

SECTION 6



Workplace
Hazardous
Materials
Information
System



What is a Hazard?

Physical HazardsHealth Hazards

Physical Hazards

FIRE

Reaction to:

- Air
- Water

EXPLOSION



- Light
- Spark
- Heat

Health Hazards

- Carcinogenic – *Cancer Causing*
- Corrosives – *Skin Rash*
- Highly Toxic and Toxic – *Cause Death*
- Irritant – *Inflammation*
- Sensitizer – *Allergic Reaction*
- Target Organ Effects – *Kills Organs*
- Acute Effects – *React Immediately*
- Chronic Effects – *Long-Term Reactions*

Exposure Limits

- Permissible Exposure Limit (TLV-PEL):
 - No adverse health effect in a 8 hour workday, 40 hour week
- Short-term Exposure Limit (TLV-STEL):
 - No more than 15 min at any given time
 - 4 x 15 min periods in 8hrs, with an hour between each period

Exposure Limits...Cont.

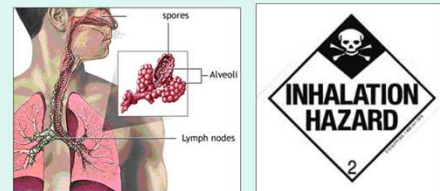
- Ceiling Exposure (TLV-C):
 - The limit of concentration that should not be exceeded momentarily.
- Odor Threshold:
 - The lowest concentration of a substance in air that can be detected by smell.
 - How does this compare with the PEL and IDLH?

Exposure Limits... Cont.

- TLV-Skin:
 - The skin designation refers to the potential contribution to the overall exposure by the route of entry, including mucous membranes and the eye. Exposure can be either by airborne or direct contact with the substance. **This designation indicates that appropriate measures should be taken to prevent skin absorption.**

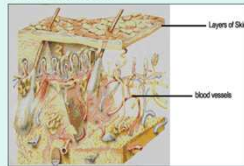
Routes of Entry

Inhalation

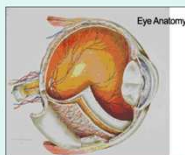


Routes of Entry

Absorption



Chemicals absorbed through the eye then enter the bloodstream.



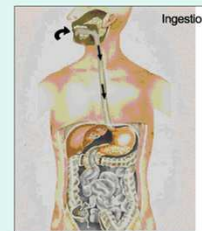
- Cuts or cracked skin
- Rashes
- Dry, flaky, and sore skin

Routes of Entry

Ingestion

Chemicals left on:

- Hands
- Clothing
- Facial Hair
- Food, Drinks, and Cigarettes



Routes of Entry

Injection

- Hydraulic lines
- Compressed air tools
- Needle stick injuries



Toxicity vs. Dose

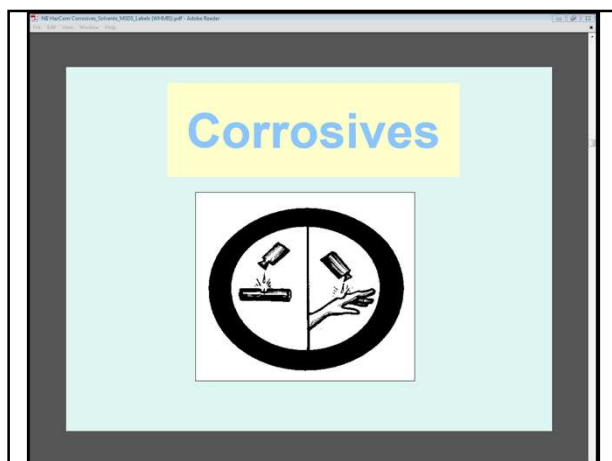
TOXICITY	Very Low	Low	Moderate	High	Very High
HAZARD POTENTIAL	Very Low	Low	Moderate	High	Very High
DOSE	Very Low	Low	Moderate	High	Very High

Toxicity vs. Dose

TOXICITY	Very Low	Low	Moderate	High	Very High
HAZARD POTENTIAL	Very Low	Low	Moderate	High	Very High
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Toxicity vs. Dose

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DOSE	Very Low	Low	Moderate	High	Very High



Corrosive

- Visible destruction, or irreversible damage to body tissue
- Acids
- Caustics (or bases)

pH Scale

Acids 7 Caustics (or bases)

1 14

Solid Corrosives (Bases)

- Preferred
 - Powder
 - Granular
- Safer in solid form
- Dangers to avoid
 - Moisture
 - Eyes, nose, lungs, and mucous membranes are greatest at risk
 - Delayed reaction

Corrosives

- Airborne Particles (Dust)
 - Rashes
 - Ulcers
 - Burns
- * Permanent damage is unavoidable.

