

# Trades Access Common Core

## **Line A: Safe Work Practices** **Competency A-3: Handle Hazardous** **Materials Safely**





# Trades Access

## COMMON CORE

Line A: Safe Work Practices  
Competency A-3: Handle Hazardous Materials Safely

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The issuing/publishing body is Crown Publications, Queen's Printer, Ministry of Technology, Innovation and Citizens' Services.

BCcampus would like to acknowledge the following individuals and organizations for their contributions in producing the Trades Access Common Core Open Textbook resources.

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## **Industry Training Authority of BC**

The ITA works with employers, employees, industry, labour, training providers, and government to issue credentials, manage apprenticeships, set program standards, and increase opportunities in approximately 100 BC trades. Among its many functions are oversight of the development of training resources that align with program standards, outlines, and learning objectives, and authorizing permission to utilize these resources (text and images).

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October 2015, Version 1

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## Foreword

The BC Open Textbook Project began in 2012 with the goal of making post-secondary education in British Columbia more accessible by reducing student cost through the use of openly licensed textbooks. The BC Open Textbook Project is administered by BCcampus and is funded by the British Columbia Ministry of Advanced Education.

Open textbooks are open educational resources (OER); they are instructional resources created and shared in ways so that more people have access to them. This is a different model than traditionally copyrighted materials. OER are defined as teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property licence that permits their free use and repurposing by others (Hewlett Foundation). Our open textbooks are openly licensed using a Creative Commons licence, and are offered in various e-book formats free of charge, or as printed books that are available at cost. For more information about this project, please contact [opentext@bccampus.ca](mailto:opentext@bccampus.ca). If you are an instructor who is using this book for a course, please let us know.

## Preface

The concept of identifying and creating resources for skills that are common to many trades has a long history in the Province of British Columbia. This collection of Trades Access Common Core (TACC) resources was adapted from the 15 Trades Common Core line modules co-published by the Industry Training and Apprenticeship Commission (ITAC) and the Centre for Curriculum Transfer and Technology (C2T2) in 2000-2002. Those modules were revisions of the original Common Core portion of the TRAC modules prepared by the Province of British Columbia Ministry of Post-Secondary Education in 1986. The TACC resources are still in use by a number of trades programs today and, with the permission from the Industry Training Authority (ITA), have been utilized in this project.

These open resources have been updated and realigned to match many of the line and competency titles found in the Province of BC's trades apprenticeship program outlines. A review was carried out to analyze the provincial program outlines of a number of trades, with the intent of finding common entry-level learning tasks that could be assembled into this package. This analysis provided the template for the outline used to update the existing modules. Many images found in ITA apprentice training modules were also incorporated into these resources to create books that are similar to what students will see when they continue their chosen trades training. The project team has also taken many new photographs for this project, which are available for use in other trades training resources.

The following list of lines and competencies was generated with the goal of creating an entry-level trades training resource, while still offering the flexibility for lines to be used as stand-alone books. This flexibility—in addition to the textbook content being openly licensed—allows these resources to be used within other contexts as well. For example, instructors or institutions may incorporate these resources into foundation-level trades training programming or within an online learning management system (LMS).

### Line A – Safe Work Practices

- A-1 Control Workplace Hazards
- A-2 Describe WorkSafeBC Regulations
- A-3 Handle Hazardous Materials Safely
- A-4 Describe Personal Safety Practices
- A-5 Describe Fire Safety

### Line B – Employability Skills

- B-1 Apply Study and Learning Skills
- B-2 Describe Expectations and Responsibilities of Employers and Employees
- B-3 Use Interpersonal Communication Skills
- B-4 Describe the Apprenticeship System

**Line C – Tools and Equipment**

- C-1 Describe Common Hand Tools and Their Uses
- C-2 Describe Common Power Tools and Their Uses
- C-3 Describe Rigging and Hoisting Equipment
- C-4 Describe Ladders and Platforms

**Line D – Organizational Skills**

- D-1 Solve Trades Mathematical Problems
- D-2 Apply Science Concepts to Trades Applications
- D-3 Read Drawings and Specifications
- D-4 Use Codes, Regulations, and Standards
- D-5 Use Manufacturer and Supplier Documentation
- D-6 Plan Projects

**Line E – Electrical Fundamentals**

- E-1 Describe the Basic Principles of Electricity
- E-2 Identify Common Circuit Components and Their Symbols
- E-3 Explain Wiring Connections
- E-4 Use Multimeters

All of these textbooks are available in a variety of formats in addition to print:

- PDF—printable document with TOC and hyperlinks intact
- HTML—basic export of an HTML file and its assets, suitable for use in learning management systems
- Reflowable EPUB—format that is suitable for all screen sizes including phones

All of the self-test questions are also available from BCcampus as separate data, if instructors would like to use the questions for online quizzes or competency testing.

**About This Book**

In an effort to make this book a flexible resource for trainers and learners, the following features are included:

- An introduction outlining the high-level goal of the Competency, and a list of objectives reflecting the skills and knowledge a person would need to achieve to fulfill this goal.
- Discrete Learning Tasks designed to help a person achieve these objectives
- Self-tests at the end of each Learning Task, designed to informally test for understanding.
- A reminder at the end of each Competency to complete a Competency test. Individual trainers are expected to determine the requirements for this test, as required.
- Throughout the textbook, there may also be links and/or references to other resources that learners will need to access, some of which are only available online.
- Notes, cautions, and warnings are identified by special symbols. A list of those symbols is provided below.

## Symbols Legend



**Important:** This icon highlights important information.



**Poisonous:** This icon is a reminder for a potentially toxic/poisonous situation.



**Resources:** The resource icon highlights any required or optional resources.



**Flammable:** This icon is a reminder for a potentially flammable situation.



**Self-test:** This icon reminds you to complete a self-test.



**Explosive:** This icon is a reminder for a possibly explosive situation.



**Safety gear:** The safety gear icon is an important reminder to use protective equipment.



**Electric shock:** This icon is a reminder for potential electric shock.

## Safety Advisory

Be advised that references to the Workers' Compensation Board of British Columbia safety regulations contained within these materials do not/may not reflect the most recent Occupational Health and Safety Regulation. The current Standards and Regulation in BC can be obtained at the following website: <http://www.worksafebc.com>.

Please note that it is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulation pertaining to his/her area of work.

BCcampus  
January 2015

## Disclaimer

The materials in the Trades Access Common Core Open Textbook project are for use by students and instructional staff and have been compiled from sources believed to be reliable and to represent best current opinions on these subjects. These manuals are intended to serve as a starting point for good practices and may not specify all minimum legal standards. No warranty, guarantee or representation is made by BCcampus as to the accuracy or sufficiency of the information contained in these publications. These manuals are intended to provide basic guidelines for trade practices. Do not assume, therefore, that all necessary warnings and safety precautionary measures are contained in this module and that other or additional measures may not be required.

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## Introduction

Workers exposed to hazardous materials may be at risk for many serious health problems, such as kidney or lung damage, sterility, cancer, allergic reactions, or burns. Some hazardous materials can also cause fires or explosions.

Legislation and regulations are in place to reduce injuries or diseases caused by exposure to hazardous materials used in the workplace.

Every person working with or near hazardous products has the right to know the hazards and how to safely use the products.

## Objectives

When you have completed the Learning Tasks in this Competency, you should be able to:

- describe Workplace Hazardous Materials Information System (WHMIS) regulations and the handling of hazardous goods
- identify the hazards associated with hazardous products
- select the appropriate personal protective clothing and equipment to protect yourself when working with hazardous materials

## Resources



You will be required to reference publications and videos available online at:

<http://www.worksafebc.com/>



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## LEARNING TASK 1

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# Explain the hazardous products legislation

The most important concept to remember about handling hazardous material is that you are responsible for your own safety and the safety of others.

## Purpose of WHMIS

The Workplace Hazardous Materials Information System (WHMIS) is Canada's national hazard communication standard. The overall purpose of WHMIS is to help ensure a safer, healthier workplace. WHMIS is also known as the *Right to Know* requirement. Your knowledge about the workplace is your biggest asset in successfully understanding and benefiting from WHMIS.

## Legislation

WHMIS is implemented through a combination of federal and provincial legislation. The main purpose of the federal WHMIS legislation is to require the suppliers of hazardous materials used in the workplace to provide health and safety information about their products as a condition of sale. The main purpose of the provincial WHMIS legislation is to require employers to obtain health and safety information about hazardous materials in the workplace and to pass this information on to workers.

