAINED AT ALL TIMES.

# Material Safety Data Sheet

## Methanol

ACC# 14280

### Section 1 - Chemical Product and Company Identification

**MSDS Name:** Methanol

**Catalog Numbers:** AC167830000, AC167830025, AC167835000, AC176840000, AC176840010, AC176840025, AC176840250, AC176845000, AC177150000, AC177150050, AC177150051, AC177150250, AC177150251, AC268280000, AC268280010, AC325740000, AC325740010, AC325740025, AC326630000, AC326630010, AC326630025, AC326950000, AC326950010, AC326951000, AC326952500, AC327900000, AC327900010, AC364390000, AC364390010, AC364391000, AC364395000, AC413770000, AC413770040, AC423950000, AC610200040, AC61040019, AC61040050, AC61040050, AC61040115, AC61040115, AC61040200, AC611070040, AC615130025, 17715-0010, 17715-0025, 19123467, 26828-0025, 41377-5000, 42395-0010, 42395-0040, 42395-0200, 42395-5000, 61009-0040, 61040-0010, 61040-1000, 61098-1000, A408-1, A408-4, A408-4LC, A408SK-4, A411-20, A411-4, A412-1, A412-20, A412-200, A412-200LC, A412-4, A412-4LC, A412-500, A412200-001, A412CU-1300, A412FB-200, A412FB115, A412FB19, A412FB50, A412P-4, A412POP19, A412POPB-200, A412RB-200, A412RB-50, A412RB115, A412RS-200, A412RS115, A412RS19, A412RS28, A412RS50, A412SK-4, A412SS-115, A413-20, A413-200, A413-4, A413-500, A433P-4, A433S-20, A433S-200, A433S-4, A434-20, A450-4, A452-1, A452-4, A452-4LC, A452N1-19, A452N2-19, A452POP-200, A452POP50, A452RS-115, A452RS-19, A452RS-200, A452RS-28, A452RS-50, A452SK-1, A452SK-4, A452SS-19, A452SS-200, A452SS-28, A452SS-50, A453-1, A453-1LC, A453-500, A454-1, A454-4, A454-4LC, A454RS-115, A454RS-200, A454RS-28, A454SK-4, A454SS-200, A454SS-28, A455-1, A456-1, A456-4, A457-4, A4574LC, A935-4, A935RB-200, A947-4, A947-4LC, A947POP-200, A947RS-115, A947RS-200, A947RS-28, A947SS-115, A947SS-200, A947SS-28, A947SS-50, BP1105-1, BP1105-4, BP1105SS19, BP1105SS28, HC4001GAL, NC9173853, NC9386568, NC9433033, NC9433739, NC9514454, NC9516446, NC9535777, NC9541632, NC9598497, NC9620421, NC9942270, S75965HPLC, SC95-1, SW2-1, TIA947-4, TIA947P-200L

**Synonyms:** Carbinol; Methyl alcohol; Methyl hydroxide; Monohydroxymethane; Wood alcohol; Wood naphtha; Wood spirits; Columbian spirits; Methanol.

**Company Identification:**

Fisher Scientific  
1 Reagent Lane  
Fair Lawn, NJ 07410

**For information, call:** 201-796-7100

**Emergency Number:** 201-796-7100

**For CHEMTREC assistance, call:** 800-424-9300

**For International CHEMTREC assistance, call:** 703-527-3887

### Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
67-56-1	Methanol	> 99	200-659-6

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: APHA: 10 max clear liquid. Flash Point: 12 deg C.

**Danger!** Poison! May be fatal or cause blindness if swallowed. Vapor harmful. **Flammable liquid and vapor.** Harmful if swallowed, inhaled, or absorbed through the skin. Causes eye, skin, and respiratory tract irritation. May cause central nervous system depression. Cannot be made non-poisonous.

