

# **Workplace Health and Safety Bulletin**



# WHMIS

## Information for Workers



## Introduction

The letters W-H-M-I-S stand for “Workplace Hazardous Materials Information System”. WHMIS is a national hazard communication system. It affects suppliers, importers, and distributors who provide potentially hazardous materials used at work sites, and employers and workers who use those materials.

The purpose of WHMIS is to ensure that workers have the information they need to work safely with hazardous materials at Alberta work sites.

WHMIS has three components:

- (1) Labels
- (2) Material Safety Data Sheets (MSDSs)
- (3) Worker Education

WHMIS applies to materials called “controlled products”. A controlled product is a product that meets the criteria for one or more of the six WHMIS hazard classes.

Each class, except Class D, has a separate “hazard symbol”(see Figure 1). Class D has three hazard symbols — one for each of its divisions.

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Figure 1 The WHMIS classes and hazards symbols

### WHMIS HAZARD CLASSES

A	COMPRESSED GAS	
B	FLAMMABLE AND COMBUSTIBLE MATERIAL	
C	OXIDIZING MATERIAL	
D	POISONOUS AND INFECTIOUS MATERIAL 1. MATERIALS CAUSING IMMEDIATE AND SERIOUS TOXIC EFFECTS 2. MATERIALS CAUSING OTHER TOXIC EFFECTS 3. BIOHAZARDOUS INFECTIOUS MATERIAL	  
E	CORROSIVE MATERIAL	
F	DANGEROUSLY REACTIVE MATERIAL	

## Labels

There are two kinds of WHMIS labels — supplier labels and work site labels.

### Supplier labels

Supplier labels appear on controlled products purchased from Canadian suppliers (see Figure 2). Supplier labels provide basic information about how to handle a product safely. Supplier labels have a distinctive rectangular slash-marked border.

Supplier labels contain 7 pieces of information:

- (1) product name;
- (2) name and address of the supplier;
- (3) symbols for each of the product's hazard classes;
- (4) main hazards of the product;
- (5) precautions during handling and use of the product;
- (6) first aid measures; and
- (7) reference to the MSDS for more information

Figure 2 Example of a WHMIS supplier label

<b>TOLUENE</b>		
<p><b>RISK PHRASES</b> <b>FLAMMABLE AND TOXIC</b> Eye, lung and skin irritant. Danger of serious damage to health by prolonged exposure. Vapour may travel long distances.</p> <p><b>PRECAUTIONARY MEASURES</b> Keep away from sources of ignition—no smoking. Container must be grounded when removing contents. Keep container closed. Do not breathe vapour. Use with enough ventilation to keep below the applicable exposure limit. Avoid contact with eyes and skin. Wear chemical goggles and viton or viton/neoprene gloves. Wash thoroughly after handling.</p> <p><b>FIRST AID</b> If affected by vapour, move to fresh air. If breathing has stopped, apply artificial respiration. In case of eye contact with liquid, flush with plenty of water for 15 minutes. <b>GET MEDICAL ATTENTION.</b> In case of skin contact, wash with soap and water. If swallowed, <b>DO NOT INDUCE VOMITING.</b> <b>GET MEDICAL ATTENTION.</b></p>	  	<p><b>MENTIONS DE RISQUE</b> <b>INFLAMMABLE ET TOXIQUE</b> Irritant pour les yeux, les poumons, et la peau. L'exposition prolongée risque d'entraîner de graves dommages à la santé. Les vapeurs peuvent séjournent sur de longues distances.</p> <p><b>PRÉCAUTIONS</b> Tenir à l'écart des flammes et des étincelles—ne pas fumer. Brancher le contenant à une prise de terre en vidant le contenu. Tenir le contenant fermé. Éviter de respirer les vapeurs. Aérer suffisamment pour maintenir le seuil toxicité suggéré. Éviter le contact avec les yeux et la peau. Porter les lunettes de sécurité et les gants de viton ou viton/neoprène. Laver à fond.</p> <p><b>PREMIERS SOINS</b> Placer la victime au grand air, si indisposé par les vapeurs. Si la respiration est interrompue, recourir à la respiration artificielle. En cas de contact avec les yeux, laver avec beaucoup de l'eau pendant au moins de 15 minutes. <b>OBTENIR DES SOINS MÉDICAUX.</b> En cas de contact avec la peau, laver avec de l'eau et du savon la région exposée. Si avalé, <b>NE PAS PROVOQUER DE VOMISSEMENT.</b> <b>OBTENIR DES SOINS MÉDICAUX.</b></p>
<b>SEE MATERIAL SAFETY DATA SHEET</b>	<b>VOIR FICHE SIGNALÉTIQUE</b>	
<p><b>ABC CHEMICAL COMPANY</b> <b>123 SAMPLE ROAD, TESTVILLE AB1 C2D</b></p>		