There are a number of pieces of federal legislation that implement WHMIS:

- The **Hazardous Products Act** places duties on suppliers to provide up-to-date labels and safety data sheets (SDSs) to their customers.
- The **Hazardous Products Regulation**, established January 30, 2015, under the amended Hazardous Products Act defines what a hazardous product is and sets the classifications, labelling, and required information to be found on SDSs. This regulation has replaced the previous Controlled Products Regulations (CPR) and the Ingredient Disclosure List.
- The **Hazardous Materials Information Review Act** establishes the Hazardous Materials Information Review Commission, which is the federal agency that rules on claims for exemption from disclosing confidential business information. This Act also defines the type of information a supplier or employer may withhold from a label or SDS.
- The **Hazardous Materials Information Review Regulations** set out the criteria that the commission uses when assessing the validity of a claim for exemption. They also set out the fees for filing a claim for exemption or appealing a decision of the commission.

## Globally Harmonized System

The Globally Harmonized System of Classification and Labelling of Chemicals (GHS) is an internationally agreed-upon system, created by the United Nations. It was designed to replace the various classification and labelling standards used in different countries by using consistent criteria for classification and labelling on a global level. Its development began at the United Nations Rio Conference in 1992.

Many countries have had different systems for classifying and labelling chemical products. Several different systems have existed even within the same country. This situation has been confusing for workers who need to understand the hazards of chemicals in order to work safely. It has also been costly for companies who have to comply with many different systems, and it has also been expensive for governments to regulate and enforce. The goal of GHS is that the same set of rules for classifying hazards and the same format and content for labels and SDSs will be adopted and used around the world.

In December 2011, the Joint Action Plan for the Canada-U.S. RCC was announced. It included a key commitment to “align and synchronize implementation of common classification and labeling requirements for workplace hazardous chemicals within the mandate of the U.S. Occupational Safety and Health Administration (US-OSHA) and Health Canada.”

In Canada on June 19, 2014, legislative amendments to the Hazardous Products Act (HPA), as well as consequential and coordinating amendments to some other federal Acts, including the Hazardous Materials Information Review Act, received Royal Assent. Health Canada then repealed and replaced the Controlled Products Regulations (CPR) with the new regulations to be called the Hazardous Products Regulations (HPR) in order to implement the GHS. These changes would then result in changes to federal, provincial, and territorial occupational health and safety (OHS) legislation and regulations.

WHMIS first came into effect in 1988 through a series of complementary federal, provincial, and territorial laws and regulations. The application of GHS for workplace chemicals in Canada did not fundamentally change the roles and responsibilities for suppliers, employers, and workers in WHMIS, but rather incorporated GHS elements into the existing system which applied the new standardized classification rules, label requirements, and safety data sheet (SDS) formats, synchronizing WHMIS with the mandate of the Joint Action Plan.

For the sake of clarity, the original WHMIS is now referred to as *WHMIS 1988*. The updated version is called *WHMIS 2015*.

## Hazardous products

WHMIS defines a hazardous product as a product that poses a physical or health hazard that meets or exceeds criteria for inclusion in one or more of the 31 WHMIS hazard classes. Some of those hazard classes are further divided into categories, also called *types*. The product suppliers classify these products and assign one or more of the appropriate pictograms (symbols) that must appear on the applicable supplier labels.

WHMIS provides information about many hazardous materials used in the workplace, referred to as *hazardous products*. Under WHMIS, workers have the right to receive information about each hazardous product they use—its identity, hazards, and safety precautions. This information is to be used to reduce exposure to hazardous materials.

## Products not covered by WHMIS

Some hazardous products are covered by other legislation and therefore are either exempt or excluded from WHMIS requirements. They will have labelling and hazard information meeting their legislative requirements. The products excluded from WHMIS are:

- explosives (as defined in the Explosives Act)
- cosmetics, devices, drugs, or foods (as defined in the Food and Drugs Act)
- pest control products (as defined in the Pest Control Products Act)
- consumer products (as defined in the Canada Consumer Product Safety Act)
- wood or products made of wood
- nuclear substances, within the meaning of the Nuclear Safety and Control Act, that are radioactive
- hazardous waste (being a hazardous product that is sold for recycling or recovery and is intended for disposal)
- tobacco and tobacco products (as defined in the Tobacco Act)
- manufactured articles

## Recognition of rights and responsibilities

WHMIS specifies the duties for suppliers, employers, and workers.

### Suppliers

Suppliers of hazardous products must ensure the products are properly classified and provide up-to-date SDSs for all hazardous products they sell or produce. If new significant data becomes available about a product, the supplier must provide an updated SDS within 90 days of becoming aware of the changes. Suppliers must also provide supplier labels on all containers of hazardous products they sell or produce.

### Workers

Workers must know and understand the information on all labels and SDSs. They must use the information they receive through education and training to handle hazardous products safely.

### Employers

Employers must ensure that there is an up-to-date SDS for each hazardous product supplied to the workplace. Copies of supplier and employer SDS must be accessible to employees. The sheets must be placed close to work areas and made available during each work shift. Workers must be taught what to look for in a data sheet, and they must be given an opportunity to become familiar with the information the sheets carry. Employers are responsible for workplace labels when required.

While some products, covered by other legislation, may be exempt from all of the WHMIS requirements employers must still provide education and training on the health effects, safe use, and storage of these products.

## Regulators

WorkSafeBC staff administer WHMIS legislation. This includes providing general information about WHMIS to employers and workers as well as ensuring compliance with both federal and provincial WHMIS legislation.

## Hazardous product classifications

There are two groups of hazardous products: those posing physical hazards and those posing health hazards. The products within these two hazard groups are further divided into hazard classes. A hazardous product may fall into more than one hazard class.

### Physical hazards

The physical hazards group includes the following hazard classes:

- combustible dusts
- corrosive to metals
- flammable aerosols
- flammable gases
- flammable liquids
- flammable solids
- gases under pressure
- organic peroxides
- oxidizing gases
- oxidizing liquids
- oxidizing solids
- pyrophoric gases
- pyrophoric liquids
- pyrophoric solids
- self-heating substances and mixtures
- self-reactive substances and mixtures
- simple asphyxiants
- substances and mixtures which, in contact with water, emit flammable gases
- physical hazards not otherwise classified

**Note:** Explosives are not included in WHMIS 2015 because they are covered by other legislation.

## Health hazards

The health hazards group includes the following hazard classes:

- acute toxicity
- aspiration hazard
- biohazardous infectious materials
- carcinogenicity
- germ cell mutagenicity
- reproductive toxicity
- respiratory or skin sensitization
- serious eye damage/eye irritation
- skin corrosion/irritation
- specific target organ toxicity - single exposure
- specific target organ toxicity - repeated exposure
- health hazards not otherwise classified

**Note:** An environmental hazards group exists in GHS. This group (and its classes) was not adopted in WHMIS 2015 since it is beyond the direct scope of WHMIS legislation (i.e., workplaces). However, you may see the environmental classes listed on labels and SDSs.

## Hazard categories

Within each hazard class there will be at one category or type. Categories use numbers, whereas types use letters. Some hazard classes may have only one category within them. The categories will give the severity of the hazard within the class. For example, a Category 1 oxidizing liquid is more hazardous than a Category 2 oxidizing liquid. In some cases the categories may be broken into subcategories (for example, 1A and 1B); in this case, 1A would be a greater hazard than 1B.

There are some exceptions to the rule of categories identifying the level of hazards severity. For example, for the “Gases under pressure” hazard class, the hazard categories are “Compressed gas,” “Liquefied gas,” “Refrigerated liquefied gas,” and “Dissolved gas.” These categories relate to the physical state of the gas when packaged and do not describe the degree of hazard.



**Now complete the Learning Task Self-Test.**

## Self-Test 1

1. What level of government is responsible for creating WHMIS?
  - a. Federal
  - b. Provincial
  - c. Municipal
  - d. Federal and provincial
  
2. What do the letters in WHMIS stand for?
  - a. Workplace Help Make It Safe
  - b. Worksite Hazard Made Isolated Standards
  - c. Workplace Hazardous Material Information System
  - d. None of the above
  
3. What is WHMIS also known as?
  - a. SDS
  - b. Shop rules
  - c. Hazard labels
  - d. The Right to Know requirement
  
4. Which federal legislation places responsibilities on suppliers to provide up-to-date SDSs with their products?
  - a. Federal Labelling Law
  - b. Hazardous Products Act
  - c. Controlled Substance Act
  - d. The Name It Right requirement
  
5. What does WHMIS call a pure substance or mixture that meets or exceeds criteria for inclusion in one or more of the WHMIS hazard classes?
  - a. Hazardous product
  - b. Dangerous mixture
  - c. Hazardous compound
  - d. Pure problematic substance

Who is responsible for providing up-to-date SDSs on hazardous products they sell or produce?

