WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS), PESTICIDE, VETERINARY DRUG AND MEDICATED FEED

Awareness Manual

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MANUAL VERSION 2.0

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Foreword

This manual is designed to support your understanding of WHMIS, as well as hazards relating to pesticides, veterinary drugs, and medicated feed products. Injuries and illnesses that result from exposures to hazardous products can be serious, however, they can also be prevented. By understanding the hazards of the products that you use, you will be able to take measures to protect yourself and others.

Any time you are working with a hazardous product, you should be able to answer these key questions before you begin:

- **What are the hazards of the product that I am going to use?**
- **What is protecting me from the hazards of this product?**
- **What do I do if an emergency/incident involving this product occurs?**
- **Where can I get more information?**

(Canadian Centre for Occupational Health and Safety, 2015, p.1)

DID YOU KNOW?

On January 4, 2023 there were amendments to the Hazardous Products Regulations in Canada. These changes were made to further align with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

A three year transition period, ending on December 14, 2025, was put in place to allow suppliers, employers, and workers time to adjust to these changes.

Should you have any questions or require additional support, *please reach out to AgSafe Alberta directly by emailing us at* ***info@agsafeab.ca***

About This Manual

The Workplace Hazardous Materials Information System (WHMIS), Pesticide, Veterinary Drug and Medicated Feed Awareness Manual and Course is for workers who directly handle hazardous products, individuals who work in or near areas with hazardous products, and those who supervise these individuals. This manual in combination with the course will support your farm in achieving the awareness component of this training.

This course covers the following modules:

1. OVERVIEW
2. WHMIS
3. PESTICIDES
4. VETERINARY DRUGS AND MEDICATED FEEDS
5. FIRST AID FOR CHEMICAL EXPOSURES

MODULE

1

Overview

At the end of this module, participants will:

1. Be familiar with the key roles and responsibilities of worksite parties
2. Know the difference between acute toxicity and chronic toxicity
3. Be introduced to the different types of legislation that cover various types of products and substances

EVERYONE IS RESPONSIBLE FOR SAFETY

Part 1 of the Alberta Occupational Health and Safety Act outlines the responsibilities of various worksite parties. While there are many worksite parties listed, and you can fall under more than one role at any given time, we will focus on the employer, supervisor, and worker/volunteer as they relate to this course.

Employers are required to:

- Provide competent supervisors and safety equipment
- Educate and train workers who will be exposed, or are likely to be exposed, on the hazards and safe use of hazardous products
- Inform workers of all the health and safety hazards at the job site and how to control them
- Ensure hazardous products are identified and properly labelled
- Provide quick and easy access to current SDSs for hazardous products and make those SDSs readily available to various workplace parties
- Develop job procedures and safe work practices for the use, handling, storage and disposal of hazardous products on the farm
- Develop emergency response procedures for incidents involving these products
- Investigate serious injuries & incidents and potentially serious incidents (PSIs)
- Work with the health and safety committee or representative, if applicable
- Meet other Occupational Health and Safety (OHS) legislated requirements

Supervisors are required to:

- Do everything reasonable (due diligence) to ensure the health and safety of the workers they supervise on the job
- Inform workers about the hazards of the products they are working with, the control measures in place to manage those hazards, and the job procedures and safe work practices relating to the tasks and products they will be working with or near
- Ensure hazardous products within their work area or responsibility are labelled and stored properly
- Ensure current SDSs for their work area or within their responsibility are easily accessed by workers and other worksite parties
- Make sure all workers have the proper training and equipment (e.g., tools, personal protective equipment, etc.) for the work they are expected to do
- Know and communicate workers health and safety rights and responsibilities
- Ensure workers are following procedures and safe work practices relating to these products; correct workers and provide coaching or additional training when they are not

Workers/volunteers are required to:

- Participate in and apply WHMIS and other farm specific training to their work
- Know where safety data sheets can be found and use them
- Follow the instructions found on product labels and in SDSs, job procedures and safe work practices
- Work safely and report unsafe work practices and conditions
- Follow health and safety procedures and use the required safety equipment and personal protective equipment
- Ask their supervisor for help or training if they are unsure about how to use or handle a hazardous product
- Inform their supervisor if they have anything going on that could affect their ability to work safely

(Adapted from the Government of Alberta, 2021, p.12-15)

Occupational Health and Safety Act: Assigns obligations, responsibilities and duties to individuals and organizations.

Roles: Positions that are held by various people on the farm.

Responsibilities: The tasks or duties that people in the various roles are expected to complete as a function of their job.