There are a few situations when the supplier label may be a bit different from the basic model. These situations include controlled products in small containers (less than 100 ml), laboratory chemicals, samples sent to labs for analysis and compressed gas cylinders or grinding wheels which have curved labels. Employers are required to teach workers about any of the variations they might see at the work site.

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## **Work site labels**

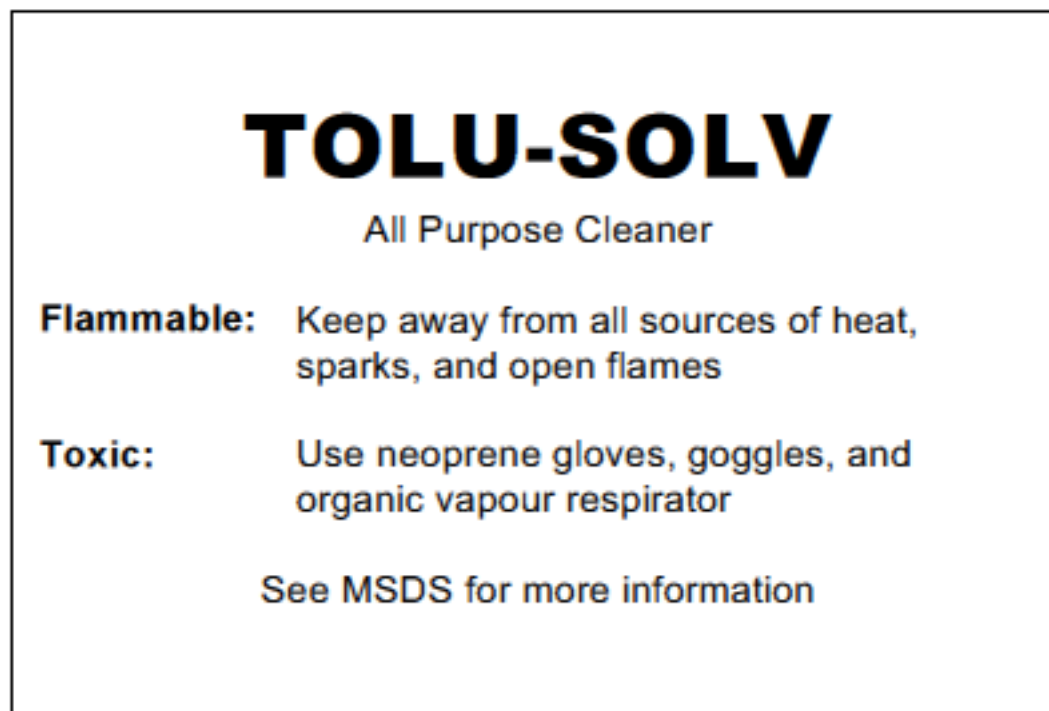
Work site labels appear on controlled products that have been transferred from suppliers' containers to work site containers, or products where the supplier label may be damaged or missing and on controlled products made at the work site (see Figure 3).

Work site labels are less detailed than supplier labels and only require three pieces of information:

- (1) name of the product;
- (2) information on how to use the product safely; and
- (3) reference to the MSDS for further information.



Figure 3 Example of a WHMIS work site label



In a few special cases, other forms of clear identification, such as the name of the product, a colour code or a numbering system may be used instead of a work site label. These cases include controlled products:

- in pipes, reaction vessels, ore cars
- on conveyor belts
- in or on other in-plant conveyance systems
- transferred into work site containers for use by one worker only and used up during the shift on which the container was filled.