**Target Organs:** Eyes, nervous system, optic nerve.

#### Potential Health Effects

**Eye:** May cause painful sensitization to light. Methanol is a mild to moderate eye irritant. Inhalation, ingestion or skin absorption of methanol can cause significant disturbances in vision, including blindness.

**Skin:** Causes moderate skin irritation. May be absorbed through the skin in harmful amounts. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. Methanol can be absorbed through the skin, producing systemic effects that include visual disturbances.

**Ingestion:** May be fatal or cause blindness if swallowed. Aspiration hazard. Cannot be made non-poisonous. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause systemic toxicity with acidosis. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. May cause cardiopulmonary system effects.

**Inhalation:** Methanol is toxic and can very readily form extremely high vapor concentrations at room temperature. Inhalation is the most common route of occupational exposure. At first, methanol causes CNS depression with nausea, headache, vomiting, dizziness and incoordination. A time period with no obvious symptoms follows (typically 8-24 hrs). This latent period is followed by metabolic acidosis and severe visual effects which may include reduced reactivity and/or increased sensitivity to light, blurred, double and/or snowy vision, and blindness. Depending on the severity of exposure and the promptness of treatment, survivors may recover completely or may have permanent blindness, vision disturbances and/or nervous system effects.

**Chronic:** Prolonged or repeated skin contact may cause dermatitis. Chronic exposure may cause effects similar to those of acute exposure. Methanol is only very slowly eliminated from the body. Because of this slow elimination, methanol should be regarded as a cumulative poison. Though a single exposure may cause no effect, daily exposures may result in the accumulation of a harmful amount. Methanol has produced fetotoxicity in rats and teratogenicity in mice exposed by inhalation to high concentrations that did not produce significant maternal toxicity.

## Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.

**Skin:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

**Ingestion:** Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.

**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

**Notes to Physician:** Effects may be delayed.

**Antidote:** Ethanol may inhibit methanol metabolism.

## Section 5 - Fire Fighting Measures

**General Information:** Ethanol may inhibit methanol metabolism. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Water may be ineffective. Material is lighter than water and a fire may be spread by the use of water. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.

**Extinguishing Media:** For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. Water may be ineffective. For large fires, use water spray, fog or alcohol-resistant foam. Do NOT use straight streams of water.

**Flash Point:** 12 deg C ( 53.60 deg F)

**Autoignition Temperature:** 455 deg C ( 851.00 deg F)

**Explosion Limits, Lower:**6.0 vol %

**Upper:** 31.00 vol %

**NFPA Rating:** (estimated) Health: 1; Flammability: 3; Instability: 0

## Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Use water spray to disperse the gas/vapor. Remove all sources of ignition. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as sawdust. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors. Water spray may reduce vapor but may not prevent ignition in closed spaces.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Do not ingest or inhale. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame. Avoid use in confined spaces.

**Storage:** Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area. Keep containers tightly closed.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

### Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Methanol	200 ppm TWA; 250 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous route	200 ppm TWA; 260 mg/m <sup>3</sup> TWA 6000 ppm IDLH	200 ppm TWA; 260 mg/m <sup>3</sup> TWA

**OSHA Vacated PELs:** Methanol: 200 ppm TWA; 260 mg/m<sup>3</sup> TWA

### Personal Protective Equipment

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear butyl rubber gloves, apron, and/or clothing.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

## Section 9 - Physical and Chemical Properties

**Physical State:** Clear liquid

**Appearance:** clear, colorless - APHA: 10 max

**Odor:** alcohol-like - weak odor

**pH:** Not available.

**Vapor Pressure:** 128 mm Hg @ 20 deg C

**Vapor Density:** 1.11 (Air=1)

**Evaporation Rate:** 5.2 (Ether=1)

**Viscosity:** 0.55 cP 20 deg C

**Boiling Point:** 64.7 deg C @ 760 mmHg

**Freezing/Melting Point:** -98 deg C

**Decomposition Temperature:** Not available.

**Solubility:** miscible

**Specific Gravity/Density:** .7910 g/cm<sup>3</sup> @ 20°C

**Molecular Formula:** CH<sub>4</sub>O

**Molecular Weight:** 32.04

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.