- e. Owner
  - f. Worker
  - g. Supplier
  - h. Employer
6. Who is responsible for ensuring SDSs are available in the work area for all known hazardous products used?
- a. Owner
  - b. Worker
  - c. Supplier
  - d. Employer
7. Who is responsible for the worker understanding the safe use of hazardous materials?
- a. Owner
  - b. Worker
  - c. Supplier
  - d. Employer
8. Where are SDSs supposed to be found?
- a. Supervisor's truck
  - b. WorkSafeBC officer's truck
  - c. Close to the work area and made available at all times
  - d. In worker's information booklet handed out at orientation
9. What do the letters SDS stand for?
- a. Safe dos and don'ts
  - b. Safety data sheet
  - c. Safer data specifications
  - d. Substance descriptor and safety
10. What are the two groups of hazardous products?
- a. Dusts and metals
  - b. Gases and liquids
  - c. Health and physical hazards
  - d. Oxidizing and respiratory hazards



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## LEARNING TASK 2

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# Describe the key elements of WHMIS

After a hazardous product has been classified, the following three WHMIS elements are used to communicate health and safety information:

1. Labelling
2. Safety data sheets (SDS)
3. Education and training

## Labelling

When a supplier produces or imports a hazardous product for distribution and sale in Canada, that supplier must prepare a label that must be clearly and prominently displayed on the container. These labels are the first alert to users about the major hazards of the product. They also outline basic precautions that should be taken. The label shown in Figure 1 is one example of an acceptable supplier label.

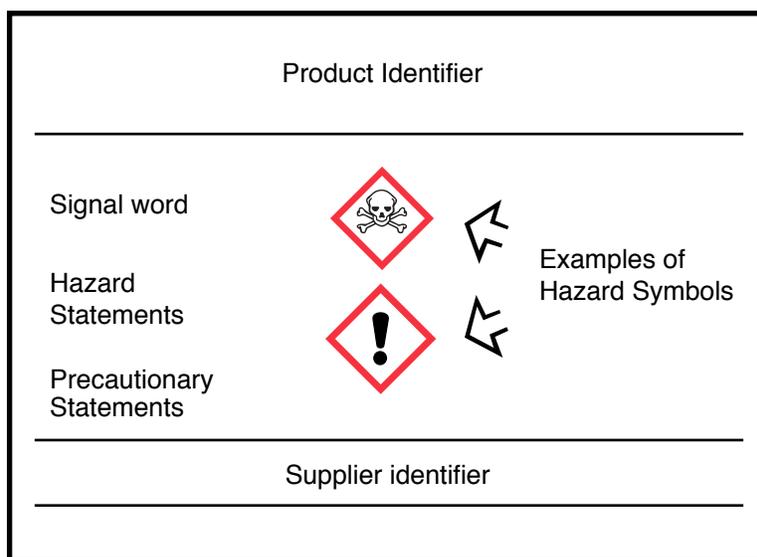


Figure 1 — Supplier label

## Safety data sheets

A safety data sheet is a technical bulletin that provides specific hazard information, safe handling information, and emergency procedures for a hazardous product. Since the SDS contains detailed health and safety information specific to each hazardous product, it should be used as a key source of information for developing training programs and safe work procedures. It is also a valuable reference source of health and safety information for workers, health and safety committees, and emergency service personnel.

## Education and training

The employer provides education and training for workers so that they can work safely with and near hazardous products. Workers need to know how WHMIS works, the dangers of hazardous products in their workplace, and the procedures they must follow to work safely with the products.



Figure 2— WHMIS information flow

Workers should be able to answer these questions for every hazardous product they work with:

- What are the hazards of the product?
- How do I protect myself from those hazards?
- What do I do in case of an emergency?
- Where can I get further information?



Now complete the Learning Task Self-Test.

## Self-Test 2

1. How do suppliers make known the risks and hazards associated with a hazardous product?
  - a. Online courses
  - b. Over-the-counter instructions
  - c. Product labels and technical bulletins
  - d. Suppliers are not required to provide this information.
2. What responsibilities do employers have in the WHMIS program?
  - a. Provide education and training
  - b. Create product labels and technical bulletins
  - c. Employers are exempt from responsibility in the WHMIS program.
  - d. Provide first aid treatment in the case of exposure to hazardous products
3. Which WHMIS element is to be found on a hazardous product received from the supplier?
  - a. SDS
  - b. Product label
  - c. Toll-free help line number
  - d. Occupational health and safety committee notes
4. When working with a hazardous product, what information should a worker know about the product?
  - a. Where to get further information
  - b. The hazards associated with the product
  - c. What to do in case of an emergency
  - d. How to protect yourself from the hazards
  - e. All of the above



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## LEARNING TASK 3

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# Describe the labelling of controlled products

Two types of labels are required by WHMIS: supplier labels and workplace labels. In general, suppliers are responsible for providing supplier labels and *employers are responsible for providing workplace labels* or other means of on-site identification. Employers must also ensure that all labels at their workplace are legible and that they are replaced if damaged.

## Supplier labels

When a supplier produces or imports a product for distribution and sale in Canada, that supplier must prepare a supplier label. Seven items of information must be included within the label border:

1. Product identification: Often the brand name, chemical name, trade name, common name, or generic name of the hazardous product.
2. Initial supplier identifier: The name, address, and phone number of the supplier (manufacturer, distributor, or importer).
3. Hazard pictogram(s): One or more of the nine graphic images indicating the type of hazard(s) the product presents.
4. Signal words: “Danger” is used for high-risk hazards: “Warning” is used for less-severe hazards. If a signal word is assigned to a hazard class and category, only the one signal word corresponding to the class of the most severe hazard should be used on a label. Some hazard classes or categories do not have a signal word assigned to them.
5. Hazard statement(s): Standardized phrases assigned to each hazard class and category that alert workers to the specific hazard(s) of the product. These are short statements, but they describe the most significant hazards of the product.

Some examples of hazard statements are:

- Extremely flammable gas.
  - Contains gas under pressure; may explode if heated.
  - Fatal if inhaled.
  - Causes eye irritation.
  - May cause cancer.
6. Precautionary statement(s): Standardized phrases that describe measures to be taken to minimize or prevent adverse effects resulting from exposure to the product or improper handling or storage. These statements can include instructions about storage, handling, first aid, personal protective equipment, and emergency measures.

Examples of precautionary statements are:

- Keep container tightly closed.
  - Wear protective gloves/protective clothing/eye protection/face protection.
  - If exposed or concerned: Get medical advice/attention.
  - Fight fire remotely due to the risk of explosion.
  - Protect from sunlight.
7. Supplemental label information: May include supplemental information about precautionary actions, physical state, or routes of exposure. Also, if the product is a mixture that contains any ingredients with unknown toxicity in amounts higher than 1 percent, the label must include a statement indicating the percentage of unknown ingredient.

See the example of a supplier label in Figure 1.