## **Material Safety Data Sheets (MSDSs)**

If you need to know more about a product than you can find on the label, go to the product's MSDS. These sheets have more detailed information about a product's properties, its hazards, and how to prevent overexposure.

WHMIS MSDSs have nine categories of information that must be provided. The blank MSDS form shown in Figure 4 shows the nine categories and the information that must be included in each category.

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An MSDS is supposed to be sent to an employer with every controlled product the employer buys. MSDSs must never be more than three years old. In addition, an employer must prepare an MSDS for each controlled product it produces at the work site.

The MSDSs for all controlled products at a work site must be kept in a place where workers have easy access to them. If you are a worker and don't know where they're kept, ask your supervisor.

Some employers transfer the information from supplier MSDSs to a standardized company MSDS form. This is done to make it easier for workers to find the information they want. If a company follows this practice, the original MSDSs received from the suppliers must be kept on file. Workers can refer to the originals if they wish.

There is no specific required layout for the WHMIS MSDS, but it must include at least each of the nine categories of information and the required detailed information in each category.

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The MSDS must include the name of the person or group that wrote the MSDS, their telephone number and the date the MSDS was prepared. This allows you to get more information about the product if you need it. The preparation date of the MSDS should never be more than three years old.

An MSDS does not list all of a product's ingredients. It lists only the ingredients considered to be hazardous, along with their concentrations. These are:

- (1) *the most hazardous controlled product ingredients* — they are listed if they make up more than 0.1 percent of the product.
- (2) *other less hazardous controlled product ingredients* — they are listed only if they make up more than 1 percent of the product.
- (3) *ingredients that are included on the Ingredient Disclosure List (IDL)* and that are present in the product at concentrations greater than the cut-off limits listed on the IDL. The IDL is a list of chemicals that must be disclosed on MSDSs. Each chemical has a special cut-off concentration. The chemical must be disclosed on a product's MSDS if it is present in the product at a concentration greater than its specific cut-off limit.
- (4) *ingredients that have not been tested for their toxic properties.*
- (5) *ingredients that the author of the MSDS considers to be hazardous* — even if the ingredients do not meet any of the first four conditions.

## Preventive Measures

The MSDS section of the WHMIS MSDS, Preventive Measures, provides information that is especially useful for workers. Information about the following topics must be covered in the Preventive Measures section of all MSDSs.

*Personal protective equipment (PPE)* — the clothing or equipment that a worker handling a controlled product wears to reduce or prevent exposure to the substance. PPE may include equipment such as coveralls, goggles, faceshields, aprons, gloves or respirators. The type of gloves and respirators should be specified, for example, “vinyl gloves” or “organic vapour cartridge respirators.”

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## Preventive Measures

*Engineering controls* — measures for eliminating or reducing chemical hazards to which workers may be exposed. Examples include the substitution of less hazardous products for more hazardous ones, enclosure of processes to prevent the release of hazardous materials, or local exhaust ventilation to remove airborne contaminants at their point(s) of generation.

*Spill/leak procedures* — these procedures describe the steps to be taken in the event of a spill or leak of the controlled product.

*Waste disposal* — describes how to dispose of waste that contains the controlled product.

*Handling procedures/equipment* — describes the basic precautions to be followed when handling the product, or the basic equipment to be used during handling.

*Storage requirements* — specific instructions for preventing the development of “conditions of flammability, instability or reactivity” during storage.

*Shipping information* — specific instructions for preventing the development of “conditions of flammability, instability or reactivity” during shipping.

## **First Aid Measures**

The MSDS section about First Aid Measures gives instructions for the specific first aid measures to be taken if:

- the hazardous substance gets into a worker's eyes or onto the skin.
- a worker has been overexposed to the hazardous substance by ingesting or inhaling it.

Much of the information in an MSDS is self-explanatory, but some terms may be unfamiliar. A number of MSDS terms are explained briefly in the Glossary of this Safety Bulletin.

## Confidential business information

Certain information does not have to be disclosed on a WHMIS MSDS if it is a company secret. Suppliers may withhold:

- the identity or concentration of one or more ingredients of a controlled product
- the names of toxicological studies that would identify those ingredients.