Dust Control Measures

- **Spot Ventilation**
 - Removes ph isolated area
 - Customized to the hazard
 - Corrosive hazards are contained faster and travel less
- **General Ventilation**
 - Ventilates the entire area
 - Moves the hazard across large area
 - Takes much longer to contain
 - Potentially contaminating others

Corrosive PPE

- Wash PPE to clean off dried residue
- Gloves
- Face shield
- Goggles (vent free only for fuels)
- Apron
- Rubber Boots (use as needed)
- Respirators



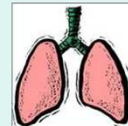
Accidental Contact Liquid

- Skin contact
 - Flush skin with a high flow of water for 15 minutes as a minimum
- Digestion
 - Drink Milk to coat and dilute
 - **DO NOT Vomit**, this increases damage to the throat and stomach lining by reintroducing the chemical again.



Corrosive Gases

- Are often produced naturally off Solid Corrosives or exists as a vapor
- Most common damaged areas:
 - Respiratory Systems
 - Eyes



MSDS (ANSI 16)

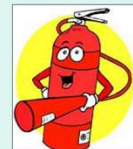
MSDS Musts Requirements:

1. Product Identification
 - Formula and Trade Name
2. Composition
 - Ingredients
3. Hazard Identification
 - Overview of physical and health hazards
4. First Aid Procedures



MSDS (ANSI 16)

5. Fire Fighting Procedures
 - Flash point, Auto ignition, UEL, and LEL
 - Extinguisher type
6. Accidental Release
7. Storage
8. Exposure Controls
 - PPE



MSDS (ANSI 16)

9. Chemical Properties
 - Odor, Color, State
10. Stability and Reactible
 - Air, Heat, Light, and Vibration
11. Toxicological Information
 - TWV, PEL (dose levels)
12. Ecological Information
 - Environmental



MSDS (ANSI 16)

13. Disposal Requirements
14. Transportation
15. Regulatory Information
16. Other Recommendations



How to teach MSDS

All MSDS be broken down into the following:

1. Product Identification

- Trade name, other names, and formula
- Address
- Emergency Contact Info...
- Date of last revision
- Ingredients



How to teach MSDS...cont.

Product Identification cont.

- Exposure Limits
 - PEL and TLV
 - STEL
- Health Hazards
- Routes of Entry
- Chronic and Acute Effects



How to teach MSDS...cont.

2. Exposure Situations

- First Aid
- Fire
 - Flammable limits UEL and LEL
 - Auto ignition temperature
 - Flash point
- Accidental release/Clean-up



How to teach MSDS...cont.

3. Hazard Prevention & Protection

- Handling and Storage
- Heat, Sunlight, and Vibration
- Engineering Controls (PPE, Ventilation)
- Physical & Chemical Properties
 - Evaporation points
 - Vapor density
 - Appearance
 - Melting and boiling points
- Stable or unstable
- Conditions that cause reactions and release



How to teach MSDS...cont.

4. Other Specific Information (Emergency Response)

- Toxicological
- Ecological
- Disposal
- Transportation
- Laws and regulations

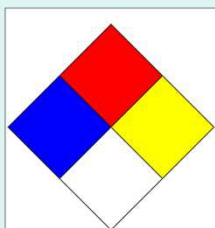


Labels

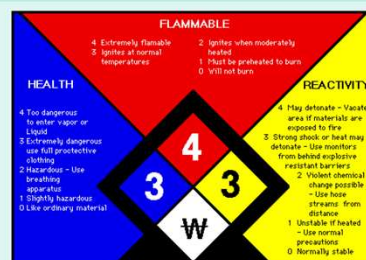
- Ministry of Transportation (MTO)
- National Fire Protection Agency (NFPA)
- Hazardous Material Identification System (HMIS)
- Waste Labels (Prov Requirements)
- Batch labels/tickets
- Company labels



NFPA / HMIS Chemical Hazard Label



NFPA Chemical Hazard Label



Chemical Hazard Label

HEALTH

4 Extreme	-On very short exposure could cause death or major residual injury even though prompt medical treatment is given. -A known or suspected human carcinogen.
3 Serious	-May cause serious temporary or residual injury on short term exposure even though prompt medical attention is given. -A known or suspected small animal carcinogen.
2 Moderate	-Intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical treatment is given.

