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1 WHMIS Responsibilities

What is WHMIS?

WHMIS (short for Workplace Hazardous Materials Information System) is a comprehensive plan for providing information on the safe use of hazardous materials used in Canadian workplaces.

Information is provided by means of **product labels, material safety data sheets (MSDS)** and **worker education programs**.

Every employer is required to:

- Ensure controlled products are properly **labeled**. WHMIS labels alert the worker to the identity of the product, hazards, and precautionary measures;
- Ensure Material Safety Data Sheets (MSDS) are available, current and readily available for all controlled products being used and stored. Material Safety Data Sheets (MSDS) provide detailed hazard and precautionary information and;
- Educate employees about WHMIS, hazardous materials, and protective measure to work safely with the controlled products.

Workplace-specific training is the most important part of WHMIS training. Your supervisor must provide you with training on the specific hazardous materials you will be working with.

Under WHMIS, suppliers, including manufacturers and distributors, must:

- Classify materials according to their hazards;
- Provide labels for the product or container and;
- Provide a current Material Safety Data Sheet (MSDS) for controlled products sold to workplaces.

Every employee shall:

- Participate in WHMIS training and other health and safety training required for your job;
- Use your WHMIS training and adhere to WHMIS requirements;
- Follow safe work procedures and rules;
- Know where MSDSs are located in your workplace and how to use them;
- Inform your supervisor about any hazards you see in the workplace and;
- Inform your supervisor of deficiencies such as labels on containers that are no longer readable, damaged or lost.

Canadian workplaces are transitioning from federally mandated practices outlined in 1988 (“WHMIS 1988”) to Globally Harmonized System requirements (“WHMIS 2015”). The next chapter outlines the context of the Globally Harmonized System.

2 Globally Harmonized System

The Globally Harmonized System for Classification and Labelling of Chemicals (GHS) is being implemented by Canada and this alignment will change WHMIS-related laws. The GHS is an internationally agreed-upon system, created by the United Nations beginning in 1992. In February 2015, Canada amended the *Hazardous Products Act* and published the *Hazardous Products Regulations* in order to incorporate the GHS into WHMIS. The new WHMIS in Canada is identified as **WHMIS 2015** (replacing WHMIS 1988).

The Globally Harmonized System is a system that defines and classifies the hazards of chemical products, and communicates health and safety information on labels and Safety Data Sheets (SDS). The goal is that **the same set of rules** for classifying hazards, and the same format and content for labels and safety data sheets (SDS) **will be adopted and used around the world.**

The two major elements of GHS are:

- Classification of the hazards of chemicals according to the GHS rules – GHS provides guidance on classifying pure chemicals and mixtures according to its criteria or rules and;
- Communication of the hazards and precautionary information using Safety Data Sheets and labels

To allow time for suppliers, employers and workers to adjust, implementation will take place over a multi-year transition period, where both the original WHMIS (WHMIS 1988) and WHMIS 2015 may be used in the workplace. Workplaces may currently use either:

- WHMIS 2015 labels and SDSs for hazardous products
- or WHMIS 1988 labels and MSDSs for hazardous products

The University of Saskatchewan, as an employer, will **fully** adopt WHMIS 2015 by December 1, 2018 (Table 1.).

Table 2.1 – Timing of GHS Adoption in Canada

Phase	Timing	Suppliers		Employer*
		<i>Manufacturers and Importers</i>	<i>Distributors</i>	
Phase 1	From February 11, 2015 to May 31, 2017	<i>WHMIS 1988 or WHMIS 2015</i>	<i>WHMIS 1988 or WHMIS 2015</i>	Consult F/P/T regulator
Phase 2	From June 1, 2017 to May 31, 2018	<i>WHMIS 2015</i>	<i>WHMIS 1988 or WHMIS 2015</i>	WHMIS 1988 or WHMIS 2015
Phase 3	From June 1, 2018 to November 30, 2018	<i>WHMIS 2015</i>	<i>WHMIS 2015</i>	WHMIS 1988 or WHMIS 2015
Completion	December 1, 2018	<i>WHMIS 2015</i>	<i>WHMIS 2015</i>	<i>WHMIS 2015</i>

Pictograms are changing – Pictograms are graphic images that immediately show the user of a hazardous product what type of hazard is present. With a quick glance, you can see, for example, that the product is flammable, or if it might be a health hazard. The graphic below shows hazard pictograms. The bold type is the name given to the pictogram; the words in the brackets describe the hazard (Fig. 5).

Labels are changing – With the GHS system, certain information will appear on the label. For example, the chemical identity may be required. Standardized hazard statements, signal words and symbols will appear on the label according to the classification of that chemical or mixture. Precautionary statements may also be required (Fig. 6).

Safety Data Sheets (SDS) – The GHS SDS has 16 sections in a set order, and minimum information is prescribed (compared to MSDSs that have 9 categories).

**** WHMIS 1988 is compared to WHMIS 2015 in the Appendix of this document ****

WHMIS 2015 Roles and Responsibilities

Overall, the current roles and responsibilities for suppliers, employers and workers likely will not change in WHMIS after GHS.

Suppliers, Importers and Producers duties will continue to include:

- Classifying hazardous products;
- Preparing labels and SDSs and;
- Providing these elements to customers.

Employers must continue to:

- Educate and train workers on the hazards and safe use of products;
- Ensure that hazardous materials are properly labelled;
- Prepare workplace labels and SDSs as necessary;
- Provide access for workers to up-to-date SDSs and;
- Ensure appropriate control measures are in place to protect the health and safety of workers.

Workers will still:

- Participate in WHMIS and chemical safety training programs;
- Take necessary steps to protect themselves and their coworkers and;
- Participate in identifying and controlling hazards.

There will be changes to:

- How chemicals are classified;
- Requirements for supplier labels and;
- The use of the 16 section Safety Data Sheet (the 9 section WHMIS format for an MSDS will no longer be acceptable).

3 WHMIS Classes

WHMIS groups products with similar properties or hazards into classes. The Controlled Products Regulations specifies the criteria used to place materials within each classification. WHMIS classifications are made by the manufacturer or supplier for products to be used in Canada.

There are six (6) main WHMIS hazard classes. In general, each class has a specific symbol to help people quickly recognize the hazard.

** (One hazard class (D) has three symbols, so there are a total of eight symbols) **

The six WHMIS 1988 classes are:

- A – Compressed gas
- B – Flammable and combustible material
- C – Oxidizing material
- D – Poisonous & infectious material
- E – Corrosive material
- F – Dangerously reactive material