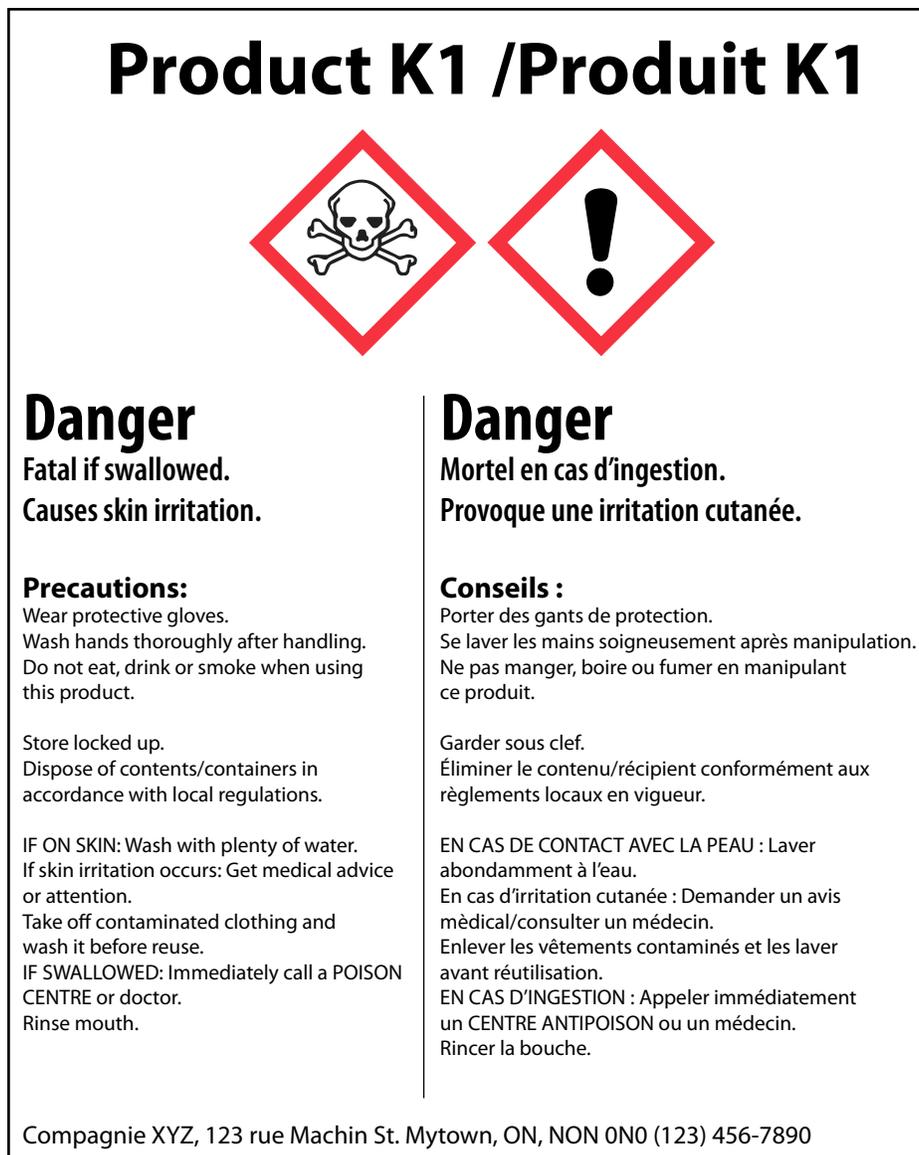


Figure 1 — Example of a supplier label

Additional requirements for supplier labels include:

- Only the above seven information items can be printed within the WHMIS label. Other information, such as directions for use, must be placed outside the WHMIS label.
- The written information must be shown in both English and French.
- The information must be correct and current. Labels need to be updated within 180 days of the supplier being aware of any significant new data. If an employer purchases a product within this 180-day time period, the supplier must inform the employer in writing, of the changes and the date they became available. Employers need to update the existing labels or the information on the containers as soon as the supplier provides the significant new information.
- Colours that conflict with transportation of dangerous goods (TDG) labelling cannot be used. For example, the colour orange cannot be used because it is used by TDG to identify explosives.
- The label must stand out from the container itself and other markings on the container. For example, the size of the label should be appropriate for the size of the container.

As long as a hazardous product remains in its supplier-provided container, the supplier label must remain attached to the container and must be legible.

## Other supplier labels

Some supplier labels may look different from the example shown in Figure 1 because less information is required for controlled products that are:

- in small containers (less than 100 mL)
- chemicals from laboratory chemical suppliers
- laboratory samples
- contained or transferred in a piping system, vessel, or tank

The Transportation of Dangerous Goods Act may require additional labels during transport. For multi-container shipments, a supplier label is not required on the outer container if a TDG label is present. Only the inner containers require supplier labels.

## Workplace labels

Workplace labels are required on containers of hazardous products for any of the following situations:

- A hazardous product is produced and used on-site
- On secondary containers after a product has been transferred from the original container
- On containers where the supplier label is missing or not readable.

Workplace labels provide three types of information:

1. product identifier
2. specific safe handling information and personal protective clothing and equipment required
3. reference to the SDS, if an SDS has been produced by the supplier

The format for workplace labels is fairly flexible. For example:

- The information can be written directly onto the container using a permanent marker.
- The languages used can be chosen to fit the specific workplace.
- The hazard pictograms are optional.

Figure 2 shows an example of a workplace label.



Figure 2 — Workplace label

## Other means of identification

In some circumstances where workplace labels are impractical, employers may use other means of identification such as warning signs, symbols, placards, and coding systems (for example, using colours, numbers, or letters). These can be used as long as the identification system is communicated effectively and understood by workers.

These other means of identification can be used when the product is:

- used in a laboratory (for example, in transfer containers such as beakers and flasks)
- transferred by a worker into a container for use during the same shift if that worker maintains control of the new container and finishes use in that shift
- contained in a transfer or reaction system such as a pipe, reaction vessel, tank car, or conveyor belt
- identified as a hazardous waste produced in the workplace

## Partially exempt products

Products covered by other federal legislation are exempt from federal WHMIS requirements for supplier labels and SDSs. However, provincial WHMIS legislation still applies, and employers must:

- provide workers with hazard information about the product
- educate workers about the hazards of the product
- educate and train workers in the safe use, handling, storage, and disposal of the product

These partially exempt products are:

- some consumer products, such as chemicals and pressurized containers
- cosmetics, medical devices, drugs, and foods (Food and Drugs Act)
- explosives (Explosives Act)
- pesticides (Pest Control Products Act)
- radioactive substances (Nuclear Safety and Control Act)

## Completely exempt products

Products that are completely exempt (sometimes called *excluded*) from both federal and provincial WHMIS legislation are still covered by general provincial occupational health and safety regulations. Workers must still be trained and supervised in the safe handling of these products.

These completely exempt products are:

- wood and products made of wood
- manufactured articles (such as appliances and car batteries)
- tobacco and products made of tobacco
- goods handled, offered for transport, or transported under the Transportation of Dangerous Goods Act
- hazardous wastes (they must be identified at workplaces where they are produced)



**Now complete the Learning Task Self-Test.**

## Self-Test 3

1. What two types of labels are required by WHMIS when handling hazardous products?
  - a. Risk and first aid labels
  - b. SDS and WHMIS labels
  - c. Storage and disposal labels
  - d. Supplier and workplace labels
  
2. What element of a supplier label provides the chemical or trade name of a hazardous product?
  - a. SDS reference
  - b. The hazard pictogram
  - c. The supplier identification
  - d. The product identification
  
3. Which part of the supplier label alerts a worker to specific risks or hazards of a hazardous product?
  - a. Hazard statements
  - b. Hazard pictograms
  - c. Product identification
  - d. Precautionary statement
  
4. Which part of the supplier label advises the worker on immediate treatment for an injury or accident with a hazardous product?
  - a. Hazard statements
  - b. Hazard pictogram
  - c. Product identification
  - d. Precautionary statements
  
5. Which part of the supplier label advises a worker on personal protective equipment when handling a hazardous product?
  - a. Hazard statements
  - b. Hazard pictograms
  - c. Product identification
  - d. Precautionary statements

6. Which part of the supplier label advises the worker, using a series of symbols, of the type of hazards associated with a hazardous product?
  - a. Hazard statements
  - b. Hazard pictograms
  - c. Be careful symbols
  - d. Product identification
7. A supplier label should be large enough and striking enough to jump out at the reader.
  - a. True
  - b. False
8. On the job, if a supplier label is accidentally ripped off a barrel containing a hazardous product, provided all workers are told what's in the barrel, no further action is necessary.
  - a. True
  - b. False
9. To make her job easier, if a worker chooses to handle a hazardous product in an approved smaller container, what is that worker required to affix to that new container?
  - a. SDS
  - b. Supplier label
  - c. Hazard pictogram
  - d. Workplace label
10. Creating a workplace label can be as easy as recording the three types of information with a sharpie on the side of the container.
  - a. True
  - b. False
11. What information must a workplace label provide?
  - a. Producer's address and phone number
  - b. Chemical symbol of hazardous product
  - c. Transportation of dangerous goods reference number
  - d. Safe-handling information, including protective-wear guidelines
12. Workplace labels are intended to be informative and relevant to the job and workers.
  - a. True
  - b. False

13. Workplace labels must include pictograms and the supplier identifier.
  - a. True
  - b. False
  
14. Which of the following products are covered by provincial health and safety regulations but are completely exempt from WHMIS legislation?
  - a. Car batteries
  - b. Wood products
  - c. Tobacco products
  - d. All of the above
  - e. None of the above
  
15. Hazardous waste created on a job site is a major safety concern requiring special training of workers but is exempt from WHMIS.
  - a. True
  - b. False

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## LEARNING TASK 4

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# Describe information to be disclosed on an SDS

A safety data sheet (SDS) is a technical bulletin created by the producer of a hazardous product. An SDS provides specific hazard information, safe handling information, and emergency procedures for a single hazardous product. The SDS is a key part of the WHMIS program as it provides informational support to workers when working with or around a hazardous product.

Since the SDS contains detailed health and safety information specific to each hazardous product, it should be used as a key source of information for developing training programs and safe work procedures. Workers must be trained to understand the basic requirements of an SDS as well as the applicable information in it.