You can always tell if confidential business information has been withheld. The confidential information will be replaced on the MSDS by:

- a registry number from the Hazardous Materials Information Review Commission (HMIRC)
- the date when the HMIRC was notified of the claim of confidential business information or the date when the Commission accepted the claim. The HMIRC reviews the MSDS to make sure that all the necessary hazard information is included.

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## **Worker education**

WHMIS requires controlled products to be labelled and MSDSs to provide more detailed information about those products. The third component of the system, Worker Education, helps workers understand WHMIS information so they can work safely with controlled products. This education explains the WHMIS system and gives workers specific training related to the controlled products they work with at their workplace, and the controlled products they are involved in producing.

Employers are required to provide worker education for WHMIS.

WHMIS worker education includes training workers to understand:

- the information on WHMIS labels and MSDSs, the meaning of that information and its application to their work
- identification systems that are used in place of labels at a work site
  
- specific procedures for safe use, handling, storage and disposal of the controlled products that workers handle
- procedures for dealing with fugitive emissions of the controlled products workers may encounter
- procedures for emergencies involving controlled products.

The information taught in a WHMIS worker education program is important because it helps workers protect their health and safety at work.

## Glossary

*Acute exposure* — a single exposure or exposure over a short time.

*Autoignition temperature* — the lowest temperature at which a substance ignites when no spark or flame is present.

*Boiling point* — the temperature above which a substance boils. Vapour is given off very rapidly at temperatures above the boiling point.

*Carcinogenicity* — a product's ability to cause cancer.

*CAS Registry Number* — Chemical Abstracts Service Registry Number. This is a unique reference number used when searching for information about a particular chemical.

*Chronic exposure* — exposure to a low concentration of a substance over an extended period of time.

*Corrosivity* — a property of a material. A material is corrosive if it corrodes metal, causes irreversible tissue damage, or causes the death (necrosis) of human skin tissue. A material can also be classified as corrosive if it is an untested mixture containing an ingredient present in a concentration of at least 1 per cent which causes irreversible tissue damage or necrosis.

*Coefficient of water/oil distribution* — a way of comparing a product's solubility in water with its solubility in oil. A value greater than 1 indicates that the product dissolves more readily in water. These materials may be absorbed by the membranes of the eyes or the respiratory tract. Values less than 1 indicate that the product is more soluble in oil. These materials may be absorbed by the skin.

*Evaporation rate* — tells how quickly a substance vapourizes compared with butyl acetate. (Butyl acetate has an evaporation rate of 1.) Substances with a high evaporation rate get into the air very quickly.



*Explosion data (sensitivity to impact)* — describes the likelihood that a product will explode when jarred.

*Explosion data (sensitivity to static discharge)* — describes the likelihood that a product will explode when it comes in contact with static electricity.

*Exposure limits* — are the concentrations of airborne chemicals that may not be exceeded in workplace air. Exposure limits have different names and often have different numerical values in different jurisdictions. In Alberta, these limits are called Occupational Exposure Limits (OELs).

*Flammability conditions* — are the situations in which the product could catch fire.

*Flash point* — the lowest temperature at which a product gives off enough vapour to catch fire when it is exposed to a source of ignition such as a flame or spark. The lower the flash point, the greater the potential fire hazard. There should be a notation behind the flash-point value to indicate the test method that was used.

*Freezing point* — the temperature below which a liquid material becomes a solid.

*Hazardous combustion products* — formed when a material is burned.

*Hazardous decomposition products* — dangerous products that may be released as a result of a chemical aging or its reaction with airborne oxygen or moisture.

*Incompatible substances* — those substances which, when combined with the material, produce toxic or corrosive materials, excessive heat or explosion.

*Instability conditions* — those conditions in which a product polymerizes, decomposes, condenses or becomes self-reactive. These conditions might include pressure, vibration, jarring, heating or the presence of moisture in the air.

*Irritancy* — ability of a product to cause local effects in the area where it contacts the body, such as the throat, eyes or skin. Effects could include redness, itching or swelling.

*LC<sub>50</sub> (Lethal Concentration, sub 50)*— refers to the airborne concentration of a substance that kills 50 per cent of the animals in tests that measure a substance's ability to cause poisoning when it is inhaled. These tests are usually conducted over a 4-hour period. The *LC<sub>50</sub>* is usually expressed as parts of test substance per million parts of air (ppm) for gases, or as milligrams of test substance per cubic metre of air (mg/m<sup>3</sup>) for dusts, mists and fumes.