DID YOU KNOW?

Supplier and manufacturer responsibilities will vary depending on the type of product (e.g., cleaning product, pesticide, anti-parasitic, etc.) and the legislation that governments it.

The Alberta Occupational Health and Safety Act does contain a section that outlines some supplier responsibilities. Three responsibilities worth highlighting include:

- Ensuring that any substance they supply is safe to use, when used as directed by the manufacturer.
- Ensuring that any harmful substance they supply comes with a written copy of the manufacturers specifications and instructions for same use as applicable.
- Provide notice to the employer when they become aware of a harmful substance that was supplied, or is about to be supplied, which does not comply with a standard prescribed under the Occupational Health and Safety Regulations or Code.

(Government of Alberta, 2021, p.15-16)

Basic Rights of Workers

Workers have basic rights that employers must ensure. These rights are:

- **The right to know.** Workers have the right to be informed of work site hazards and the means to eliminate or control these hazards.
- **The right to participate.** Workers have the right to meaningful participation in the health and safety activities that relate to their work and the workplace. This right includes the ability to communicate their health and safety concerns.
- **The right to refuse.** Workers have the right to refuse work that poses a serious and immediate threat to their health or safety.
- **The ability to work without being subject to disciplinary action for exercising a right or fulfilling a duty** outlined in the Alberta Occupational Health and Safety Act, Regulations, or Code.

(Government of Alberta, 2021, p.11)

HAZARDOUS SUBSTANCES

How Chemicals Enter The Body

In order for a product to cause harm to someone, it must first come into contact with or enter their body. This property of being harmful and the level of harm it can cause is referred to as toxicity, and the four main ways that chemicals enter a body (called **routes of entry)** are:

- **Inhalation (breathing)**

  Most common way that chemicals enter the body.

- **Absorption/Skin or Eye Contact**

  Some chemicals can pass through our skin and enter our blood stream.

  Some chemicals can enter our bodies through our eyes.

- **Swallowing (eating or drinking)**
- **Injection**

  Such as when a pressurized liquid in a hydraulic line escapes through a pinhole, the force of the liquid can break the skin and enter the body.

Inhalation

Absorption

Swallowing

Injection

Acute Toxicity

Toxicity is a property of a substance being harmful to a living thing and the level of harm it can cause. As you continue through this course, you will need to understand what acute toxicity and chronic toxicity are.

Acute toxicity are the immediate health effects after being exposed to a toxic product. Effects can come from a single exposure, or several exposures over a short period of time.

Acute toxicity can:

- Develop within minutes or a few days following an exposure
- Cause rapid, potentially fatal, health effects
- Result in acute poisoning after a person has become sensitized to a product after repeated exposures

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Acute Toxicity: Immediate health effects after being exposed to a toxic product. The effect can come from a single exposure, or several exposures over a short period of time, such as over a 24-hour period or within four hours of inhalation.

Toxic Substance: Any substance that can cause injury or illness, or one that is suspected of being able to cause injury or illness under some conditions.

Toxicity: The property of a substance being harmful to a living thing and the level of harm it can cause.

Routes of Entry: The ways that a chemical enters the body, such as through inhalation, ingestion, absorption and injection.

Acute toxicity is measured in three ways:

LD stands for Lethal Dose. The LD_{50} is the amount of a substance that when given all at once to a group of test animals, kills 50% (half) of them.

LC stands for Lethal Concentration. The LC_{50} number refers to the concentration of a chemical in the air or in water which will kill 50% of a group of test animals. The LC_{50} can be shown as:

- Parts per million by air (ppm) volume for gas and vapors
- Micrograms of material per liter of air (micro-g/L)

KEY POINTS TO REMEMBER

- The smaller the LD_{50} number, the more toxic the substance.
- The LD_{50} is a guide to acute toxicity only.
- The LD_{50} or LC_{50} may vary significantly between different types of test animals (e.g., rats, rabbits, dogs, pigs, etc.).

NOTE

A sensitizer is a chemical that causes an allergic reaction in skin or lung tissue after repeated exposures. Once sensitized, individuals can have severe reactions to further exposures, even if the amount they are exposed to is very small.

Chronic Toxicity

Chronic toxicity and its effects tend to develop over a period of time, often as the result of long-term exposure to a particular product over weeks, months or years. Chronic toxicity can also refer to a continual or persistent adverse health effect that is the result of a short-term exposure to a toxic product.

For some chronic toxicity hazards, there is no known safe amount to which a person can be exposed. Toxic effects will also vary by age, health, weight, route of exposure, severity of exposure, etc.