In addition to providing adequate education, employers are responsible for making SDSs available, accurate, and up-to-date for all workers at all times. Employers must ensure that up-to-date SDSs are received for all hazardous products purchased. No SDS on site can be more than three years old unless the employer has written confirmation from the supplier that the SDS hasn't changed.

If the employer produces a hazardous product for use at the workplace, the employer must develop an SDS for that product and make it available to workers. Copies of supplier and employer SDSs must be readily accessible to employees during each work shift.

## SDS sections

The following are the 16 section headings within an SDS and the types of information to be provided in each section.

**Note:** Sections 12 to 15 require the headings to be present, but under Canadian regulations, the supplier has the option to not provide information in these sections.

### Section 1: Identification

This section identifies the product, the manufacturer, and the supplier, and it describes the intended product use. It also provides information about where to contact the manufacturer and supplier for information and/or in case of emergency.

### Section 2: Hazard Identification

This section lists the classification of the hazardous product, hazard pictogram, signal word, hazard statement and precautionary statements for each category or subcategory applicable, and other hazards known to the supplier with respect to the product.

### **Section 3: Composition/Information on ingredients**

This section contains general information on physical and chemical properties such as the chemical name, common name and synonyms, CAS registry number, and any unique identifiers, mixture concentrations, or stabilizing additives.

### **Section 4: Firstaid measures**

This section lists specific instructions for the immediate treatment of a worker who has inhaled or swallowed the product or who has had skin or eye contact with the product.

### **Section 5: Firefighting measures**

This section lists the information for developing strategies and procedures to deal with fire hazards.

### **Section 6: Accidental release measures**

This section includes information on required protective equipment, as well as on how to safely clean up and contain spills.

### **Section 7: Handling and storage**

This section includes information on how to safely handle and store the product.

### **Section 8: Exposure controls/Personal protection**

This section includes information on how to control exposure as well as exposure limit values.

### **Section 9: Physical and chemical properties**

This section includes information on all of the physical and chemical properties of the hazardous product.

### **Section 10: Stability and reactivity data**

This section lists conditions and other substances that should be avoided to prevent dangerous reactions.

### **Section 11: Toxicological information**

This section identifies how the substance enters the body and the possible health effects from single or repeated exposure. It also identifies if the product has any known long-term health effects such as liver or kidney damage, sensitization, cancer, or reproductive effects.

### **Section 12: Ecological information**

This section identifies what short- or long-term effects the substance could have on the environment.

### **Section 13: Disposal considerations**

This section includes information on the safe handling and disposal methods, including any containment packaging required.

### **Section 14: Transport information**

This section includes all of the necessary international shipping information

### **Section 15: Regulatory information**

This section includes any safety, health, and environmental regulations that have been made specific to this product.

### **Section 16: Other information**

This section includes the date of the latest revision of the safety data sheet.

Appendix A shows a sample SDS for chromium acetate hydroxide.



Now complete the Learning Task Self-Test.

## Self-Test 4

1. What information is provided in a material safety data sheet (SDS)?
  - a. Handling guidelines for a group of hazardous products
  - b. Employer responsibilities for handling a hazardous product
  - c. Detailed safety and health information about a single hazardous product
  - d. General safety and health guidelines about a group of hazardous products
2. Which section of an SDS identifies how the hazardous product enters the body, and the possible health effects from single or repeated exposures?
  - a. First aid measures
  - b. Hazard identification
  - c. Handling and storage
  - d. Toxicological information
3. Which section of an SDS identifies the hazardous product, the manufacturer, and the supplier, and describes the product's intended use?
  - a. Ingredients
  - b. Identification
  - c. Toxicological information
  - d. Stability and reactivity data
4. Which section of the SDS lists the specific chemical name and mixture concentrations for the components of the hazardous product?
  - a. Ingredients
  - b. Identification
  - c. Toxicological information
  - d. Stability and reactivity data
5. Which section of the SDS describes the flammability and conditions under which a hazardous product might explode?
  - a. Hazard identification
  - b. Composition/information
  - c. Toxicological information
  - d. Stability and reactivity data

6. Which section of an SDS would describe chemical properties such as specific gravity or the boiling point of a hazardous product?
  - a. Hazard identification
  - b. Firefighting measures
  - c. Accidental release measures
  - d. Physical and chemical properties
  
7. Which section of an SDS would describe either how to clean up a spill or the personal protective clothing and equipment that are required when handling the hazardous product?
  - a. Hazard identification
  - b. Firefighting measures
  - c. Accidental release measures
  - d. Physical and chemical properties
  
8. Which section of an SDS would you refer to if a co-worker got splashed by a hazardous product?
  - a. First aid measures
  - b. Hazard identification
  - c. Handling and storage
  - d. Toxicological information
  
9. Which section of an SDS would you reference to check if the SDS is out of date?
  - a. Identification
  - b. First aid measures
  - c. Other information
  - d. Toxicological information
  
10. Which section of an SDS would you refer for the hazard classification of a hazardous product?
  - a. First aid measures
  - b. Hazard identification
  - c. Handling and storage
  - d. Toxicological information



## LEARNING TASK 5

## Identify pictograms found on WHMIS labels

Pictograms are graphic images that immediately show you what type of hazard a hazardous product presents.

Manufacturers and suppliers classify the products into one or more of the hazard classes and assign one or more of the appropriate pictograms. Pictograms will be on the product supplier labels of the hazardous products as well as on the SDSs.

Workers must recognize the ten hazard pictograms and know what they mean. Most pictograms have a distinctive red border in the shape of a square set on one of its corners. Inside this border is a symbol that represents the potential hazard (e.g., fire, health hazard, corrosive, etc.). With a quick glance, a worker can see, for example, that the product is flammable or if it might be a health hazard.

### Hazard classes, categories, and pictograms

Figure 1 shows each hazard pictogram, its name, hazard description, and the associated hazard classes and categories.

Name/Description	Pictogram	Classes and categories
<b>Flame</b> (for fire hazards)		<ul style="list-style-type: none"> <li>• Flammable gases (Category 1)</li> <li>• Flammable aerosols (Category 1 and 2)</li> <li>• Flammable liquids (Category 1, 2, and 3)</li> <li>• Flammable solids (Category 1 and 2)</li> <li>• Pyrophoric liquids (Category 1)</li> <li>• Pyrophoric solids (Category 1)</li> <li>• Pyrophoric gases (Category 1)</li> <li>• Self-heating substances and mixtures (Category 1 and 2)</li> <li>• Substances and mixtures which, in contact with water, emit flammable gases (Category 1, 2, and 3)</li> <li>• Self-reactive substances and mixtures (Types B*, C, D, E, and F)</li> <li>• Organic peroxides (Types B*, C, D, E, and F)</li> </ul>
<b>Flame over circle</b> (for oxidizing hazards)		<ul style="list-style-type: none"> <li>• Oxidizing gases (Category 1)</li> <li>• Oxidizing liquids (Category 1, 2, and 3)</li> <li>• Oxidizing solids (Category 1, 2, and 3)</li> </ul>

Name/Description	Pictogram	Classes and categories
<p><b>Exploding bomb</b> (for explosion or reactivity hazards)</p>		<ul style="list-style-type: none"> <li>• Self-reactive substances and mixtures (Types A and B*)</li> <li>• Organic peroxides (Types A and B*)</li> </ul>
<p><b>Corrosion</b> (for corrosive damage to metals, as well as skin, eyes)</p>		<ul style="list-style-type: none"> <li>• Corrosive to metals (Category 1)</li> <li>• Skin corrosion/irritation - Skin corrosion (Category 1, 1A, 1B, and 1C)</li> <li>• Serious eye damage/eye irritation - Serious eye damage (Category 1)</li> </ul>
<p><b>Gas cylinder</b> (for gases under pressure)</p>		<ul style="list-style-type: none"> <li>• Gases under pressure (compressed gas, liquefied gas, refrigerated liquefied gas, and Dissolved gas)</li> </ul>
<p><b>Skull and crossbones</b> (can cause death or toxicity with short exposure to small amounts)</p>		<ul style="list-style-type: none"> <li>• Acute toxicity                             <ul style="list-style-type: none"> <li>- Oral (Category 1, 2 and 3)</li> <li>- Dermal (Category 1, 2, and 3)</li> <li>- Inhalation (Category 1, 2, and 3)</li> </ul> </li> </ul>
<p><b>Exclamation mark</b> (may cause less serious health effects or damage the ozone layer)</p>		<ul style="list-style-type: none"> <li>• Acute toxicity - Oral, dermal, inhalation (Category 4)</li> <li>• Skin corrosion/irritation - Skin irritation (Category 2)</li> <li>• Serious eye damage/eye irritation - Eye irritation (Category 2 and 2A)</li> <li>• Respiratory or skin sensitization - Skin sensitizer (Category 1, 1A and 1B)</li> <li>• Specific target organ toxicity - Single exposure (Category 3)</li> </ul>