**Conditions to Avoid:** High temperatures, ignition sources, confined spaces.

**Incompatibilities with Other Materials:** Oxidizing agents, reducing agents, acids, alkali metals, potassium, sodium, metals as powders (e.g. hafnium, rhenium, nickel), acid anhydrides, acid chlorides, powdered aluminum, powdered magnesium.

**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide, formaldehyde.

**Hazardous Polymerization:** Will not occur.

## Section 11 - Toxicological Information

**RTECS#:****CAS#** 67-56-1: PC1400000**LD50/LC50:****CAS#** 67-56-1:

- Draize test, rabbit, eye: 40 mg Moderate;
- Draize test, rabbit, eye: 100 mg/24H Moderate;
- Draize test, rabbit, skin: 20 mg/24H Moderate;
- Inhalation, rabbit: LC50 = 81000 mg/m<sup>3</sup>/14H;
- Inhalation, rat: LC50 = 64000 ppm/4H;
- Oral, mouse: LD50 = 7300 mg/kg;
- Oral, rabbit: LD50 = 14200 mg/kg;
- Oral, rat: LD50 = 5600 mg/kg;
- Skin, rabbit: LD50 = 15800 mg/kg;

Human LDLo Oral: 143 mg/kg; Human LDLo Oral: 428 mg/kg; Human TCLo Inhalation; 300 ppm caused visual field changes & headache; Monkey LDLo Skin: 393 mg/kg. Methanol is significantly less toxic to most experimental animals than humans, because most animal species metabolize methanol differently. Non-primate species do not ordinarily show symptoms of metabolic acidosis or the visual effects which have been observed in primates and humans.

**Carcinogenicity:****CAS#** 67-56-1: Not listed by ACGIH, IARC, NTP, or CA Prop 65.**Epidemiology:** No information found**Teratogenicity:** There is no human information available. Methanol is considered to be a potential developmental hazard based on animal data. In animal experiments, methanol has caused fetotoxic or teratogenic effects without maternal toxicity.**Reproductive Effects:** See actual entry in RTECS for complete information.**Mutagenicity:** See actual entry in RTECS for complete information.**Neurotoxicity:** ACGIH cites neuropathy, vision and CNS under TLV basis.**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** Fish: Fathead Minnow: 29.4 g/L; 96 Hr; LC50 (unspecified) Fish: Goldfish: 250 ppm; 11 Hr; resulted in death Fish: Rainbow trout: 8000 mg/L; 48 Hr; LC50 (unspecified) Fish: Rainbow trout: LC50 = 13-68 mg/L; 96 Hr.; 12 degrees C Fish: Fathead Minnow: LC50 = 29400 mg/L; 96 Hr.; 25 degrees C, pH 7.63 Fish: Rainbow trout: LC50 = 8000 mg/L; 48 Hr.; Unspecified Bacteria: Phytobacterium phosphoreum: EC50 = 51,000-320,000 mg/L; 30 minutes; Microtox test No data available.

**Environmental:** Dangerous to aquatic life in high concentrations. Aquatic toxicity rating: TLm 96 > 1000 ppm. May be dangerous if it enters water intakes. Methyl alcohol is expected to biodegrade in soil and water very rapidly. This product will show high soil mobility and will be degraded from the ambient atmosphere by the reaction with photochemically produced hydroxyl radicals with an estimated half-life of 17.8 days. Bioconcentration factor for fish (golden ide) < 10. Based on a log Kow of -0.77, the BCF value for methanol can be estimated to be 0.2.

**Physical:** No information available.**Other:** No information available.

## Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** None listed.

**RCRA U-Series:**

CAS# 67-56-1: waste number U154 (Ignitable waste).