Chronic Toxicity: Adverse effects that result from repeated doses or exposures to a substance over a relatively long period of time.

Sensitizer: A substance that causes an allergic reaction in skin or lung tissue after repeated exposures.

PRACTICAL APPLICATION

Employers must ensure that everyone working on their farm has received adequate training in the products, procedures and safe work practices for each product they will use in addition to being deemed competent to perform these tasks.

It is the workers responsibility to apply their training, follow procedures and safe work practices, and ask their supervisor questions when they don't understand something. You should always remember to:

- Check the label on the product that you intend to use; ensure there is a readable label and that it is the right product.
- Read the label before use and follow the instructions on the label. Review the safety data sheet (SDS) and apply the information found in it accordingly.
- If you are unsure about any part of the products use, storage or handling, ask your supervisor.
- Obtain a new label when the old one becomes difficult to read or starts to fall off.
- Never use a product that is not labelled.
- Ensure that you receive education and training for the hazardous products that you will be working directly with or near.

KEY POINTS TO REMEMBER

It is an employer's responsibility to review product information before work begins to ensure that the correct handling procedures, storage methods and hazard controls are in place to eliminate or reduce hazards.

General Handling Information

When using any hazardous product, remember to:

- **Check the label, package insert and/or SDS** for information about the hazards and necessary precautions you will need to take.
- **Understand your farm's emergency procedures** and know what you are to do in an emergency.
- **Always practice good personal hygiene;** wash your hands:
  - After handling
  - Before smoking, eating or drinking
  - Before going to the toilet
- **If personal protective equipment (PPE) is needed, be sure you have the correct training** in its selection, use, fit, and maintenance.

Safety Data Sheet (SDS): A document that contains detailed information about a product. Its purpose is to inform users on what the hazards of the product are, how to use the product safely, how to recognize symptoms of exposure, and what to do in the event of an incident.

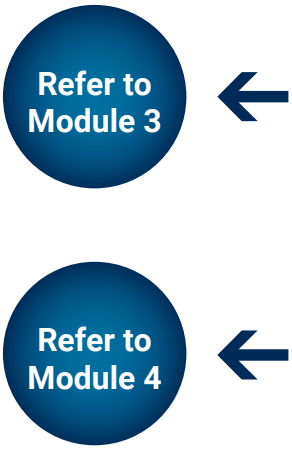
Personal Protective Equipment (PPE): Equipment worn by workers to minimize exposure and protect against hazards in the workplace; examples include respirators, ear muffs, and chemical aprons.

LEGISLATION AND PRODUCTS NOT COVERED BY WHMIS

- Both federal and provincial legislation apply to the Workplace Hazardous Materials Information System (WHMIS).
- The Hazardous Products Act and Hazardous Products Regulations belong to federal legislation. This legislation is aimed at the suppliers, manufacturers and importers of hazardous products and addresses how hazardous products are classified in Canada. This is where the standards for product classification, labels, pictograms, signal words, precautionary statements, hazard statements and safety data sheets (SDSs) are established.
- The Occupational Health and Safety Act, Regulations and Code are provincial legislation. It is the Act that establishes the expectation that an employer will take every reasonable measure to protect the health and safety of those present at the workplace and the Code creates minimum standards for health and safety practices in workplaces.
- Part 29 of the Alberta Occupational Health and Safety Code is provincial legislation that addresses WHMIS in workplaces. Sections apply to many topics, such as training, labelling, availability of safety data sheets, etc.
- WHMIS only covers products that are classified as being hazardous in the Hazardous Products Regulation. There may be other products on your farm that are potentially harmful but are covered by other legislation. These products use different methods to communicate their hazardous properties, for example, they may use different types of labels or symbols (e.g., pesticides). Employers must still provide workers with information on the hazards of these types of products found in their workplace and ensure that workers are educated on how to safely work with and around them.

Products Covered Under Other Legislation

Product	Government Department or Agency
Dangerous Goods	• Transportation of Dangerous Goods (TDG) Directorate • Transport Canada
Explosives	• Explosives Safety and Security Branch • Natural Resources Canada
Fertilizers	• Canadian Food Inspection Agency • Agriculture and Agri-food Canada
Hazardous Waste	• Alberta Environment • Environment Canada
Nuclear Substances	• Canadian Nuclear Safety Commission
Pesticides	• Environmental Protection and Enhancement Act (Alberta) • Pest Management Regulatory Agency • Health Canada
Radioactive Substances	• Radiation Protection Bureau • Health Canada
Veterinary Drugs	• Veterinary Drugs Directorate (VDD) • Health Canada



Golden Rules of Hazardous Products

The golden rules of hazardous products apply to every potentially hazardous product that you have on your farm, whether it is a cleaning product, a pesticide, or a veterinary drug.