Chemical Hazard Label

HEALTH

1 Slight	-May cause irritation but only minor residual injury even without treatment. -Recognized innocuous material when used with responsible care.
0 Minimal	-No chemical is without some degree of toxicity.

Chemical Hazard Label

Flammability

4 Extreme	Extremely. Flash point below 73 F (22.8 C)
3 Serious	<ul style="list-style-type: none"> -Vaporizes readily and can be ignited under almost all conditions. -May form explosive mixtures with or burn rapidly in air. -May burn rapidly due to self-contained oxygen. -May ignite spontaneously in air. -Flash point at or above 73 F (22.8 C) but less than 100 F (37.8 C).

Chemical Hazard Label

Flammability

2 Moderate	<ul style="list-style-type: none"> -Must be moderately heated or exposed to relatively high temperatures ---for ignition to occur. -Solids which readily give off flammable vapors. -Flash point at or above 100 F (37.8 C) but less than 200 F (93.4 C).
1 Slight	<ul style="list-style-type: none"> -Must be preheated for ignition to occur. -Will burn in air when exposed at 1500 F (815.5 C) for 5 minutes. -Flash point at or above 200 F (93.4 C).

Chemical Hazard Label

Flammability

0 Minimal	<ul style="list-style-type: none"> -Will not burn -Will not exhibit a flash point -Will not burn in air when exposed at 1500 F (815.5 C) for 5 minutes
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Chemical Hazard Label

Reactivity

4 Extreme	<ul style="list-style-type: none"> -Can explode or decompose violently at normal temperature and pressure. -Can undergo a violent self-accelerating exothermic reaction with common materials or by itself. -May be sensitive to mechanical or local thermal shock at normal temperature and pressure.
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Chemical Hazard Label

Reactivity

3 Serious	<ul style="list-style-type: none"> -Can detonate or explode but requires a strong initiating force or confined heating before initiation. -Readily promotes oxidation with combustible materials and may cause fires. -Is sensitive to thermal or mechanical shock at elevated temperatures. -May react explosively with water without requiring heat or confinement.
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Chemical Hazard Label

Reactivity

2 Moderate	<ul style="list-style-type: none"> -Normally unstable and readily undergoes violent change but does not detonate. -May undergo chemical change with rapid release of energy at normal temperature and pressure. -May react violently with water. -Forms potentially explosive mixtures with water.
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Chemical Hazard Label

Reactivity

1 Slight	-Normally stable material which can become unstable at high temperature and pressure.
0 Minimal	-Normally stable material which is not reactive with water.

NFPA / HMIS Chemical Hazard Label

Special

Updated NFPA Labels

ReactivityInstability

Prior 1996Current

Updated HMIS Labels

PERSONAL PROTECTION
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(HMIS® I & II)(HMIS® III) April 2002

Personal Protective Equipment

HMIS Letter	Required Equipment
A	Safety Glasses
B	Safety Glasses Gloves
C	Safety Glasses Gloves Respirator
D	Face Shield Gloves Respirator

Personal Protective Equipment


E	Safety Glasses Gloves Respirator
F	Safety Glasses Gloves Protective Apron Respirator
G	Safety Glasses Gloves Respirator
H	Face Shield Gloves Protective Apron Respirator

	Personal Protective Equipment			
I	 Safety Glasses	 Gloves	 Dust Respirator	 Vapor Respirator
J	 Splash Goggles	 Gloves	 Protective Apron	 Dust Respirator
K	 Air Line Mask or Hood	 Gloves	 Full Suit	 Boots
L through Z	Site-specific label. Ask your supervisor or safety specialist for handling instructions			

Compressed Gas Cylinders

If you work in the plant shop or around contractors, you may be affected by the safety of compressed gas cylinders.

You must be able to recognize unsafe cylinders and remove them from service.



P-1 3.5 Flammable gases

Indoor cylinder storage

- Well protected
- Well insulated
- Dry
- Twenty feet from flammable or combustible materials

20 Feet

The diagram shows two gas cylinders, one labeled 'Fuel Gas' and the other 'Oxygen', positioned on either side of a central text box. A large red double-headed arrow at the bottom indicates a 20-foot distance from flammable or combustible materials.

Compressed Gas Cylinders

Markings are placed on the shoulder of each cylinder and provide important information.