Name/Description	Pictogram	Classes and categories
<p><b>Health hazard</b> (may cause or suspected of causing serious health effects)</p>		<ul style="list-style-type: none"> <li>• Respiratory or skin sensitization - Respiratory sensitizer (Category 1, 1A, and 1B)</li> <li>• Germ cell mutagenicity (Category 1, 1A, 1B, and 2)</li> <li>• Carcinogenicity (Category 1, 1A, 1B, and 2)</li> <li>• Reproductive toxicity (Category 1, 1A, 1B, and 2)</li> <li>• Specific target organ toxicity - Single exposure (Category 1 and 2)</li> <li>• Specific target organ toxicity - Repeated exposure (Category 1 and 2)</li> <li>• Aspiration hazard (Category 1)</li> </ul>
<p><b>Biohazardous infectious materials</b> (for organisms or toxins that can cause diseases in people or animals)</p>		<ul style="list-style-type: none"> <li>• Biohazardous infectious materials (Category 1)</li> </ul>

Figure 1 — Hazard symbols

*\* Both the flame and explosive pictograms are used for self-reactive substances and mixtures (Type B) and organic peroxides (Type B).*

An environmental hazards group exists in the GHS for products that may cause damage to the aquatic environment. This group (and its classes) were not adopted in WHMIS 2015. However, you may see the environmental pictogram (Figure 2) listed on labels and SDSs.



Figure 2 — Environmental hazard pictogram

## Hazard classes and categories without pictograms

There are hazardous products that meet the criteria for a hazard class or category but whose classes and categories do not require a pictogram. The product label and Section 2 (Hazards Identification) of the SDS still require the signal word, hazard statement(s), and other required label elements.

WHMIS 2015 classes and categories that do not require a pictogram are:

- Flammable gases - Category 2
- Flammable liquids - Category 4
- Self-reactive substances and mixtures - Type G
- Organic peroxides - Type G
- Combustible dusts - Category 1
- Simple asphyxiants - Category 1
- Serious eye damage/eye irritation - Eye irritation - Category 2B
- Reproductive toxicity - Effects on or via lactation



**Now complete the Learning Task Self-Test.**

## Self-Test 5

1. What is the purpose of the hazard pictograms found on WHMIS labels?
  - a. To visually highlight that a hazard exists
  - b. To classify a hazard in one of 31 hazard classes
  - c. To provide personal protective equipment at a glance
  - d. To provide physical and chemical properties at a glance
2. What section of the SDS must include the pictogram?
  - a. First aid measures
  - b. Hazard identification
  - c. Handling and storage
  - d. Toxicological information
3. Which two pictograms are used for the hazard class of organic peroxides (Type B)?
  - a. Flame and corrosion
  - b. Flame and exploding bomb
  - c. Flame and flame over circle
  - d. Exploding bomb and corrosion
4. All hazard classes require a pictogram.
  - a. True
  - b. False

5. Match the correct hazard description to the proper hazard pictogram.

Description		Pictogram
I. _____	Gases under pressure	a. 
II. _____	Fire hazards	b. 
III. _____	Oxidizing hazards	c. 
IV. _____	Can cause death or immediate and serious toxic effects	d. 
V. _____	May cause less serious health effects or damage the ozone layer	e. 
VI. _____	Organisms or toxins that can cause diseases in people or animals	f. 
VII. _____	Can cause corrosive damage to metals, as well as skin, eyes	g. 
VIII. _____	Explosion or reactivity hazards	h. 
IX. _____	Serious health effects	i. 

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## LEARNING TASK 6

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# Explain WHMIS education and training

The third component of WHMIS is worker education and training. The information provided by labels and SDSs will be of little use unless workers can understand it and apply it through training.

## Employer responsibilities

Employers must establish an education program for their workers to ensure that workers understand WHMIS and the hazards of the hazardous products they work with or near. Education programs about WHMIS must be followed up with job-specific training in safe work procedures for handling, storing, and disposing of these hazardous products. Worker representatives or the health and safety committee must be consulted in developing, implementing, and reviewing education and training programs.

## Difference between education and training

WHMIS education explains how WHMIS works, what an SDS is, what information is on a WHMIS label, and other information about WHMIS. WHMIS training refers to hands-on job-specific training. Training shows individuals how to work safely with the hazardous products in a particular workplace.

## Education

Worker education must include instruction in the content, purpose, and significance of workplace and supplier labels and SDSs. Workers can be educated through classroom instruction or by using videos or computer programs. Education courses can be offered on-site by employers, offered through contracted specialized companies, or through continuing studies at a local training facility. WHMIS education can also be completed and tested online.

## Certification

Some industries, such as construction, offer WHMIS “cards” or “certificates” to participants who complete their WHMIS education program. Such cards and certificates are useful for workers who move regularly from site to site, enabling them to prove to new employers that they have attended WHMIS education sessions. However, job-specific training at each work site is still required for all workers who work with or near hazardous products.

## Job-specific training

Employees must be trained in the procedures specific to their workplace. These include:

- which hazardous products they could be exposed to in their workplace
- how to store, handle, use, or dispose of hazardous products in their workplace
- emergency procedures in the event of an accident or spill

## Implementing WHMIS in the workplace

To implement the WHMIS program and develop written safe work procedures, employers make use of supplier labels and SDSs, as well as their own knowledge of the hazardous properties of products and their use in the workplace. Here are the main hazards of the products in the two hazard groups.

### Hazardous properties for the physical hazard classes

This list shows the main concerns for the 18 hazard classes found in the physical hazard grouping.

Hazard class	Hazardous properties
Flammable gases Flammable aerosols Flammable liquids Flammable solids	These classes of products that have the ability to ignite (catch fire) easily. The main hazards are fire or explosion.
Oxidizing gases Oxidizing liquids Oxidizing solids	These classes of products are oxidizers, which may cause or intensify a fire or cause an explosion.
Gases under pressure	This class includes compressed gases, liquefied gases, dissolved gases and refrigerated liquefied gases. Compressed gases, liquefied gases, and dissolved gases are hazardous because of the high pressure inside the cylinder or container. The cylinder or container may explode if heated. Refrigerated liquefied gases are very cold and can cause severe cold (cryogenic) burns or injury.
Self-reactive substances and mixtures	These products may react on their own to cause a fire or explosion, or may cause a fire or explosion if heated.
Pyrophoric liquids Pyrophoric solids Pyrophoric gases	These products can catch fire very quickly (spontaneously) if exposed to air.
Self-heating substances and mixtures	These products may catch fire if exposed to air. These products differ from pyrophoric liquids or solids in that they will ignite only after a longer period of time or when in large amounts.
Organic peroxides	These products may cause a fire or explosion if heated.
Corrosive to metals	These products may be corrosive (chemically damage or destroy) to metals.

Hazard class	Hazardous properties
Combustible dust	This class is used to warn of products that are finely divided solid particles. If dispersed in air, the particles may catch fire or explode if ignited.
Simple asphyxiants	These products are gases that may displace oxygen in air and cause rapid suffocation.
Physical hazards not otherwise classified	This class is meant to cover any physical hazards that are not covered in any other physical hazard class. These hazards must have the characteristic of occurring by chemical reaction and result in the serious injury or death of a person at the time the reaction occurs. If a product is classified in this class, the hazard statement on the label and SDS will describe the nature of the hazard.

## Hazardous properties for the health hazard classes

This list shows the main concerns for the 12 hazard classes found in the health hazard grouping.