Being familiar with the product, its hazards, and controlling these hazards appropriately is key to staying safe and healthy.

It is also important to know that the ingredients of a product that you have used for years can change (and in turn, so can the hazards of that product) without you realizing it, which makes it even more important to read the label and safety data sheet regularly:

1. **BEFORE BUYING** the hazardous product.
2. **BEFORE USING** the hazardous product.
3. **BEFORE STORING** the hazardous product.
4. **BEFORE DISPOSING** of the hazardous product.

Ideally, your farm will also have a health and safety management program that has a component addressing chemical management.

MODULE

2

WHMIS

At the end of this module, participants will:

1. Be able to explain in general terms what the Workplace Hazardous Materials Information System (WHMIS) is and its purpose.

2. Be able to describe how labels, safety data sheets and worker education and training help make a workplace safer.

3. Learn the differences between a Supplier Label and a Workplace Label and their applications.

4. Understand the purpose of safety data sheets (SDSs) and become familiar with the types of information found within them.

5. Become familiar with the Hazard Groups, Hazard Classes and Pictograms used in WHMIS.

INTRODUCTION

Canada uses the Workplace Hazardous Materials Information System (WHMIS) to classify chemicals and communicate their hazards. Countries across the world regulate chemicals differently and because of this Canada has aligned with the Globally Harmonized System (GHS) for the Classification and Labelling of Chemicals.

Aligning WHMIS with GHS has resulted in such positive changes as:

- Better and consistent hazard information.
- Improved communication of the hazards and hazard severity.
- Greater support of emergency response efforts.
- Stronger promotion of safe handling and use.
- The physical hazard criteria match Transport of Dangerous Good (TDG) regulations.
- A standardized and more detailed safety data sheet format.

The purpose of GHS is to support consistent, uniform hazard communication.

This is achieved by:

- Using the same set of rules to classify hazards.
- Standardized safety data sheet (SDS) format and product information.
- Standardized product labels.

KEY POINTS TO REMEMBER

For the GHS system to work effectively, it relies on two key parts:

Classification: Standardized classification of hazardous products into hazard classes and categories according to the set of rules created in the GHS.

Communication: Standardized communication of hazard and precautionary information through the use of labels and SDSs.

(United Nations, 2011, p.5)

Benefits of Using the Globally Harmonized System (GHS)

1. Better and consistent hazard information
2. Promotes regulatory efficiency
3. Supports emergency response efforts
4. Supports trade between countries
5. Promotes safe handling and use
6. Promotes compliance with hazard communication

(Canadian Centre for Occupational Health and Safety, 2017, p.6-7)

Globally Harmonized System of Classification and Labelling of Chemicals (GHS): A globally recognized system created to support consistent hazard communication by using the same set of rules to classify hazards, as well as keeping the same format and information that is to be included on safety data sheets (SDS) and product labels worldwide.

Safety Data Sheet (SDS): A document that contains detailed information about a product. Its purpose is to inform users on what the hazards of the product are, how to use the product safely, how to recognize symptoms of exposure, and what to do in the event of an incident.

Workplace Hazardous Material Information System (WHMIS): A system used in Canada to classify hazardous products and communicate their specific hazards in the workplace.

WHMIS ON YOUR FARM

Canadian workplaces are required to have a WHMIS program in place and to make certain that workers are trained and knowledgeable in it. Both federal and provincial legislation calls for workplaces to meet certain WHMIS requirements. These requirements ensure that workers are aware of the hazardous products used on the farm, understand the hazards of these products, and know how to work safely with them.

The key parts of WHMIS are:

1. **Hazard Identification and Product Classification**
   - Identifies the products physical hazards, health hazards, and environmental hazards
   - Shows what hazard classes and hazard categories apply to the product
2. **Labels**
   - Supplier labels
   - Workplace labels
3. **Safety Data Sheets (SDSs)**
   - Must be easy to access (readily available)
   - 12 mandatory sections
   - 4 optional sections
4. **Worker Education and Training**
   - General (generic) WHMIS education
   - Workplace-specific training
   - Ensuring education and training is effective and documented

DID YOU KNOW?