Figure 3.1 – WHMIS 1988 Hazard Class Symbols

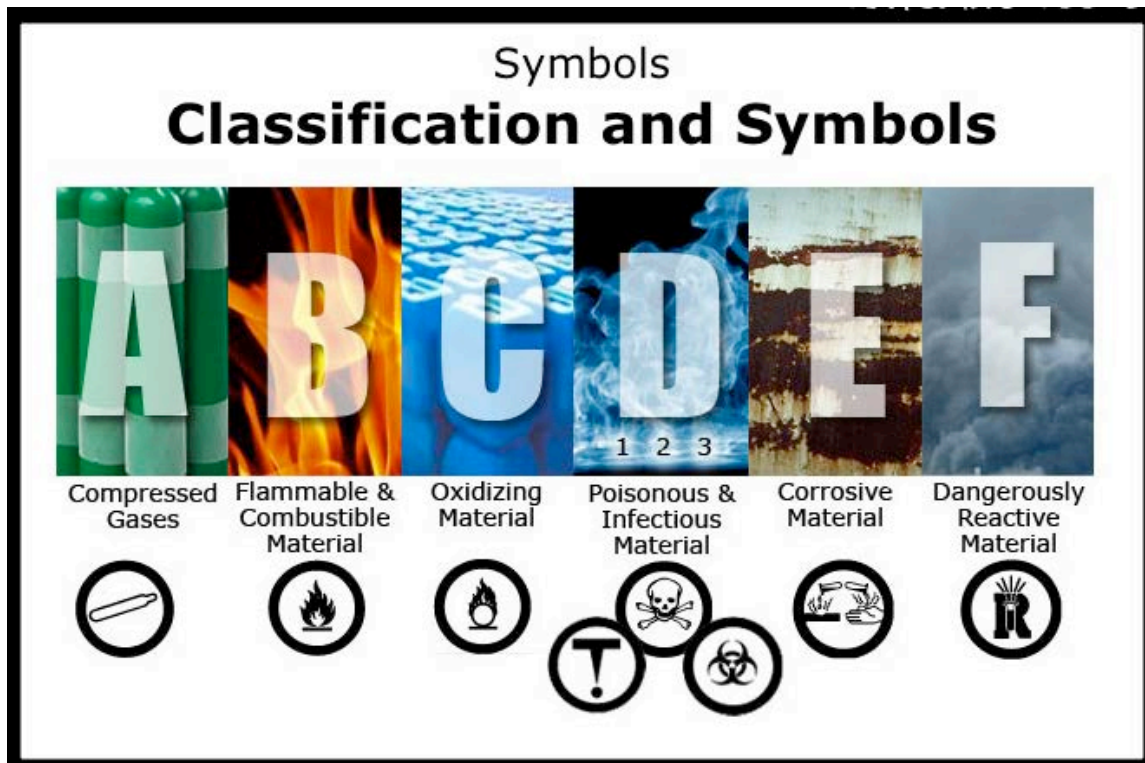










Table 3.1 - WHMIS 1988 chemical hazard classes, general hazards and safe work practices.

WHMIS 1988 Hazard Class	Class Description	Hazards	General Safe Work Practices
<p>A - Compressed gas</p>  <p>Examples: nitrogen, hydrogen, oxygen, acetylene, argon</p>	<p>Includes compressed gases, dissolved gases, and liquefied gases.</p> <p>Often requires another symbol if not inert (e.g. toxic, oxidizer, corrosive, inert, flammable, reactive)</p>	<ul style="list-style-type: none"> • May explode when heated or when cylinder is damaged. • May also be flammable, toxic, corrosive, or dangerously reactive. • May act as a projectile if damaged. 	<ul style="list-style-type: none"> • Obtain and read the Material Safety Data Sheets for all materials you work with. • Cylinders should be secured to the wall or structure using a chain or strap. • Protect cylinders from heat and physical damage • Keep valve caps on all cylinders not in use or when storing or moving them. • Before using cylinders, check all fittings and regulators for defects, leaks, oil and grease. • Use the smallest cylinder required for the work. • Wear goggle for safety glasses. • Do not empty a cylinder completely. A slight pressure will keep contaminant out. • Use proper storage and transportation procedures. • Use a cart designed for moving cylinders • Wear steel-toed footwear when handling large cylinders.
<p>B – Flammable and combustible material</p>  <p>Examples: white phosphorus, acetone, propane, gasoline</p>	<p>Solids, liquids, and gases capable of catching fire or exploding in the presence of an ignition source.</p> <p>Division 1: Flammable Gases</p> <p>Division 2: Flammable Liquids (Fp < 37°C)</p> <p>Division 3: Combustible Liquids (Fp > 37°C)</p> <p>Division 4: Flammable Solids</p> <p>Division 5: Flammable Aerosols</p> <p>Division 6: Flammable Reactive Materials</p>	<ul style="list-style-type: none"> • May readily burn or explode if placed near heat, sparks, or open flames. 	<ul style="list-style-type: none"> • Obtain and read the Material Safety Data Sheets for all materials you work with. • Wear appropriate PPE. • Keep away from ignition sources (heat, sparks, and open flames). • Keep only the minimum quantity required in work areas. • Store away from oxidizers. • Store materials in fire-resistant cabinets or other specified storage areas. • Work with flammable materials should be performed in a fume hood or well-ventilated area. • Keep storage areas cool and dry. • Use labelled and approved safety containers. • Keep containers closed when not in use. • Bond and ground containers when transferring flammable and combustible liquids.

WHMIS 1988 Hazard Class	Class Description	Hazards	General Safe Work Practices
<p>C – Oxidizing material</p>  <p>Examples: organic peroxides, nitrates, perchlorates</p>	<p>Materials that provide oxygen.</p>	<ul style="list-style-type: none"> • May cause fire if in contact with flammable and combustible materials, even without a source of ignition or oxygen. • May increase the speed and intensity of a fire. • May cause materials normally considered non-combustible to burn rapidly. • May react with other chemicals to produce toxic gases. 	<ul style="list-style-type: none"> • Obtain and read the Material Safety Data Sheets for all materials you work with. • Wear appropriate PPE. • If the reaction can be violent, use barriers to isolate it. • Keep only the minimum quantity required in work areas. • Keep the work areas clear of unneeded materials that could react with oxidizers. • Store away from flammable materials, organic materials, and reducing agents. • Do not open peroxide containers where crystals have formed around the lid. • Any spills of oxidizing materials need to be cleaned up immediately and thoroughly.
<p>D – Poisonous and infectious materials</p> <p>Materials causing immediate and serious health effects</p>  <p>Examples: sodium cyanide, hydrogen sulfide, arsenic, formaldehyde</p>	<p>Materials that can cause immediate and serious health effects</p>	<ul style="list-style-type: none"> • May cause immediate and serious toxic effects. • May cause death or serious injury if inhaled, ingested, or absorbed/injected through the skin. 	<ul style="list-style-type: none"> • Obtain and read the Material Safety Data Sheets for all materials you work with. • Employ a fume hood when working with the materials. • Wear appropriate PPE. • Establish standard operating procedures when working with materials. • Keep only the minimum quantity required in work areas. • Know the signs and symptoms of exposure of the materials being used. • Establish cleaning and decontamination procedures. • Consider substituting highly toxic substances with less hazardous alternatives.