Hazard class	Hazardous properties
Acute toxicity	<p>These products are fatal, toxic, or harmful if inhaled, following skin contact, or if swallowed.</p> <p>Acute toxicity refers to effects occurring following skin contact or ingestion exposure to a single dose, or multiple doses given within 24 hours, or an inhalation exposure of 4 hours.</p> <p>Acute toxicity could result from exposure to the product itself, or to a product that, upon contact with water, releases a gaseous substance that is able to cause acute toxicity.</p>
Skin corrosion/irritation	Products in this class cause severe skin burns (i.e., corrosion) and/or skin irritation.
Serious eye damage/eye irritation	Products in this class cause serious eye damage (i.e., corrosion) and/or eye irritation.
Respiratory or skin sensitization	<p>A respiratory sensitizer is a product that may cause allergy or asthma symptoms or breathing difficulties if inhaled.</p> <p>A skin sensitizer is a product that may cause an allergic skin reaction.</p>
Germ cell mutagenicity	This class includes products that may cause or are suspected of causing genetic defects (permanent changes (mutations) to body cells that can be passed on to future generations.
Carcinogenicity	This class includes products that may cause or are suspected of causing cancer.
Reproductive toxicity	<p>This class includes products that may damage or are suspected of damaging fertility or the unborn child (baby).</p> <p>Note: There is an additional category that includes products that may cause harm to breast-fed children.</p>

Hazard class	Hazardous properties
Specific target organ toxicity – single exposure	This class covers products that cause or may cause damage to organs (e.g., liver, kidneys, or blood) following a single exposure.  This class also includes a category for products that cause respiratory irritation, drowsiness, or dizziness.
Specific target organ toxicity – repeated exposure	This class covers products that cause or may cause damage to organs (e.g., liver, kidneys, or blood) following prolonged or repeated exposure.
Aspiration hazard	This class is for products that may be fatal if they are swallowed and enter the airways.
Biohazardous infectious materials	These materials are microorganisms, nucleic acids, or proteins that cause or are probable cause of infection, with or without toxicity, in humans or animals.
Health hazards not otherwise classified	This class covers products that are not included in any other health hazard class. These hazards have the characteristic of occurring following acute or repeated exposure and have an adverse effect on the health of a person exposed to it — including an injury or resulting in the death of that person. If a product is classified in this class, the hazard statement will describe the nature of the hazard.

## Written safe work procedures

Employers are required to write safe work procedures as safety guidelines for workers who will handle hazardous products. Safe work procedures address the specific hazards of the hazardous product and how it is safely used in the workplace. The written procedure must contain enough detail to provide clear direction to authorized workers.

The following steps outline the written safe work procedure to be used by authorized workers for clean-up of small spills of acetone (about one litre) for a particular work site.

### Safe work procedure for clean-up of acetone spills

1. Extinguish and control all ignition sources, including electrical services, open flames, and electrostatic discharge.
2. Evacuate workers to the designated safe location.
3. Report the spill to your supervisor.
4. Get the waste containers and spill cart.
5. Put on the respirator, butyl rubber gloves, and safety goggles.
6. Clean up the acetone using chemical absorbent pillows from the spill cart according to the manufacturer's instructions.
7. Do not flush or rinse the spilled acetone into the sewer system.

8. Place used absorbent pillows (containing acetone) in designated waste containers.
9. Dispose of used chemical absorbent pillows according to local waste disposal procedures.

## General precautions when using common hazardous materials

Employers should take note of the following general precautions:

- Some common materials are considered safe to use under normal operation but may change to hazardous materials under certain conditions. These include fresh concrete, pressure-treated wood, contact cement, paints, and cleaners.
- Some substances are flammable as well as toxic. Use products such as contact cement and certain paints that are highly flammable in well-ventilated work areas that contain no open flame.
- Many substances are harmless by themselves, but when combined, they release toxic fumes. Two common household cleaning agents, ammonia and bleach, when mixed together will produce toxic chlorine gas. It is best not to mix any chemicals found on the job site unless you are absolutely certain that the combined mixture will not be harmful.
- Sometimes chemical changes are triggered by heat or radiation. The ultraviolet radiation from a welding operation can transform the vapours of many common solvents into the deadly gas phosgene. Many plastics and vinyl resins are harmless in their normal state but give off a highly toxic smoke when burned.
- Many paints and cleaners come in aerosol cans that use pressure to release their contents. These cans should not be kept near heat or exposed to flames. Empty cans should be disposed of properly, never burned. The containers are explosive and the residual contents are often highly flammable.
- Charges for powder-actuated tools are often used in shops and on construction sites, and are potentially dangerous. These products are supplied in plastic strips or plastic boxes. Live charges that are dropped on the floor or strips discarded with live charges in them can be dangerous. If sweepings and garbage are burned on the site, the charges will explode when heated, which could injure anyone near the fire.



Here are some links to additional WorkSafeBC documents:

**WHMIS at Work**

<https://www.worksafebc.com/en/resources/health-safety/whmis/whmis-work-2015>

**WHMIS video series**

<https://www.worksafebc.com/en/resources/health-safety/videos/whmis/overview-1-of-5>



Now complete the Learning Task Self-Test.

## Self-Test 6

1. Who is responsible, under WHMIS legislation, for the education and training of workers who will handle hazardous products?
  - a. The worker
  - b. The supplier
  - c. WorkSafeBC
  - d. The employer
  
2. What key resources are used to create on-site WHMIS education and training?
  - a. WorkSafeBC guidelines and policies
  - b. Supplier labels and SDSs found on site
  - c. WHMIS education the workers missed at their last job
  - d. Occupation health and safety regulations and guidelines relating to all work sites
  
3. Which of the following best describes the need for job specific WHMIS training?
  - a. Workers need a break and a WHMIS training day is just that.
  - b. WHMIS is to be taught again and again or the workers never learn.
  - c. Companies aren't required by law to provide training, so it is optional.
  - d. Specific awareness of hazardous products workers may handle on site.
  
4. What are the common main hazards for flammable gases, aerosols, liquids, and solids?
  - a. Oxidizers that may cause or intensify a fire or cause a fire or explosion.
  - b. The ability to ignite (catch fire) easily, and the main hazards are fire or explosion
  - c. May react on their own to cause a fire or explosion, or may cause a fire or explosion if heated
  - d. These products can catch fire very quickly (spontaneously) if exposed to air.
  
5. Under certain conditions such as combustion, the hazard potential of many commonly found materials can change, posing a new threat to the health and safety of workers.
  - a. True
  - b. False
  
6. Safe work procedures written by the employer should be very general in scope and avoid overly detailed information.
  - a. True
  - b. False

## Answer Key

### Self-Test 1

1. d. Federal and provincial
2. c. Workplace Hazardous Material Information System
3. d. The Right to Know requirement
4. b. Hazardous Products Act
5. a. Hazardous product
6. c. Supplier
7. d. Employer
8. b. Worker
9. c. Close to the work area and made available at all times
10. b. Safety data sheet
11. c. Health and physical hazards

### Self-Test 2

1. c. Product labels and technical bulletins
2. a. Provide education and training
3. b. Product label
4. e. All of the above

### Self-Test 3

1. d. Supplier and workplace labels
2. d. The product identification
3. a. Hazard statements
4. d. Precautionary statements
5. d. Precautionary statements
6. b. Hazard pictograms
7. a. True
8. b. False
9. d. Workplace label

- 10. a. True
- 11. d. Safe-handling information, including protective-wear guidelines
- 12. a. True
- 13. b. False
- 14. d. All of the above
- 15. a. True

**Self-Test 4**

- 1. c. Detailed safety and health information about a single hazardous product
- 2. d. Toxicological information
- 3. b. Identification
- 4. a. Ingredients
- 5. d. Stability and reactivity data
- 6. d. Physical and chemical properties
- 7. c. Accidental release measures
- 8. a. First aid measures
- 9. c. Other information
- 10. b. Hazard identification

**Self-Test 5**

- 1. a. To visually highlight that a hazard exists
- 2. b. Hazard identification
- 3. b. Flame and exploding bomb
- 4. b. False

5.

Description		Pictogram
I. e	Gases under pressure	a. 
II. a	Fire hazards	b. 
III. g	Oxidizing hazards	c. 
IV. d	Can cause death or immediate and serious toxic effects	d. 
V. i	May cause less serious health effects or damage the ozone layer	e. 
VI. b	Organisms or toxins that can cause diseases in people or animals	f. 
VII. f	Can cause corrosive damage to metals, as well as skin, eyes	g. 
VIII.c	Explosion or reactivity hazards	h. 
IX. h	Serious health effects	i. 