Under WHMIS, suppliers (e.g., manufacturers, distributors and importers) are required to:

- Classify products they sell or import according to their hazards and the WHMIS criteria.
- Provide current, WHMIS compliant labels and SDSs for these products. This includes updating them when products change, or new data becomes available.

(Government of Canada, 2023 and Alberta Occupational Health and Safety Act, 2023, s.6(1)(s))

General vs. Workplace-Specific WHMIS Training

WHMIS training is an important part of safety on any farm. Everyone who performs work on your farm (including volunteers) is required to have WHMIS training, however, those who work with or near hazardous products must receive workplace-specific training as well. It is important to ensure that your farm team has all the training they will need.

GENERAL WHMIS TRAINING		WORKPLACE-SPECIFIC TRAINING
• Hazard Groups, Classes and Categories • Pictograms • Signal Words • Hazard Statements • Precautionary Statements • WHMIS Training Requirements • Worksite and Supplier Labels • Safety Data Sheets	**VS.**	• Product Inventory • Hazard identification • Engineering Controls (e.g., ventilation) • Safe Work Practices • Safe Operating Procedures • PPE Requirements • Emergency Response Procedures • First Aid Procedures • Spill and Release Procedures • Storage and Handling • Disposal Procedures

HAZARD CLASSIFICATION AND LABELLING SYSTEM

In order to understand WHMIS, you must first understand each of its basic elements. These elements are:

- Hazard Groups
- Hazard Classes
- Hazard Categories
- Pictograms
- Signal Words
- Hazard Statements
- Precautionary Statements

(Canadian Centre for Occupational Health and Safety, 2015, p.11)

Hazard: Any source of possible damage, harm, danger or negative health effect on someone or something.

Label: A piece of material, such as paper or plastic, that is attached to the container or package of a hazardous product and which provides information about it.

HAZARD GROUPS

WHMIS identifies two major groups of hazards, these are **physical hazards** and **health hazards.** Each hazard group includes hazard classes that have specific properties, however, it is important to remember that some hazardous products can belong to both hazard groups.

- The **physical hazard group** has hazard classes based on the physical or chemical properties of the product (e.g., flammable or corrosive).
- The **health hazard group** includes classes that can cause a health effect (e.g., being acutely toxic, causing sensitization, causing cancer, etc.).

Physical Hazard Symbols

No Symbol: Some hazard classes and some of the less hazardous categories do not have an assigned pictogram.

Any Symbol: Any Symbol: Products with physical hazards that are not classified in any of the already established hazard classes can be classified as Physical Hazards Not Otherwise Classified (PHNOC) and can be represented by an appropriate physical hazard symbol.

Multiple Symbols: Categories 1 & 2 of the Chemicals under pressure hazard class use both the Flame and Gas cylinder pictograms.

Health Hazard Symbols

No Symbol: Some of the less hazardous categories do not have an assigned pictogram.

Any Symbol: Products with health hazards that are not classified in any of the already established hazard classes can be classified as Health Hazards Not Otherwise Classified (HHNOC) and can be represented by an appropriate health hazard symbol.

HAZARD CLASSES

Each hazard group is divided into several hazard classes. There are 19 physical hazard classes, 12 health hazard classes, and two environmental classes defined by GHS. Key points to remember are:

- WHMIS has adopted the physical hazards group and health hazards group only.
- Hazard classes describe the type of hazard present.

Hazard Groups and Hazards Classes

PHYSICAL HAZARDS GROUP	HEALTH HAZARDS GROUP	ENVIRONMENTAL GROUP
• Explosives* • Flammable Gases • Aerosols • Oxidizing Gases • Gases Under Pressure • Flammable Liquids • Flammable Solids • Self-Reactive Substances and Mixtures • Pyrophoric Liquids • Pyrophoric Solids • Self-Heating Substances and Mixtures • Substances and Mixtures Which, in Contact With Water, Emit Flammable Gases • Oxidizing Liquids • Oxidizing Solids • Organic Peroxides • Corrosive to Metals • Combustible Dusts • Simple Asphyxiants • Physical Hazards Not Otherwise Classified • Chemicals Under Pressure	• Acute Toxicity • Skin Corrosion/Irritation • Serious Eye Damage/Eye Irritation • Respiratory or Skin Sensitization • Germ Cell Mutagenicity • Carcinogenicity • Reproductive Toxicity • Specific Target Organ Toxicity—Single Exposure • Specific Target Organ Toxicity—Repeated Exposure • Aspiration Hazard • Biohazardous Infectious Materials • Health Hazards Not Otherwise Classified	• Hazardous to The Aquatic Environment* • Hazardous to The Ozone Layer*

** This group is not mandatory in Canada, but you may see these identified on labels or SDSs.*

(Canadian Centre for Occupational Health and Safety, 2024)

DID YOU KNOW?