WHMIS 1988 Hazard Class	Class Description	Hazards	General Safe Work Practices
<p>D – Poisonous and infectious materials</p> <p>Poisonous materials causing other toxic effects</p>  <p>Examples: acetone, asbestos, toluene, formaldehyde, benzene</p>	<p>Materials that may cause other health effects. This includes immediate health effects such as irritation or the development of sensitivities, and latent health effects such as cancers, or diseases of the organs.</p>	<ul style="list-style-type: none"> • May cause immediate adverse health effects. • May cause latent adverse health effects from repeated or chronic exposure to the material. 	<ul style="list-style-type: none"> • Obtain and read the Material Safety Data Sheets for all materials you work with. • Use engineered controls such as a fume hood or snorkel when working with the material. • Wear appropriate PPE. • Establish standard operating procedures when working with materials. • Keep only the minimum quantity required in work areas. • Know the signs and symptoms of exposure to materials being used. • Establish cleaning and decontamination procedures.
<p>D – Poisonous and infectious materials</p> <p>Biohazardous infectious materials</p>  <p>Examples: viruses, bacteria, fungus, parasites, toxins</p>	<p>Materials that may cause infection and disease.</p>	<ul style="list-style-type: none"> • May cause infections. • May cause disease. 	<ul style="list-style-type: none"> • Obtain and read the Material Safety Data Sheets for all materials you work with. • Work with the materials in a biosafety cabinet. • Wear appropriate PPE. • Establish standard operating procedures when working with materials. • Keep only the minimum quantity required in work areas. • Establish medical surveillance program (e.g. immunization, medical monitoring and reporting). • Establish cleaning and decontamination procedures.

WHMIS 1988 Hazard Class	Class Description	Hazards	General Safe Work Practices
<p>E – Corrosive material</p>  <p>Examples: hydrochloric acid, sodium hydroxide</p>	<p>Materials that can destroy skin or eat through materials</p>	<ul style="list-style-type: none"> • May cause burns to the eyes and skin. • May cause burns to tissues of respiratory systems if inhaled. 	<ul style="list-style-type: none"> • Obtain and read the Material Safety Data Sheets for all materials you work with. • Wear appropriate PPE. • Use corrosion-resistant equipment and materials. • Work in a fume hood or well-ventilated area. • Add acid slowly to water; never add water to acid. • Never return unused material to the original container. It may contain traces of contamination which may cause a chemical reaction. • Keep containers closed when not in use. • Store acids and bases separately from each other and in a well-ventilated area. • In case of eye/skin contact flush areas with emergency eyewash/shower for 15 minutes and seek medical attention.
<p>F – Dangerously reactive material</p>  <p>Examples: hydrogen cyanide, benzoyl peroxide, organic peroxides</p>	<p>Products that can undergo reaction (burn, explode, or produce dangerous gases) when exposed to heat, physical movement (such as jarring, compression), water, moisture, or incompatible materials</p>	<ul style="list-style-type: none"> • May undergo vigorous decomposition, polymerization, or condensation upon standing or when exposed to heat, light, air, or physical movement. • May also be toxic, corrosive, flammable. • May become extremely reactive upon standing from time of purchase. 	<ul style="list-style-type: none"> • Obtain and read the Material Safety Data Sheets for all materials you work with. • Work in a fume hood. • Wear appropriate PPE. • Establish standard operating procedures when working with materials. • If the reaction can be violent, use barriers. • Use only the minimum amount of the material necessary. • Discard of unopened materials within 12 months, and opened materials within 6 months.

Select information provided courtesy of WorkSafeBC, Laboratory Health and Safety Handbook.

Class A – Compressed Gases

Class A hazardous materials include gases under pressure or which are chilled.

The main hazards associated with compressed gases are:

- A leaking cylinder can rapidly release extremely large amounts of gas into the workplace, which may be toxic or lower the oxygen concentration.
- Leaking gas cylinders can be very cold and may cause frostbite if it touches your skin.
- If a pressurized cylinder is punctured because it is dropped or exposed to excessive heat, the exploding fragments or rocket-like projectiles present a serious physical hazard.
- Compressed gas cylinders can be large and heavy and can pose physical safety hazards when handling them (e.g. risk of musculoskeletal injuries).

Examples of compressed gases include: propane, chlorine gas as disinfectant, oxygen and oxyacetylene for welding.

Compressed gases may have additional hazardous properties. Chlorine is a compressed gas but is also toxic. Propane is a compressed gas, but is also flammable.

When working with compressed gases they must be securely fastened to a stable structure such as a bench top or wall mount bracket. When not in use the protective cap must always be put back on and when transporting full or empty cylinders the proper cylinder cart must be used.

Class B – Flammable and Combustible Material

Flammable and combustible materials are those that can ignite, explode or react with other chemicals.

Flammable materials are more dangerous than combustible because they ignite more easily. During use, they must be kept away from ignition sources such as sparks or open flames. When not in use, flammable materials must be stored in fire-resistant cabinets or other specified storage areas. Flammable storage cabinets must be grounded. Contact Facilities Management Division at 4496 for assistance.

There are six divisions under Class B hazardous materials:

- Division 1: **Flammable Gas**. These are compressed gases that are also flammable.
- Division 2: **Flammable Liquid**. These are liquids with a flashpoint of less than 38° C (100° F).
- Division 3: **Combustible Liquid**. These are liquids with a flashpoint less than 93° C, but more than 38° C (100° - 200° F).
- Division 4: **Flammable Solid**. These are solids that cause fire through friction or retained heat from manufacturing or processing or readily ignite and burn violently and persistently.
- Division 5: **Flammable Aerosol**. These are materials packaged in aerosol containers that are highly flammable.
- Division 6: **Reactive Flammable Material**. These are materials that may become spontaneously combustible in air, or when they come into contact with water.

All work with flammable materials is to be performed in fume hoods to minimize the potential to build up dangerous concentrations of flammable vapours.

Class C – Oxidizing Material

Oxidizing material, or oxidizers, are hazardous materials that cause or contribute to the combustion of other materials. An oxidizer may react with a combustible material to cause a fire without a source of

ignition. Consequently, oxidizing material greatly increase the risk of fire, if they come in contact with materials that can burn.

Oxidizers can be in the form of gases (e.g. oxygen, ozone), liquids (e.g. nitric acid, perchloric acid solutions) and solids (e.g. potassium permanganate, sodium chlorite). Some oxidizers such as the organic peroxide family are extremely hazardous because they will burn (they are combustible) as well as they have the ability to provide oxygen for the fire. They can have strong reactions which can result in an explosion.

These materials should never be stored or used near flammable or combustible materials. For example, do not store oil-based paints or solvents like toluene or xylene near oxidizers such as hydrogen peroxide or bleach. Any spills of oxidizing materials need to be cleaned up immediately and thoroughly. All appropriate PPE, gloves, glasses and lab coat need to be worn.

Class D - Poisonous and Infectious materials

This class of materials covers a wide range of hazardous materials that can cause adverse health effects. Class D poisonous and infectious material is divided into three subdivisions:

Class D Division 1: Material causing immediate and serious health effects

These materials are highly toxic and could be immediately dangerous to life and health.

Effects of exposure to Class D, Division 1 materials may include nausea, dizziness, breathing difficulty, headaches and, in severe cases, loss of consciousness, coma, or death. Recall, that adverse health effects which occur shortly after exposure are termed acute effects.

Examples of Class D, Division 1 Poisonous and Infectious Materials include arsenic, methylene chloride, formaldehyde, hydrogen sulphide.

Depending upon the toxicity of the material, work with these chemicals may require the use of a glove box if the potential for airborne contaminants is great. Personal protective equipment required would include safety goggles, gloves and lab coat.

All spills of these types of materials need to be cleaned up immediately and thoroughly. Also, if it is practicable to substitute to something less toxic the employer must do so.

Class D Division 2: Materials Causing Other Toxic Effects

Materials in this subdivision are toxic but do not cause immediate (acute) adverse health effects. Possible adverse health effects include:

- Immediate skin or eye irritation;
- Chronic health effects on body organs, cardiovascular or nervous system;
- Sensitivities (allergies);
- Cancers and;
- Birth defects.