*LD<sub>50</sub> (Lethal Dose, sub 50)*—refers to the single dose of a substance that kills 50 per cent of the animals in tests that measure a substance's ability to cause poisoning when it is swallowed or absorbed through the skin. The *LD<sub>50</sub>* for a product varies by species of tested animals and by the route of entry, so this information must be specified along with the *LD<sub>50</sub>* value. The *LD<sub>50</sub>* is usually expressed as milligrams of substance per kilogram of test-animal body weight (mg/kg).

*Lower explosive limit (LEL) or Lower flammable limit (LFL)* — the lowest concentration of a product in air that will burn or explode when an ignition source is present. At concentrations lower than the LEL, the mixture is “too lean” to burn or explode.

*Means of extinction* — includes both the type of fire extinguisher that should be used on a small fire involving the product, and the firefighting agents that should be used for fighting a major fire.

*Melting point* — the temperature above which a solid material becomes a liquid.

*Mutagenicity* — a product’s ability to change the genetic materials in the body cells of exposed persons. Mutations to reproductive cells (sperm and ova, also called germ cells) may be passed on to the exposed person’s children. Mutations to other cells (called somatic cells) affect only the person who was exposed.

*Odour threshold* — the lowest airborne concentration of a substance that most people can smell.

*pH* — a measure of a substance's acidity or alkalinity. A pH of 7 is neutral. Substances with a pH greater than 7 are alkaline (caustic). Alkalinity increases as the number increases. Substances with a pH of less than 7 are acidic. Acidity increases as the number decreases.

*Physical state* — tells whether the product is a solid, liquid or gas.

*PIN* — means Product Identification Number. It is a special series of letters and numbers used when looking for emergency response information about a chemical. PINs appear on the Transportation of Dangerous Goods (TDG) placards carried by trucks, railway cars, etc. loaded with dangerous goods.

*Reactivity conditions* — situations where two or more substances react when they come into contact. Reactivity conditions include the presence of light, an elevated temperature, the aging of one of the substances or the absence of a substance that prevents a reaction (an inhibitor).



*Reproductive toxicity* — a product's ability to affect the fertility of persons exposed to it. The effects include changes in sperm or ova, and miscarriages.

*Route of entry* — refers to the way a product enters the body. The most common routes of entry for workplace chemicals are inhalation, ingestion (by mouth) and absorption through the skin. Contact between a product and the skin does not necessarily result in the material being absorbed into the body. The material could cause a chemical burn or rash on the surface of the skin or eye and never enter the body.

*Sensitization* — a substance's ability to affect the body's immune system so that further exposures may result in symptoms. These symptoms may include skin irritation or asthma-like conditions and may vary from mild to very severe.

*Specific gravity* — a comparison of a substance's weight to the weight of an equal volume of water. Substances with a specific gravity greater than 1 are heavier than water — they sink to the bottom of water mixture. Substances with a specific gravity of less than 1 are lighter than water — they float on water.

*Synergistic product* — materials that interact so that the effects of the two products together are greater than the sum of the individual effects caused by the two substances alone.

*Teratogenicity* — a product's ability to damage the development of an unborn child without adversely affecting the pregnant woman.

*Upper explosive limit (UEL) or Upper flammable limit (UFL)* — the greatest concentration of a product in air that will burn or explode if an ignition source is present. At concentrations greater than the UEL, the mixture is “too rich” to burn or explode.



*Vapour density* — a comparison of the weight of a vapour to the weight of an equal volume of air. Substances with vapour densities greater than 1 “sink” to low-lying areas and accumulate there. If the substance is flammable, a dropped match or a spark can cause a fire or explosion. If the substance is toxic, persons working in low areas (such as mechanics’ pits) may be exposed to high concentrations of the vapour and suffer the toxic effects of the product.

*Vapour pressure* — indicates the likelihood of a substance to form vapours. Substances with high vapour pressure evaporate very rapidly. The presence of those vapours in the air may be a hazard, especially if the vapours are flammable or toxic, or in confined spaces where they may displace breathable air out of the space.