While you may see the explosives hazard class and the environmental hazard classes identified in your workplace, WHMIS does not use or follow these hazard classes.

Hazard Categories

Each hazard class has at least one category in it, and each category can be broken down further into sub-categories or types.

The hazard category tells you what the degree of the hazard is for that product. The lower the category number, the greater the hazard. Category 1 will always be the highest level of hazard, where categories 2 or 3 within the same class have a lower degree of hazard.

(Canadian Centre for Occupational Health and Safety, 2015, p.31)

Some hazard classes will only have one category (e.g., corrosive to metals), where others can have many (e.g., acute toxicity). Categories can also be identified using letters, for example, A is a greater hazard than B. The numbering (or lettering) system used by the hazard category gives you an idea about the level of precautions and control measures that you will need to take.

	Number System	Letter System	Number System with Letter SubCategories/Types
Highest Hazard	Category 1	Category A	Category 1
	Category 2	Category B	Category 1A
	Category 3	Category C	Category 1B
	Category 4	Category D	Category 2
Lowest Hazard	Category 5	Category E	Category 2A

Hazard Category Comparison
Below is an example of two seemingly similar products that use the same pictograms. When you look at the hazard categories, however, you can see that gasoline is more hazardous than diesel.

	HAZARDOUS PRODUCT	
	Diesel	**Gasoline**
Pictogram		
Physical Hazard Group Example	Flammable Liquids Category 3	Flammable Liquids Category 1
Health Hazard Group Example	Carcinogenicity Category 2	Carcinogenicity Category 1A

Hazard Category Exceptions

The **Gases under pressure class** contains 4 categories which do not identify the degree of hazard, but instead tell you the type of hazard present. These categories are:

- Compressed gas
- Liquified gas
- Refrigerated gas
- Dissolved gas

The **Reproductive toxicity** class has categories 1 and 2 which relate to the effects on fertility or the unborn baby. It also has an additional, separate category called “Effects on or via lactation”.

(Canadian Centre for Occupational Health and Safety, 2015, p.14)

Hazard Pictograms

Pictograms are special symbols used to show what kind of hazard is present. Hazard classes or categories are assigned a hazard pictogram.

Pictograms have a diamond shape (or a "square on point") border that is solid red in color. Within this border is a symbol that represents the potential hazard. The only exception to this is the biohazardous infectious material symbol which has a round black circle for a border.

Exploding bomb
(for explosion or reactivity hazards)

Gas cylinder
(for gases under pressure)

Flame
(for fire hazards)

Corrosion
(for corrosive damage to materials as well as skin, eyes)

Flame over circle
(for oxidizing hazards)

Skull and crossbones
(very toxic material that can cause illness/death with small amounts and short exposures)

Health hazard
(for materials that may cause or are suspected of causing serious health effects)

Exclamation mark
(for materials that may cause less serious health effects or damage to the ozone layer*)

Environment*
(for materials that may cause damage to the aquatic environment)

Biohazardous Infectious Materials
(for organisms or toxins that can cause diseases in people or animals)

* The GHS System includes an Environmental hazards group, however, this group and its classes were not adopted. You will likely see the environmental classes listed on product labels and SDSs as this is permitted by WHMIS.

(Canadian Centre for Occupational Health and Safety, 2015, p.15)

Signal Words

A signal word is used to alert you to a potential hazard and the level of hazard (or severity) associated with a product.

- **Danger:** Used for high risk or severe hazards
- **Warning:** Used for low risk or less severe hazards

Some hazard classes and categories do not have a signal word assigned to them. If a signal word has been assigned to a hazard class or category of a product, it must be included on the products label.

(Canadian Centre for Occupational Health and Safety, 2015, p.17)

Hazard Statements

Hazard statements are short, standardized sentences used to describe the most serious hazards of a product. Each hazard class and category have assigned hazard statements and the wording of the hazard statement helps to describe the severity of the hazard; for example, using the hazard statement “May cause cancer” is a more serious warning statement than “Suspected of causing cancer”.

EXAMPLES

Common hazard statements you might see include:

- Pressurized container: may burst if heated
- Flammable gas
- Causes eye irritation
- Fatal if swallowed
- Harmful if inhaled
- May cause cancer
- May cause or intensify fire; oxidizer
- May cause harm to breast-fed children

Precautionary Statements

Precautionary statements tell you how to prevent or minimize the harmful effects of the product. It is common for these statements to give directions for storage, handling, personal protective equipment, first aid, and emergency response.