**Self-Test 6**

1. d. The employer
2. b. Supplier labels and SDSs found on site
3. d. Specific awareness of hazardous products workers may handle on site.
4. a. The ability to ignite (catch fire) easily, and the main hazards are fire or explosion
5. b. True
6. b. False

# Appendix A—Sample Safety Data Sheet for Chromium Acetate Hydroxide

<b>SIGMA-ALDRICH</b>		<small>sigma-aldrich.com</small>
		<b>Safety Data Sheet</b>
		<small>Version 4.1 Revision Date 10/23/2010 Print Date 02/08/2011</small>
<b>1. PRODUCT AND COMPANY IDENTIFICATION</b>		
Product name	: Chromium(III) acetate hydroxide	
Product Number	: 318108	
Brand	: Aldrich	
Product Use	: For laboratory research purposes.	
Supplier	: Sigma-Aldrich Canada, Ltd 2149 Winston Park Drive OAKVILLE ON L6H 6J8 CANADA	Manufacturer : Sigma-Aldrich Corporation 3050 Spruce St. St. Louis, Missouri 63103 USA
Telephone	: +19058299500	
Fax	: +19058299292	
Emergency Phone # (For both supplier and manufacturer)	: 1-800-424-9300	
Preparation Information	: Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956	
<b>2. HAZARDS IDENTIFICATION</b>		
<b>Emergency Overview</b>		
<b>WHMIS Classification</b>		
	Not WHMIS controlled.	Not WHMIS controlled.
<b>GHS Classification</b>		
Acute toxicity, Inhalation (Category 4)		
Acute toxicity, Dermal (Category 4)		
Acute toxicity, Oral (Category 4)		
Skin irritation (Category 2)		
Eye irritation (Category 2A)		
Specific target organ toxicity - single exposure (Category 3)		
<b>GHS Label elements, including precautionary statements</b>		
Pictogram		
Signal word	Warning	
Hazard statement(s)		
H302 + H312	Harmful if swallowed or in contact with skin.	
H315	Causes skin irritation.	
H319	Causes serious eye irritation.	
H332	Harmful if inhaled.	
H335	May cause respiratory irritation.	
Precautionary statement(s)		
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.	
P264	Wash skin thoroughly after handling.	
P270	Do not eat, drink or smoke when using this product.	
P271	Use only outdoors or in a well-ventilated area.	
P280	Wear protective gloves/ eye protection/ face protection.	
P301 + P312	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.	
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P302 + P352 P304 + P340	IF ON SKIN: Wash with plenty of soap and water. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.		
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a POISON CENTER or doctor/ physician if you feel unwell.		
P312	Specific measures (see supplemental first aid instructions on this label).		
P322	Rinse mouth.		
P330	If skin irritation occurs: Get medical advice/ attention.		
P332 + P313	If eye irritation persists: Get medical advice/ attention.		
P337 + P313	Take off contaminated clothing and wash before reuse.		
P362	Store in a well-ventilated place. Keep container tightly closed.		
P403 + P233	Store locked up.		
P405	Dispose of contents/ container to an approved waste disposal plant.		
P501			
<b>HMIS Classification</b>			
<b>Health hazard:</b>	0		
<b>Flammability:</b>	0		
<b>Physical hazards:</b>	0		
<b>Potential Health Effects</b>			
<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.		
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.		
<b>Eyes</b>	May cause eye irritation.		
<b>Ingestion</b>	May be harmful if swallowed.		
<b>3. COMPOSITION/INFORMATION ON INGREDIENTS</b>			
Formula	: C <sub>14</sub> H <sub>23</sub> Cr <sub>3</sub> O <sub>16</sub>		
Molecular Weight	: 603.31 g/mol		
CAS-No.	EC-No.	Index-No.	Concentration
<b>Chromium(III) acetate hydroxide</b>			
39430-51-8	254-447-3	-	-
<b>4. FIRST AID MEASURES</b>			
<b>General advice</b> Consult a physician. Show this safety data sheet to the doctor in attendance.			
<b>If inhaled</b> If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.			
<b>In case of skin contact</b> Wash off with soap and plenty of water. Consult a physician.			
<b>In case of eye contact</b> Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.			
<b>If swallowed</b> Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.			
<b>5. FIRE-FIGHTING MEASURES</b>			
<b>Conditions of flammability</b> Not flammable or combustible.			
<b>Suitable extinguishing media</b> Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.			
<b>Special protective equipment for fire-fighters</b> Wear self contained breathing apparatus for fire fighting if necessary.			
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**Hazardous combustion products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Chromium oxides

**Explosion data - sensitivity to mechanical impact**

no data available

**Explosion data - sensitivity to static discharge**

no data available

**6. ACCIDENTAL RELEASE MEASURES****Personal precautions**

Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

**Environmental precautions**

Do not let product enter drains.

**Methods and materials for containment and cleaning up**

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

**7. HANDLING AND STORAGE****Precautions for safe handling**

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.

**Conditions for safe storage**

Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

Contains no substances with occupational exposure limit values.

**Personal protective equipment****Respiratory protection**

For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Eye protection**

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin and body protection**

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Hygiene measures**

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

**Specific engineering controls**

Use mechanical exhaust or laboratory fumehood to avoid exposure.

<b>9. PHYSICAL AND CHEMICAL PROPERTIES</b>	
<b>Appearance</b>	
Form	powder
Colour	green
<b>Safety data</b>	
pH	no data available
Melting/freezing point	no data available
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available
<hr/>	
<b>10. STABILITY AND REACTIVITY</b>	
<b>Chemical stability</b>	
Stable under recommended storage conditions.	
<b>Possibility of hazardous reactions</b>	
no data available	
<b>Conditions to avoid</b>	
no data available	
<b>Materials to avoid</b>	
Strong oxidizing agents	
<b>Hazardous decomposition products</b>	
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Chromium oxides	
<hr/>	
<b>11. TOXICOLOGICAL INFORMATION</b>	
<b>Acute toxicity</b>	
<b>Oral LD50</b>	
no data available	
<b>Inhalation LC50</b>	
<b>Dermal LD50</b>	
<b>Other information on acute toxicity</b>	
no data available	
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<p><b>Skin corrosion/irritation</b> no data available</p> <p><b>Serious eye damage/eye irritation</b> no data available</p> <p><b>Respiratory or skin sensitization</b> no data available</p> <p><b>Germ cell mutagenicity</b> no data available</p> <p><b>Carcinogenicity</b> IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.</p> <p><b>Reproductive toxicity</b>  no data available</p> <p><b>Teratogenicity</b> no data available</p> <p><b>Specific target organ toxicity - single exposure (Globally Harmonized System)</b> Inhalation - May cause respiratory irritation.</p> <p><b>Specific target organ toxicity - repeated exposure (Globally Harmonized System)</b> no data available</p> <p><b>Aspiration hazard</b> no data available</p> <p><b>Potential health effects</b>  <table border="0"> <tr> <td><b>Inhalation</b></td> <td>May be harmful if inhaled. May cause respiratory tract irritation.</td> </tr> <tr> <td><b>Ingestion</b></td> <td>May be harmful if swallowed.</td> </tr> <tr> <td><b>Skin</b></td> <td>May be harmful if absorbed through skin. May cause skin irritation.</td> </tr> <tr> <td><b>Eyes</b></td> <td>May cause eye irritation.</td> </tr> </table> </p> <p><b>Signs and Symptoms of Exposure</b> To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.</p> <p><b>Synergistic effects</b> no data available</p> <p><b>Additional Information</b> RTECS: Not available</p> <hr/> <p><b>12. ECOLOGICAL INFORMATION</b></p> <p><b>Toxicity</b> no data available</p> <p><b>Persistence and degradability</b> no data available</p> <p><b>Bioaccumulative potential</b> no data available</p> <p><b>Mobility in soil</b> no data available</p> <p><b>PBT and vPvB assessment</b></p>	<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.	<b>Ingestion</b>	May be harmful if swallowed.	<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.	<b>Eyes</b>	May cause eye irritation.	<p style="text-align: right;">Page 5 of 6</p>
<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.								
<b>Ingestion</b>	May be harmful if swallowed.								
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.								
<b>Eyes</b>	May cause eye irritation.								

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<p>no data available</p> <p><b>Other adverse effects</b></p> <p>no data available</p>		
<p><b>13. DISPOSAL CONSIDERATIONS</b></p> <p><b>Product</b> Offer surplus and non-recyclable solutions to a licensed disposal company.</p> <p><b>Contaminated packaging</b> Dispose of as unused product.</p>		
<p><b>14. TRANSPORT INFORMATION</b></p> <p><b>DOT (US)</b> Not dangerous goods</p> <p><b>IMDG</b> Not dangerous goods</p> <p><b>IATA</b> Not dangerous goods</p>		
<p><b>15. REGULATORY INFORMATION</b></p> <p><b>DSL Status</b> This product contains the following components listed on the Canadian NDSL list. All other components are on the Canadian DSL list.</p> <table border="0"> <tr> <td>Chromium(III) acetate hydroxide</td> <td>CAS-No. 39430-51-8</td> </tr> </table> <p><b>WHMIS Classification</b> Not WHMIS controlled. Not WHMIS controlled.</p> <p>This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.</p>	Chromium(III) acetate hydroxide	CAS-No. 39430-51-8
Chromium(III) acetate hydroxide	CAS-No. 39430-51-8	
<p><b>16. OTHER INFORMATION</b></p> <p><b>Further information</b> Copyright 2010 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.</p>		
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