Examples of materials causing other toxic effects include asbestos, benzene, formaldehyde, xylene, calcium chloride, mercury.

Work with these types of materials in a properly functioning fume hood and wear safety goggles, gloves and lab coat.

Class D Division 3: Biohazardous Infectious Material

These materials are organisms (and the toxins they produce) that cause disease in people or animals. Bacteria, viruses, fungi and parasites are examples of organisms included in this division.

Because biohazardous organisms can live in body tissues or fluids (blood, sputum, urine, body tissues), these materials are included within this class and division.

At the University of Saskatchewan, a significant amount of research takes place involving biohazardous organisms and material. All individuals at the university who wish to acquire, use, store and dispose of biohazardous materials are required to obtain a Biosafety Permit from Safety Resources (<http://safetyresources.usask.ca>). Additional training is also required for individuals working with biohazardous materials.

Class E - Corrosive Material

Corrosive materials are hazardous materials that can cause severe burns to the skin, eyes and respiratory tract. Corrosive materials can also attack metals and eat through containers resulting in spills, reactivity and fire hazards. The degree of damage caused by a corrosive material will depend on the pH, concentration of the corrosive, and the length of exposure.

Examples of corrosive material include acids and bases (alkalis) such as hydrochloric acid, hydrofluoric acid, and sodium hydroxide.

When handling corrosive acids and bases additional protective equipment may be required such as aprons, goggles, face shields and heavy gloves.

Class F - Dangerously Reactive Materials

This class of hazardous materials are unstable or extremely reactive.

Dangerously reactive materials may:

- Explode or catch fire if shocked, pressurized, or heated;
- React vigorously with water or air to release poisonous gas;
- Undergo vigorous polymerization, decomposition or condensation and;
- Reactive explosively on their own at normal temperatures and pressures.

Examples of dangerously reactive materials include hydrogen cyanide, benzoyl peroxide, chlorine dioxide, organic peroxides.

When working with these types of chemicals, work should be performed in a fume hood and if there is the possibility of a vigorous or explosive reaction, a blast shield should be used. Workers should consider wearing a face shield in addition to protective eyewear as well. If the chemical is highly flammable or air reactive, a Nomex (or other fire resistant lab coat) lab coat should be worn.

4 WHMIS Labelling

The purpose of WHMIS labels is to alert workers to the main hazards of controlled products, to provide instructions for safe handling, and to direct workers to the Material Safety Data Sheet (MSDS) for more information.

All hazardous products in the workplace have to be labelled or marked in some way. Employers are responsible for making sure all hazardous products have labels. Workers are to let their supervisor know if a label is missing or unreadable.

There are two types of WHMIS labels:

- Supplier labels
- Workplace labels

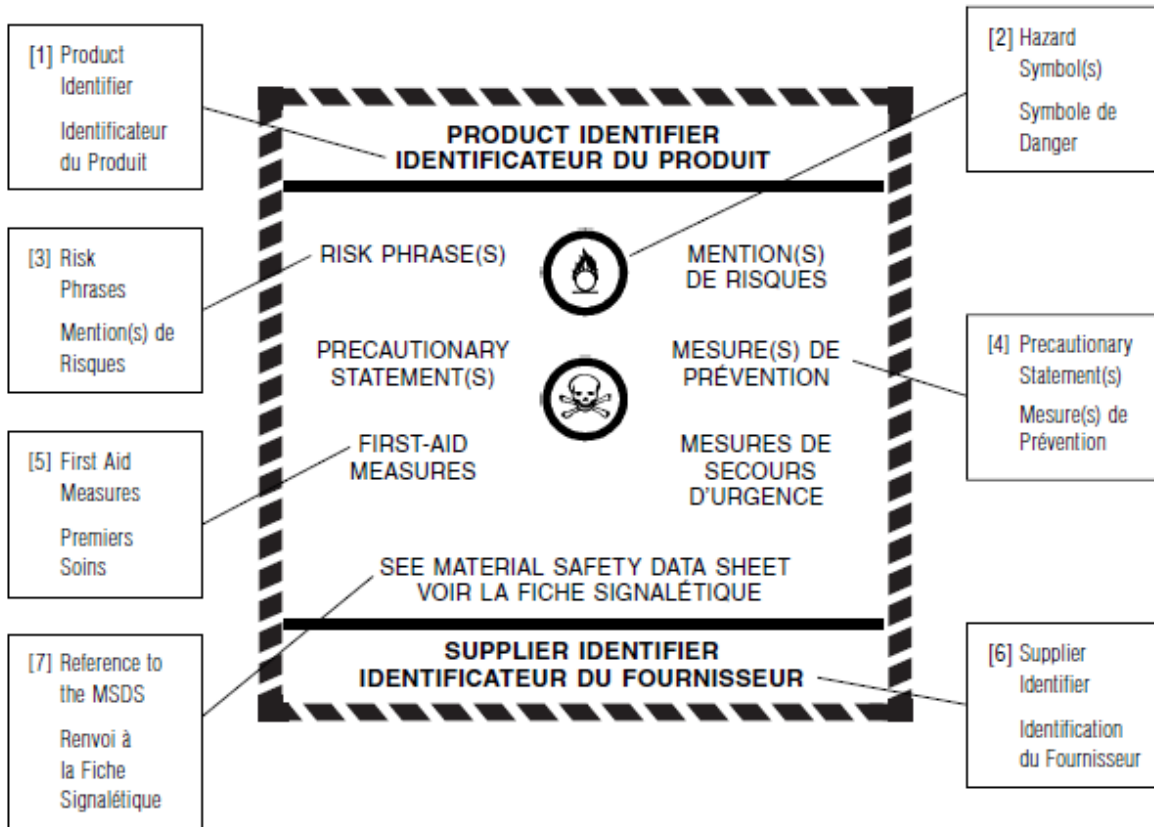
Supplier Labels

Suppliers must provide labels on containers of all controlled products sold or imported for use in the workplace.

Table 4.1 – Supplier labelling requirements

<p><u>Supplier labels</u> are required to include the following information:</p>	<ul style="list-style-type: none"> • Product identifier (product name); • Supplier identifier (supplier name); • Hazard symbols; • Risk phrases; • Precautionary statements; • First Aid measures and; • Reference to the MSDS
<p><u>Laboratory-Use-Only Supplier Labels</u></p> <p>For controlled products that are intended only for laboratory use, and which are less than 10 L in volume, there are slightly less restrictive WHMIS labeling requirements.</p> <p>Laboratory use only supplier labels must include:</p>	<ul style="list-style-type: none"> • Product identified (product name); • Risk phrases; • Precautionary statements; • First aid measures and; • Reference to the MSDS.
<p><u>Small quantity Supplier Label</u></p> <p>For controlled products in a container <i>less than 100 ml in volume</i>, supplier labels must include the following information:</p>	<ul style="list-style-type: none"> • Product identifier (product name); • Supplier information; • Hazard symbols and; • Reference to MSDS.

Figure 4.1: Supplier label format and requirements.



** All information on the label must be provided in English and French and within a hatched board **

Workplace labels

Workplace labels are required on containers of controlled products produced on site, and on secondary containers where the product has been transferred from the original container.