These statements are standardized, and their use will reflect the hazard level of the product. The five types of precautionary statements are:

- General
- Prevention
- Response
- Storage
- Disposal

(Canadian Centre for Occupational Health and Safety, 2015, p.17)

EXAMPLES

Common precautionary statements you might see include:

- Do not eat, drink or smoke when using this product.
- Wear protective gloves/protective clothing/eye protection/face protection.
- Protect from sunlight.
- Wear protective gloves, protective clothing, and eye protection.
- If swallowed: immediately call a poison center.
- In case of fire: use CO_2, dry chemical or foam to extinguish.

Hazard Statements: Standardized phrases which describe the nature of the hazard posed by a hazardous product.

Pictogram: Graphic images that immediately show the user of a hazardous product what type of hazard is present.

Precautionary Statements: Standardized phrases that communicate information on how to prevent or minimize the harmful effects of the product.

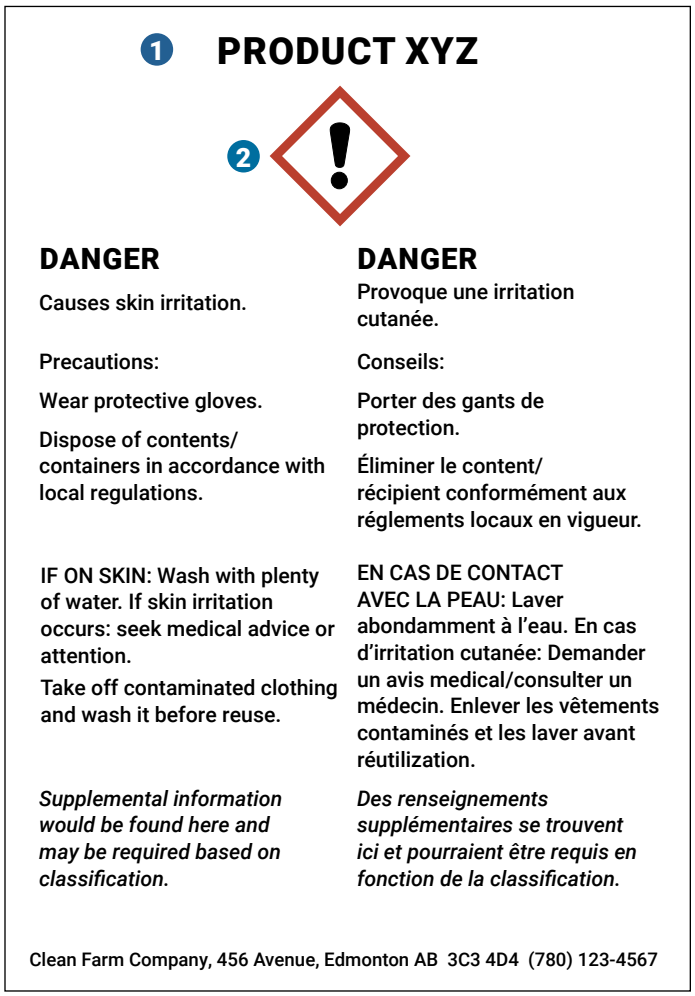
Signal Word: A word used to alert the reader to a potential hazard and to indicate the severity of the hazard.

Labels

Labels are an important part of communicating hazards. They tell the user about the most serious hazards of the product and outline steps that should be taken in order to work safely with the product. The elements that are used in combination to make up a label were covered earlier in this manual (e.g., signal word, hazard statements, precautionary statements and pictograms). There are two types of labels that you will see in a workplace; these are **supplier labels** and **workplace labels**.

Supplier Labels

Supplier labels must be available in both English and French. Hazardous ingredients may or may not be listed on the label as suppliers are given this choice. A supplier label is required to have the following elements:



1. **Product Identifier:** name of the product
2. **Pictograms:** the symbols that represent the hazard class. Sometimes, no pictogram is required.
3. **Signal Word:** a word used to alert the reader to a potential hazard and to indicated the severity of the hazard.
4. **Hazard Statement(s):** Short, standardized sentences used to describe the most serious hazard(s) of a product.
5. **Precautionary Statements(s):** standardized phrases that communicate information on how to prevent or minimize the harmful effects of the product.
6. **Supplemental Information:** This information may be required based on the products classification (for example, if it contains ingredients with an unknown toxicity). Supplemental information may also include hazards not included in the GHS, physical state, routes of exposure, and even precautionary actions.
7. **Initial Supplier Identifier:** the name, address, and telephone number of either the Canadian manufacturer or the Canadian importer.