## Section 14 - Transport Information

	US DOT	Canada TDG
<b>Shipping Name:</b>	METHANOL	METHANOL
<b>Hazard Class:</b>	3	3
<b>UN Number:</b>	UN1230	UN1230
<b>Packing Group:</b>	II	II
<b>Additional Info:</b>		FLASHPOINT 11 C

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

CAS# 67-56-1 is listed on the TSCA inventory.

#### Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

#### Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

#### Section 12b

None of the chemicals are listed under TSCA Section 12b.

#### TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

#### CERCLA Hazardous Substances and corresponding RQs

CAS# 67-56-1: 5000 lb final RQ; 2270 kg final RQ

#### SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

#### SARA Codes

CAS # 67-56-1: immediate, fire.

#### Section 313

This material contains Methanol (CAS# 67-56-1, > 99%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

#### Clean Air Act:

CAS# 67-56-1 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**

None of the chemicals in this product are listed as Hazardous Substances under the CWA.  
None of the chemicals in this product are listed as Priority Pollutants under the CWA.  
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**

None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**

CAS# 67-56-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations****European Labeling in Accordance with EC Directives****Hazard Symbols:**

T F

**Risk Phrases:**

R 11 Highly flammable.  
R 23/24/25 Toxic by inhalation, in contact with skin and if swallowed.  
R 39/23/24/25 Toxic : danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed.

**Safety Phrases:**

S 16 Keep away from sources of ignition - No smoking.  
S 36/37 Wear suitable protective clothing and gloves.  
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).  
S 7 Keep container tightly closed.

**WGK (Water Danger/Protection)**

CAS# 67-56-1: 1

**Canada - DSL/NDSL**

CAS# 67-56-1 is listed on Canada's DSL List.

**Canada - WHMIS**

This product has a WHMIS classification of B2, D1B, D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**

CAS# 67-56-1 is listed on the Canadian Ingredient Disclosure List.

## Section 16 - Additional Information

**MSDS Creation Date:** 7/21/1999

**Revision #17 Date:** 2/11/2008

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## APPENDIX "D"

### A SAMPLE GENERIC WHMIS TEST (20 Minutes)

1. What does **WHMIS** stand for? \_\_\_\_\_
2. Identify each of the following symbols commonly found on supplier labels:



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_

For each of the following questions **circle the most appropriate answer.**

3. A complete list of all hazardous materials controlled under WHMIS is available from the Government of Canada.
  - a. True
  - b. False
4. WHMIS applies to the following classes of hazardous materials:
  - a. Consumer Products
  - b. Drugs
  - c. Flammable and combustible material
5. The three elements of WHMIS are:
  - a. Supplier Information, Product Labels and Emergency Information
  - b. MSDS, Transportation Documentation and Emergency Information
  - c. Product Labels, MSDS and Worker Education.
6. A hazardous material classified under Class D, Division 1, Material Causing Immediate and Serious Toxic Effects:
  - a. Refers to an organism or its toxins that may cause serious infectious disease
  - b. Will cause harmful effects including death within a short period of time after exposure
  - c. Will cause harmful effects after days, month or years after one or more exposures.
  - d. All of the above
7. Two types of WHMIS labels are:
  - a. Pesticide and Explosive Labels
  - b. Supplier and Transportation Labels
  - c. Workplace and Consumer Labels
  - d. Supplier and Workplace Labels
8. WHMIS labels must be applied on:
  - a. Tobacco or products made of tobacco
  - b. Consumer products
  - c. Transported products
  - d. Controlled products
  - e. None of the above
9. The three pieces of information required on a Workplace label are:
  - a. Supplier identifier, Product Identifier, and Reference to the MSDS
  - b. Product Identifier, Emergency telephone number, and Hazard Symbol
  - c. Product Identifier, Safe Handling Information, and Reference to the MSDS
  - d. None of the above