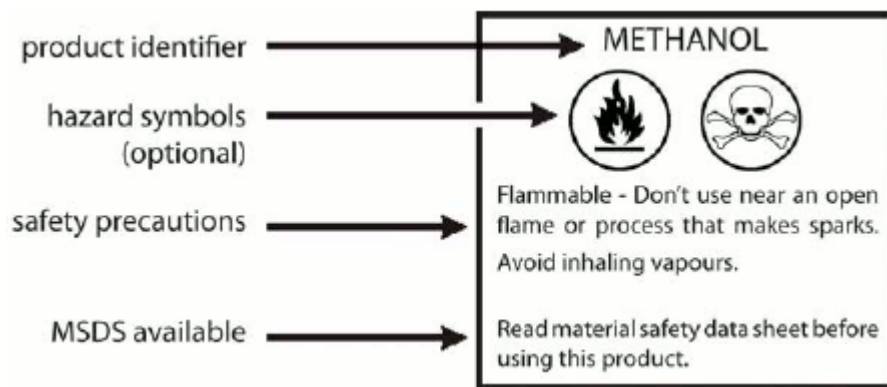
Workplace labels may also be used to replace a damaged or missing supplier label on an original container. As long as the controlled product remains in its original container, with a supplier label on it, no additional labeling is required.

Workplace labels must include the following information:

- Product identifier (product name);
- Safe handling information and;
- Reference to the MSDS.

The format for workplace labels is flexible but they must be in the **English** language. The label may include WHMIS hazard symbols or other pictograms.

Figure 4.2: Example of a workplace label.



Exclusion to Workplace Labels

A workplace label is not necessary for WHMIS controlled products:

- When the controlled product is poured into a container and it is used immediately.
- If the material is under the control of the person who decanted it, and is all used during the work shift. A product identifier must be attached to the container.

If the hazardous material is not used right away, or if more than one person will be in control of the material, **a workplace label is required.**

5 Material Safety Data Sheets / Safety Data Sheets

WHMIS requires suppliers to provide their customers with information about any material under the controlled product act.

A Material Safety Data Sheet (MSDS) / Safety Data Sheet (SDS) is a technical document developed by the supplier that provides information specific to the hazardous material such as information on hazards, controls, safe handling and storage guidelines, emergency procedures for the controlled product etc.

The MSDS/SDS is critical for developing safe work procedures or standard operating procedures involving hazardous materials. One of the key elements for developing procedures is worker education and on-going training. Education and on-going training is intended as a proactive measure, administrative control and is directly related to the health and safety any individual potentially affected by a hazardous material. The best practice of referring to the information contained in a MSDS/SDS provides the opportunity for workers to exercise 2 out of 3 basic rights in the workplace in Saskatchewan: the right to **know** and the right to **participate**. The right to refuse may indicate a lack of knowledge, training, competence or that the proper tools or personal protective equipment need improvement and are to be addressed by the supervisor in order to resolve the concern.

In absence of a paper format, the MSDS/SDS must be accessible in a digital or electronic format. The electronic format will be accessible on a laptop, computer, iPad, tablet or other such device capable of storing, displaying and printing MSDS/SDS for all hazardous materials present. The device must not be password protected and anyone must have access to the device. The device must be connected to an alternating current power supply and have a battery back up in case of power failure. All affected personnel must be trained on the use of the device. All MSDS/SDS sheets for hazardous products present must stored/saved in a pdf or portable document format and in a single folder on the desktop or default page labelled "MSDS/SDS". All MSDS/SDS sheets are to be saved according to the product identification and the date the MSDS/SDS the effective date or revision date:

Example: Sulphuric Acid Effective date July 1, 2016.

No MSDS should be older than 3 years, and updated within 90 days if new information becomes available.

Figure 5.1: MSDS location in a laboratory.



After November of 2018 and Global Harmonized System (GHS) take the place of WHMIS 2015 and WHMIS 1988, SDS will not need to be updated unless there is a change from the supplier to a hazardous material.

MSDS Categories

There are nine categories of information that must be present on an MSDS in Canada. Some MSDS will have up to 16 categories. This is acceptable in Canada as long as the content of the MSDS meets Canadian Law.

The nine MSDS categories are:

1. Product information
2. Hazardous ingredients
3. Physical data
4. Fire and explosion data
5. Reactivity data
6. Toxicological properties
7. Preventative measures
8. First aid measures
9. Preparation information

Section 1 – Product Information

In the Product Information section of an MSDS, the following information must be provided.

- Product name;
- Product manufacturer;
- Product supplier and;
- Contact information.

Product Identifier		WHMIS Classification (optional)	
Product Use			
Manufacturer Name		Supplier Name	
Street Address		Street Address	
City	Province	City	Province
Postal Code	Emergency Telephone	Postal Code	Emergency Telephone

Section 2 – Hazardous Ingredients

Hazardous ingredients must be listed in this section of the MSDS. This section must include:

- Chemical name;
- Percentage concentration;
- Chemical Abstract Service (CAS) registry number. The CAS is a unique identifying number given to each chemical and;
- Acute toxicity data.

Hazardous Ingredients	%	CAS Number	LD ₅₀ of Ingredient	LC ₅₀ of Ingredient

Carcinogens and some highly toxic materials must be named if present at a concentration 0.1% or greater. All other ingredients which are controlled products must be disclosed if present at a concentration of 1% or greater.

On some MSDS, you may see one or more ingredients listed as trade secrets. Suppliers may apply for trade secret protection to the *Hazardous Materials Information Review Commission* and show that the identity of an ingredient should be protected. Health hazard information, preventative measures and first aid information must still be disclosed on the MSDS.

Section 3 – Physical Data

In this section, general information on physical and chemical properties such as physical state (solid, liquid, gas), appearance, specific gravity, boiling point, and evaporation rate are provided.

Following are a number of physical properties associated with hazardous materials.

Physical State	Odour and Appearance		Odour Threshold (ppm)
Specific Gravity	Vapour Density (air=1)	Vapour Pressure	Evaporation Rate
Boiling Point	Freezing Point	pH	Coefficient of Water/Oil Distribution

Physical State: gas, liquid, solid.

Odour and Appearance: what the material smells like and looks like.

Specific Gravity: the weight of a substance compared with the weight of an equal quantity of water. If a material is heavier than water (specific gravity greater than “1”), it will sink. If a material is lighter than water (specific gravity less than “1”), it will float, e.g., gasoline.

Vapour Pressure: the pressure exerted by a saturated vapour above its own liquid in a closed container.

Vapour Density: the weight of a vapour or gas compared to the weight of an equal volume of air. If a material is heavier than air (vapour density greater than “1”), it will sink and collect in low places, e.g. chlorine. If a material is lighter than air (vapour density lower than “1”), it will rise up and dissipate, e.g. hydrogen, acetylene.

Evaporation Rate: the rate at which a particular material will evaporate relative to n-butyl acetate, ether or some other specified solvent.

Boiling Point: the temperature at which a liquid boils.

Freezing Point: the temperature at which a liquid solidifies.

pH: a measure of how basic or acidic a material is. A material with a pH less than 7 is acidic. A material with a pH greater than 7 is alkaline (basic).

Coefficient of Water/Oil Distribution: the ratio of a product's solubility in water to its solubility in n-octanol.

Section 4 – Fire and Explosion Data

This section in the MSDS specifies the means of extinguishing fires for flammable products. For example suitable extinguishers for the combustible liquid, ethanalamine include water spray or fog, dry chemical, or alcohol resistant foam.