ICC 3AA2015
A35798641
PST
6 Ø56 +
5-61 +
5-66 + *

The diagram shows two compressed gas cylinders. The left cylinder is labeled with 'WORKING PRESSURE GAUGE', 'REGULATOR', 'GRIP HANDLE', 'DIN-5 AIR/WATER MIRROR', and 'GAS CYLINDER'. The right cylinder is labeled with 'WORKING PRESSURE GAUGE', 'VALVE', 'MIRROR', 'ACETYLENE REGULATOR', 'GAS CYLINDER', and 'DIN-5'. The top of the right cylinder is labeled 'DIN-5 REG. TYP. ACETYLENE REG. CONNECTION'. The bottom of the right cylinder is labeled 'DIN-5 REG. ACETYLENE CYLINDER'.

Markings

1. MTO/DOT or an ICC marking indicating pertinent regulations
2. Serial number
3. Symbol of the manufacturer, user, or purchaser
4. Manufacture
5. retest months-month and year
6. (+) 10% overcharged
7. * 10 yrs interval

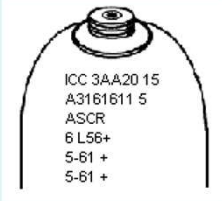


Diagram of a propane tank with the following markings:

- ICC 3AA20 15
- A3161611 5
- ASCR
- 6 L56+
- 5-61 +
- 5-61 +

SCENARIO: Chlorine and Diesel Fuel Spill

An auto parts manufacturer, Apex, stores 100 gallons of chlorine, 50 gallons of # 2 type diesel fuel, and a small quantity of oils, greases, and solvents in their repair and maintains department.

The chlorine is stored in two 50 gallon above ground tanks. The chlorine is transported by an electric pump. The diesel fuel is directly adjacent to the chlorine.

WHMIS SYMBOLS



Class A - Compressed Gas



Contents under high pressure.
Cylinder may explode or burst when heated, dropped or damaged.

Class B - Flammable and Combustible Material



May catch fire when exposed to heat, spark or flame.
May burst into flames.

Class C - Oxidizing Material



May cause fire or explosion when in contact with wood, fuels or other combustible material.

Class D, Division 1 - Poisonous and Infectious Material: Immediate and serious toxic effects



Poisonous substance.
A single exposure may be fatal or cause serious or permanent damage to health.

Class D, Division 2 - Poisonous and Infectious Material: Other toxic effects



Poisonous substance.
May cause irritation.
Repeated exposure may cause cancer, birth defects, or other permanent damage.

Class D, Division 3 - Poisonous and Infectious Material: Bio-hazardous infectious materials



May cause disease or serious illness.
Drastic exposures may result in death.

Class E - Corrosive Material



Can cause burns to eyes, skin or respiratory system.

Class F - Dangerously Reactive Material



May react violently causing explosion, fire or release of toxic gases, when exposed to light, heat, vibration or extreme temperatures.

WHMIS LABELING

What is a WHMIS label?

In Canada, the WHMIS (Workplace Hazardous Material Information System) label is one of the ways health hazard information is made available to anyone using the material. Labels are required by WHMIS laws.

Why label stuff?

Labels are important because they are the first alert there may be hazards associated with using the product covered by WHMIS legislation. The labels also tell what precautions to take when using the product. In addition, labels also inform the person that there is a Material Safety Data Sheet (MSDS) available which contains more detailed information on the product.

Who is responsible for labelling?

Suppliers are responsible for labelling WHMIS-controlled products that they provide to customers. Employers and sometimes employees are all responsible for labelling or re-labelling products in the workplace, as directed in occupational health and safety legislation. This includes labelling controlled products with workplace labels, decanted products, laboratory chemicals or piping and bulk containers where a controlled product is being held or is flowing.

Are there different types of labels?

Yes. A WHMIS label can be a mark, sign, stamp, sticker, seal, ticket, tag or wrapper. It can be attached, imprinted, stencilled or embossed on the controlled product or its container. However, there are two different types that are used most often: the supplier label and the workplace label.

Is the content of supplier and workplace labels different?

There are slightly different requirements for what must be on the label depending on who is required to put the label on the product.

If a supplier label is not attached to a controlled product you are not to use the material until the supplier gives you an MSDS and a supplier label.

A supplier label must:

appear on all controlled products received at workplaces in Canada contain the following information:

- product identifier (name of product)
- supplier identifier (name of company that sold it)
- a statement that an MSDS is available
- hazard symbols [the pictures of the classification(s)]
- risk phrases (words that describe the main hazards of the product)
- precautionary measures (how to work with the product safely), and
- first aid measures (what to do in an emergency)
- have all text in English and French
- have the WHMIS hatched border.