Flammability (yes/no)	If yes, under which conditions?	
Means of extinction		
Flashpoint and Method	Lower Explosion Limit (% by volume)	Upper Explosion Limit (% by volume)
Auto-ignition Temperature	Explosion Data – Sensitivity to Impact	Explosion Data – Sensitivity to Static Discharge
Hazardous Combustion Products		

Workers should know where fire extinguishers are in their work area and be trained how to use them. For information on available fire extinguisher training, visit the Safety Resources website at www.safetyresources.usask.ca/.

Workers should also know the fire evacuation procedure for the area(s) and building(s) they work in.

Section 5 – Reactivity Data

This section of the MSDS lists conditions under which the controlled product may react or is unstable. Substances that should be avoided to prevent dangerous reactions should be listed in this section.

Chemical Stability (yes/no)	If no, under which conditions?
Incompatibility with Other Substances (yes/no)	If yes, which chemicals?
Reactivity, and Under What Conditions?	
Hazardous Decomposition Products	

Section 6 – Toxicological Properties

This section of the MSDS provides information on how the substance enters the body and the possible health effects from single or repeated exposures. Known long-term health effects such as organ damage, cancer, reproductive effects or sensitization from exposure to the material must be included in this section. Exposure limits (e.g. Threshold Limit Values (TLVs)) should be included if they exist.

Routes of Entry (inhalation/ingestion/eye contact/skin contact/skin absorption)
Effects of Acute Exposure to Product
Effects of Chronic Exposure to Product
Exposure Limits (value, source, date)
Other Toxic Effects

When handling hazardous chemicals it is essential that all the proper equipment and controls are used. It is expected that workers carry out experiments in fume hoods or under the appropriate ventilation systems whenever there is the risk of inhalation exposure occurring. Workers are expected to follow all safety procedures provided to them and wear the personal protective equipment appropriate to the chemical hazards they could encounter. Despite best efforts, sometimes exposures can occur in the workplace while working with hazardous materials. Common routes of exposure are:

- Inhalation;
- Ingestion;
- Absorption through the skin and;
- Injection, needle pokes and cuts.

Acute and Chronic Toxic Effects

Toxic materials can cause two types of adverse health effects: Acute and Chronic effects.

Acute Effects

Acute toxic effects are serious and follow immediately or shortly after exposure to a hazardous material. They normally result from a single exposure to the hazardous material. Difficulty breathing, nausea, tearing of the eyes, dizziness, unconsciousness or the onset of disease are examples of acute effects.

Acute toxic effects, are measured by the following test values:

- **LD₅₀** – The median “lethal dose” (LD) of a substance, or the amount required to kill 50% of a given test population. The LD₅₀ is a measurement used in toxicology studies to determine the potential impact of toxic substances on different types of organisms. The LD₅₀ measurement is usually expressed as the amount of toxin per kilogram or pound of body weight. When comparing LD₅₀ values, a lower value is regarded as more toxic, as it means a smaller amount of the toxin is required to cause death.
- **LC₅₀** – The median “lethal concentration” (LC) of a substance, or the amount required to kill 50% of a given test population. It applies to vapours, mists and dusts in the air. The LC₅₀ is a measurement used in toxicology studies to determine the potential impact of toxic substances on different types of organisms.

Further information about LD₅₀ and LC₅₀ can be found on the *Canadian Centre for Occupational Health and Safety (CCOHS)* website.

Chronic Effects

Chronic effects are those adverse health effects that result from repeated exposure to a hazardous material in the workplace. Chronic effects develop over time from the exposure and can be serious. Examples of chronic adverse health effects include:

- Cancers
- Reproductive toxicity causing sterility, disruption of the menstrual cycle
- Teratogenicity, which is an exogenous substance that interferes with normal development of the fetus, can cause malformed fetus at birth
- Mutagenicity, which directly affects and disrupts DNA by causing an increase in the rate of change in genes, can cause genes to change, which in turn may cause cancer or birth defects
- Sensitization (allergies)

Irritants

Irritants are another category of toxic materials. The adverse health effects of irritants are immediate but they are temporary, so they are not considered to be as serious as acute or chronic effects.

- Skin irritants, like paint thinners, cause contact dermatitis and;
- Respiratory irritants, like ammonia, cause irritation to the respiratory system.

Normally, these effects disappear within a short time after the exposure ceases.

Section 7 – Preventative Measures

This section of the MSDS includes safe handling, use, storage and disposal information, required protective equipment including personal protective equipment. Information on how to deal with spills should also be provided in this section of the MSDS.

Personal Protective Equipment (specify type)
Engineering Controls
Handling Procedures
Storage Requirements
Waste Disposal Procedures
Leak and Spill Procedures
Shipping Information

Contact Safety Resources should you have questions about the safe handling of controlled products. We have specialists in hazardous materials. Our group is also trained in spill response.

Section 8 – First Aid Measures

This section of an MSDS lists specific instructions for the immediate treatment of a worker who has been exposed (inhalation, ingestion, eyes, absorption) to the controlled product.

Inhalation
Ingestion
Skin Contact
Eye Contact

The first aid advice provided in the MSDS is to be used by a trained first aid attendant. It can also be used by a medical professional. Ensure that you know where your First Aid kit is in your work area, and that it is appropriately stocked. If an emergency eyewash or shower is required, workers should know where it is and how to use it.

Section 9 – Preparation Information

This section of the MSDS lists the date the MSDS was prepared and who prepared it.

Prepared by:	Telephone Number	Preparation Date:
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International MSDS Format (SDS – Safety Data Sheets)

In Canada, MSDSs must include at minimum the nine categories discussed thus far. Most adhere to the international format which contains 16 sections:

1. Product and company information;
2. Hazards identification;
3. Composition/information on ingredients;
4. First aid measures;
5. Firefighting measures;
6. Accidental release measures;
7. Handling and storage;
8. Exposure controls/personal protection;
9. Physical and chemical properties;
10. Stability and reactivity;
11. Toxicological information;
12. Ecological information;
13. Disposal considerations;
14. Transport information;
15. Regulatory information and;
16. Other information.

The longer format MSDS will contain further information about the controlled product including ecological, transport and regulatory information. In Canada, the extended MSDS format is acceptable.

6 Chemical Storage Guidelines

Following, are general guidelines for the safe and proper storage of chemicals in laboratories:

- Adhere to manufacturer recommendations for the storage of chemicals;
- Do not store chemicals alphabetically;
- Always keep containers sealed when not in use;
- Store chemicals in the appropriate storage cabinets or cupboards,
- Flammable or combustible liquids, toxic chemicals, explosive chemicals, oxidizing agents, corrosive chemicals, water-sensitive chemicals, and compressed gases should be segregated from each other;
- Volatile liquids must be kept away from heat sources, sunlight, and electric switches;
- Chemicals must be stored in such a way that they will not mix with each other if a container leaks or breaks;
- Keep pressurized gases securely strapped to a wall or bench at all times and their safety caps on while not in use; and
- Keep health toxins and other especially dangerous items properly labelled and store under added security.

Examples of incompatible chemicals are presented in Table 2.

Table 6.1: Chemical storage incompatibility

Chemical	Incompatible With The Following Common Chemicals
Acetaldehyde	Acetic anhydride, acetic acid, acetone, ethanol, sulfuric acid
Acetic acid	Chromic acid, nitric acid, hydroxyl compounds, ethylene glycol, perchloric acid, peroxides, permanganates
Acetone	Concentrated nitric and sulfuric acid mixtures, and strong bases
Acetylene	Chlorine, bromine, copper, fluorine, silver, mercury
Alkaline metals (e.g. powdered aluminum or magnesium, sodium, potassium)	Water, carbon tetrachloride and other chlorinated hydrocarbons, carbon dioxide, halogens
Ammonia (anhydrous)	Mercury, chlorine, calcium hypochlorite, iodine, bromine, hydrofluoric acid (anhydrous)
Ammonium nitrate	Acids, powdered metals, flammable liquids, chlorates, nitrites, sulfur, finely divided organic or combustible materials
Aniline	Nitric acid, chromic acid, hydrogen peroxide
Bromine	Ammonia, acetylene, butadiene, butane, methane, propane (or other petroleum gases), hydrogen, sodium carbide, turpentine, benzene, finely divided metals
Carbon (activated)	Calcium hypochlorite, all oxidizing agents
Carbon tetrachloride	Diborane, fluorine, sodium
Chlorates	Ammonium salts, acids, powdered metals, sulfur, finely divided organic or combustible materials
Chromic acid and chromium trioxide	Acetic acid, naphthalene, camphor, glycerol, glycerine, alcohol, turpentine, all other flammable liquids
Chlorine	Ammonia, acetylene, butadiene, butane, methane, propane (or other petroleum gases), hydrogen, sodium carbide, turpentine, benzene, finely divided metals
Chlorine dioxide	Ammonia, methane, phosphine, hydrogen sulfide
Copper	Acetylene, hydrogen peroxide
Cumene hydroperoxide	Acids (organic or inorganic)
Cyanides	Acids
Dimethyl sulfoxide	Perchloric acid, silver fluoride, potassium permanganate, cetylchloride, benzene sulfonyl chloride

Chemical	Incompatible With The Following Common Chemicals
Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide, halogens
Fluorine	<i>Isolate from all other chemicals.</i>
Hydrocarbons such as butane, propane, benzene, and gasoline	Fluorine, bromine, chlorine, chromic acid, sodium peroxide
Hydrocyanic acid	Nitric acid, alkali
Hydrofluoric acid (anhydrous)	Ammonia (aqueous or anhydrous)
Hydrogen peroxide	Copper, chromium, iron, most metals or their salts, alcohols, acetone, organic materials, aniline, nitromethane, flammable liquids, combustible materials
Hydrogen sulfide	Fuming nitric acid, other acids, oxidizing gases, acetylene, ammonia (aqueous or anhydrous), hydrogen
Iodine	Acetylene, ammonia (aqueous or anhydrous), hydrogen
Mercury	Acetylene, fulminic acid, ammonia, oxalic acid
Nitric acid (concentrated)	Acetic acid, aniline, chromic acid, hydrocyanic acid, hydrogen sulfide, flammable liquids, flammable gases, copper, brass, any heavy metals
Oxalic acid	Silver, mercury
Perchloric acid	Strong bases, Strong acids, Amines, Phosphorus halides, Alcohols, Organic materials, Powdered metals, Strong reducing agents.
Phosphorus (white)	Air, oxygen, alkalis, reducing agents
Potassium	Carbon tetrachloride, carbon dioxide, water
Potassium chlorate	Sulfuric and other acids
Potassium permanganate	Glycerol, ethylene glycol, benzaldehyde, sulfuric acid
Silver	Acetylene, oxalic acid, tartaric acid, ammonium compounds, fulminic acid
Sodium	Carbon tetrachloride, carbon dioxide, water
Sodium peroxide	Ethyl or methyl alcohol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerin, ethylene glycol, ethyl acetate, methyl acetate, furfural
Sulfuric acid	Potassium chlorate, potassium perchlorate, potassium permanganate (and similar compounds of light metals such as sodium, lithium)



Select information provided courtesy of WorkSafeBC, *Laboratory Health and Safety Handbook*.
Bretherick's *Handbook of Reactive Chemical Hazards*, 7th Edition (2006).

7 Appendix

Quick comparisons between the old WHMIS 1988 system and the new WHMIS 2015 system.

Table 7.1 – WHMIS 1988 vs. WHMIS 2015 – Main differences

	WHMIS 1988	WHMIS 2015
Hazard Classes	<p>A – Compressed gas</p> <p>B – Flammable and combustible material</p> <p>C – Oxidizing material</p> <p>D – Poisonous and infectious material</p> <p>E – Corrosive material</p> <p>F – Dangerously reactive material</p>	<p>Physical Hazards</p> <ul style="list-style-type: none"> • Flammable gases • Flammable aerosols • Oxidizing gases • Gases under pressure • Flammable liquids • Flammable solids • Self-reactive substances and mixtures • Pyrophoric liquids • Pyrophoric solids • Self-heating substances and mixtures • Substances and mixtures which, in contact with water, emit flammable gases • Oxidizing liquids • Oxidizing solids • Organic peroxides • Corrosive to metals • Combustible dusts • Simple asphyxiants • Pyrophoric gases • Physical hazards not otherwise classified <p>Health Hazards</p> <ul style="list-style-type: none"> • Acute toxicity • Skin corrosion/irritation • Serious eye damage/eye irritation • Respiratory or skin sensitization • Germ cell mutagenicity • Carcinogenicity • Reproductive toxicity • Specific target organ toxicity – single exposure • Specific target organ toxicity – repeated exposure • Aspiration hazard • Biohazardous infectious materials • Health hazards not otherwise classified <p>Environmental hazards:</p> <ul style="list-style-type: none"> • Acute aquatic toxicity • Chronic aquatic toxicity