LABEL
BORDER

Supplier labels for materials from a laboratory supply house that are intended for use in a laboratory in amount less than 10 kg, and any controlled product sold in a container with less than 100 ml may contain less information than listed above.

If the product is always used in the container with the supplier label, no other label is required (unless the supplier label falls off or becomes unreadable). However, sometimes you will want to put some of the material into another container for use in the workplace. This new container does require a workplace WHMIS label.

A workplace label must:

appear on all controlled products produced in a workplace or transferred to other containers by the employer
may appear in placard form on controlled products received in bulk from a supplier
have the following information:

- product identifier (product name)
- information for the safe handling of the product
- statement that the MSDS is available

may contain the WHMIS hazard symbols or other pictograms.

These are the minimum requirements for workplace labels. The employer may wish to put more information on the labels but it is not required under the law.

Do workplace labels have to have a hatched border?

Supplier labels must have a hatched border around the information on the label but labels prepared in the workplace do not necessarily have to have hatched borders.

The Hazardous Products Act and the Controlled Products Regulations specify, among other things, what suppliers and importers are required to do with respect to MSDSs and labels. Section 20 of the Controlled Products Regulations prescribes label design requirements for supplier labels and Schedule III has a picture of how the label should look.

It is occupational health and safety legislation, not the Controlled Products Regulations, that describe what employer must do when preparing workplace labels. For example, section 10.41 on "Replacing Labels" in the Canada Occupational Safety and Health Regulations states:

"Where, in a work place, a label applied to a controlled product or a container of a controlled product becomes illegible or is removed from the controlled product or the container, the employer shall replace the label with a work place label that discloses the following information in respect of the controlled product

- (a) the product identifier;
- (b) the hazard information; and
- (c) a statement indicating that a material safety data sheet is available in the work place."

This section does not require employers to use WHMIS symbols and a hatched border when preparing workplace labels. However, nothing in the regulations prevents an employer from using the WHMIS requirements for designing supplier labels when prepare workplace labels. Provincial OH&S legislation have similar provisions.

What happens if I put the material in a different container?

You must use a workplace label on the container. There are two special cases when a workplace label is not necessary. When a controlled material is poured into a container and it is going to be used immediately, no label is required. Also, if the material is "under the control of the person who decanted it" (which means if the person who poured it will be the only one using it) and if the material is all used during one shift, just the product identifier (name) is required. However, if the material is not used right away or if more than one person will be in control of the material, a workplace label is required. Your company may have special rules about labelling containers so you should ask about labelling policies.

What types of labels do I use if the material is shipped in bulk?

Material that is shipped in bulk also follows special rules. The tank or container that the bulk material is transferred into must be labelled with either a supplier label or a workplace label. When the material is moved into containers for resale or delivery out of your workplace, you must put a supplier label on each container. When the bulk material is used in your workplace (usually transferred into smaller containers), a workplace label is required on the containers.

Are workplace labels necessary if the material is in a pipe or reaction vessel?

Not necessarily. Pipes and reaction vessels may be marked in other ways such as a colour coding, or placards. However, it is the employers duty to train workers how to recognize and interpret the markings used in your workplace.

Are labels different if I work in a laboratory?

Sometimes. Laboratory samples of controlled products that are less than 10 kilograms do not have to have a WHMIS label as long as there is a label which states the following in both English and French:

- the product identifier (name)
- the chemical identity or generic chemical identity of an ingredient of the controlled product, if known
- the supplier identification
- the statement "Hazardous Laboratory Sample. For hazard information or in an emergency, call..."
- and an emergency telephone number must be provided

WHMIS SUPPLIER LABELS

These labels are applied, by the supplier, to a controlled product that is sold or import to a workplace in Canada. If the supplier label becomes damaged, unreadable or falls off it must be replaced with a workplace label.

Items 1-6 are mandatory and will be found on all supplier labels of any controlled product. Items 7-9 are included on supplier labels of any controlled product with a container size of more than 100ml.

- | | |
|----------------------------------|---------------------------|
| 1. HATCHED BORDER | 6. MSDS REFERENCE |
| 2. WRITTEN IN ENGLISH AND FRENCH | 7. RISK PHRASES |
| 3. PRODUCT IDENTIFIER | 8. PRECAUTIONARY MEASURES |
| 4. SUPPLIER IDENTIFIER | 9. FIRST AID MEASURES |
| 5. HAZARD SYMBOL(S) | |