	WHMIS 1988	WHMIS 2015				
MSDS / SDS	<p>MSDSs have 9 categories:</p> <ol style="list-style-type: none"> 1. Product information 2. Hazardous ingredients 3. Physical data 4. Fire and explosion data 5. Reactivity data 6. Toxicological properties 7. Preventative measures 8. First aid measures 9. Preparation information 	<p>SDSs have 16 categories:</p> <ol style="list-style-type: none"> 1. Product and company information; 2. Hazards identification; 3. Composition/information on ingredients; 4. First aid measures; 5. Firefighting measures; 6. Accidental release measures; 7. Handling and storage; 8. Exposure controls/personal protection; 9. Physical and chemical properties; 10. Stability and reactivity; 11. Toxicological information; 12. Ecological information; 13. Disposal considerations; 14. Transport information; 15. Regulatory information and; 16. Other information. 				
Supplier Labels	<p style="text-align: center;">Supplier Label Etiquette du fournisseur</p> <div style="border: 2px solid black; padding: 10px; text-align: center;"> <p>NETTOYANT XYZ CLEANER</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>Causes Burns Very Toxic Material</p> <p>Avoid Contact with Skin</p> <p>In case of skin or eye contact, flush with copious amounts of water for 15 minutes and seek medical attention</p> </td> <td style="width: 50%; vertical-align: top;"> <p>Cause des brûlurs Produit très toxique</p> <p>Éviter tout contact avec la peau</p> <p>En cas de contact avec la peau ou les yeux, laver à grande eau pendant 15 minutes et consulter un médecin.</p> </td> </tr> </table> <p>See Material Safety Data Sheet Voir la fiche signalétique</p> <p>ABC Chemical Company Ltd. Fabricant de produits chimiques ABC</p> </div>	<p>Causes Burns Very Toxic Material</p> <p>Avoid Contact with Skin</p> <p>In case of skin or eye contact, flush with copious amounts of water for 15 minutes and seek medical attention</p>	<p>Cause des brûlurs Produit très toxique</p> <p>Éviter tout contact avec la peau</p> <p>En cas de contact avec la peau ou les yeux, laver à grande eau pendant 15 minutes et consulter un médecin.</p>	<p style="text-align: center;">Product K1 / Produit K1</p> <div style="display: flex; justify-content: center; gap: 20px;">   </div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>Danger</p> <p>Fatal if swallowed. Causes skin irritation.</p> <p>Precautions: Wear protective gloves. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product.</p> <p>Store locked up. Dispose of contents/containers in accordance with local regulations.</p> <p>IF ON SKIN: Wash with plenty of water. If skin irritation occurs: Get medical advice or attention. Take off contaminated clothing and wash it before reuse. IF SWALLOWED: Immediately call a POISON CENTRE or doctor. Rinse mouth.</p> </td> <td style="width: 50%; vertical-align: top;"> <p>Danger</p> <p>Mortel en cas d'ingestion. Provoque une irritation cutanée.</p> <p>Conseils : Porter des gants de protection. Se laver les mains soigneusement après manipulation. Ne pas manger, boire ou fumer en manipulant ce produit.</p> <p>Garder sous clef. Éliminer le contenu/réceptacle conformément aux règlements locaux en vigueur.</p> <p>EN CAS DE CONTACT AVEC LA PEAU : Laver abondamment à l'eau. En cas d'irritation cutanée : Demander un avis médical/consulter un médecin. Enlever les vêtements contaminés et les laver avant réutilisation. EN CAS D'INGESTION : Appeler immédiatement un CENTRE ANTIPOISON ou un médecin. Rincer la bouche.</p> </td> </tr> </table> <p style="text-align: center;">Compagnie XYZ, 123 rue Machin St, Mytown, ON, N0N 0N0 (123) 456-7890</p>	<p>Danger</p> <p>Fatal if swallowed. Causes skin irritation.</p> <p>Precautions: Wear protective gloves. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product.</p> <p>Store locked up. Dispose of contents/containers in accordance with local regulations.</p> <p>IF ON SKIN: Wash with plenty of water. If skin irritation occurs: Get medical advice or attention. Take off contaminated clothing and wash it before reuse. IF SWALLOWED: Immediately call a POISON CENTRE or doctor. Rinse mouth.</p>	<p>Danger</p> <p>Mortel en cas d'ingestion. Provoque une irritation cutanée.</p> <p>Conseils : Porter des gants de protection. Se laver les mains soigneusement après manipulation. Ne pas manger, boire ou fumer en manipulant ce produit.</p> <p>Garder sous clef. Éliminer le contenu/réceptacle conformément aux règlements locaux en vigueur.</p> <p>EN CAS DE CONTACT AVEC LA PEAU : Laver abondamment à l'eau. En cas d'irritation cutanée : Demander un avis médical/consulter un médecin. Enlever les vêtements contaminés et les laver avant réutilisation. EN CAS D'INGESTION : Appeler immédiatement un CENTRE ANTIPOISON ou un médecin. Rincer la bouche.</p>
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<p>Danger</p> <p>Fatal if swallowed. Causes skin irritation.</p> <p>Precautions: Wear protective gloves. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product.</p> <p>Store locked up. Dispose of contents/containers in accordance with local regulations.</p> <p>IF ON SKIN: Wash with plenty of water. If skin irritation occurs: Get medical advice or attention. Take off contaminated clothing and wash it before reuse. IF SWALLOWED: Immediately call a POISON CENTRE or doctor. Rinse mouth.</p>	<p>Danger</p> <p>Mortel en cas d'ingestion. Provoque une irritation cutanée.</p> <p>Conseils : Porter des gants de protection. Se laver les mains soigneusement après manipulation. Ne pas manger, boire ou fumer en manipulant ce produit.</p> <p>Garder sous clef. Éliminer le contenu/réceptacle conformément aux règlements locaux en vigueur.</p> <p>EN CAS DE CONTACT AVEC LA PEAU : Laver abondamment à l'eau. En cas d'irritation cutanée : Demander un avis médical/consulter un médecin. Enlever les vêtements contaminés et les laver avant réutilisation. EN CAS D'INGESTION : Appeler immédiatement un CENTRE ANTIPOISON ou un médecin. Rincer la bouche.</p>					

WHMIS 1988

WHMIS Quick Facts
Workplace Hazardous Materials Information System

Do You Know These Vital Signs?

The hazard symbols of WHMIS

WHMIS provides you with information on the safe use, storage, handling and disposal of hazardous materials at Canadian workplaces.

CLASS A Compressed Gas			CLASS D2 Poisonous and Infectious Material (material causing other toxic effects)
CLASS B Flammable and Combustible Material			CLASS D3 Poisonous and Infectious Material (Biohazardous Infectious Material)
CLASS C Oxidizing Material			CLASS E Corrosive Material
CLASS D1 Poisonous and Infectious Material (Material causing immediate and serious effects)			CLASS F Dangerously Reactive Material

For additional information and resources, visit www.whmle.gc.ca and/or www.ccohs.ca

WHMIS 2015

WHMIS 2015
Workplace Hazardous Materials Information System
fact sheets

These Fact Sheets summarize key requirements of WHMIS 2015 which incorporates the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) for Canadian Workplaces. See WHMIS.org for more information.

Pictograms and Their Hazards

WHMIS 2015	Types of Hazards
	Gases under pressure
	Flammables (gases, aerosols, liquids, solids), Pyrophoric (liquids, solids, gases), Self-reactive substances and mixtures, Self-heating substances and mixtures, Substances and mixtures which, in contact with water, emit flammable gases, Organic peroxides
	Oxidizing (liquids, solids, gases)
	Acute toxicity (fatal or toxic)
	Carcinogenicity, Germ cell mutagenicity, Respiratory sensitization, Reproductive toxicity, Specific target organ toxicity - single exposure, Specific target organ toxicity - repeated exposure, Aspiration hazard
	Acute toxicity (harmful), Skin irritation, Eye irritation, Skin sensitization, Specific target organ toxicity - single exposure (respiratory irritation or drowsiness or dizziness)
	Corrosive to metals, Skin corrosion, Serious eye damage
	Self-reactive substances and mixtures, Organic peroxides
	Biohazardous infectious materials

WHMIS 2015 does not incorporate the GHS Explosives and Environmental Hazard Classes.

	Explosives
	Hazardous to the aquatic environment
	Hazardous to the ozone layer

The requirements for pictograms are based on the severity of the hazard. In some cases no pictogram is required. For Physical and Health Hazards Not Otherwise Classified, the supplier must use a WHMIS 2015 pictogram appropriate for the hazard.

September 2016 WHMIS.org
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Pictograms

8 References

- *Laboratory Safety Manual*, Safety Resources, 2015.
- *Compressed Gas Cylinder, Safety Handling, Use and Storage*, Safety Resources, 2015.