(Canadian Centre for Occupational Health and Safety, 2015, p.19)

DID YOU KNOW?

The precautionary statements that you read on the label of a product will likely not identify all of the precautionary measures that you will need to take. This is just another reason why checking the SDS prior to using a product is so important!

Workplace Labels

Workplace labels are used when you transfer a product from its original container into a new container, when a product is made and used on-site, and when the supplier label is missing or is not readable.

Workplace labels must have:

1. A product identifier that is identical to that found on the SDS for the product.
2. Information for the safe handling of the product.
3. A reference to the SDS.

(Alberta Occupational Health and Safety Code, 2023, s.394.1(c))

Other Ways to Identify Hazardous Products

In some situations, there are other means of identifying hazardous products that may be used so long as everyone in the workplace has received appropriate training and education on them. These methods may include warning signs, placards, symbols and coding systems.

EXAMPLE

A farm might identify a hazardous product inside a system by placing a label on a section of pipe indicating the name of the product in it.

Label: A piece of material, such as paper or plastic, that is attached to the container or package of a hazardous product and which provides information about it.

Supplier Label: A label provided by a supplier of a hazardous product that meets the requirements of the Hazardous Products Act.

Workplace Label: A label used at the workplace, commonly when a product is transferred into a new container or the supplier label can no longer be read and meets the requirements of WHMIS and provincial legislation.

Safety Data Sheets (SDSs)

Suppliers of hazardous products create Safety Data Sheets (SDSs) which give the user more detailed information than can be found on the product label. This includes information on what types of personal protective equipment to use, how to store the product, and even what emergency response measures to take in the event of an exposure or spill.

SDSs follow the format outlined under the GHS system. A GHS SDS has 16 standard sections and the required information must always be in the same section. As some of the SDS sections can be technical, it is important that you ask your supervisor if you don't understand something.

In Canada, the SDSs and labels must be updated when the product changes or significant new data becomes available.

(Canadian Centre for Occupational Health and Safety, 2015, p.23)

DID YOU KNOW?

It is acceptable for a supplier to provide an SDS to the purchaser of the hazardous product either in a hard copy form (e.g., a printed copy sent by mail), or by electronic means (e.g., e-mail attachment or USB).

It is not acceptable for a supplier to provide a purchaser with a website address or hyperlink where they may download the SDS for the product that they purchased.

(Canadian Centre for Occupational Health and Safety, 2023)

NOTE

SDSs must be "readily available" to everyone in the workplace:

- They must be easy to get at and not locked away someplace.
- SDSs may be stored in a binder or electronically on a computer (that is, not accessed via the internet).
- Regardless of how SDSs are kept and made available on the farm, everyone must be trained on how to read them, where to find them and how to access them.

Safety Data Sheet (SDS): A document that contains detailed information about a product. Its purpose is to inform users on what the hazards of the product are, how to use the product safely, how to recognize symptoms of exposure, and what to do in the event of an incident.

The 16 SDS sections and the type of information in them can be found in the table below.

SDS Section and Heading	Specific Informaton Elements
1. Identification	• Product identifier (e.g. product name) • Other means of identification (e.g. product family, synonyms, etc.) • Recommended use • Restrictions on use • Canadian supplier identifier+ • Name, full address and phone number(s) • Emergency telephone number and any restrictions on the use of that number, if applicable++

2. Hazard Identification	• Hazard classification (class, category or subcategory) of substance or mixture or a description of the identified hazard for Physical or Health Hazards Not Otherwise Classified
	• Label elements:
	  • Symbol (image) or the name of the symbol (e.g., flame, skull and crossbones)
	  • Signal word
	  • Hazard statement(s)
	  • Precautionary statement(s)
	• Other hazards which do not result in classification (e.g., molten metal hazard)

3. Composition/Information on Ingredients	• When a hazardous product is a material or substance:
	  • Chemical name
	  • Common name and synonyms
	  • Chemical Abstract Service (CAS) registry number and any unique identifiers
	  • Chemical name of impurities, stabilizing solvents and/or additives*
	• For each material or substance in a mixture that is classified in a health hazard class**:
	  • Chemical name
	  • Common name and synonyms
	  • CAS registry number and any unique identifiers
	  • Concentration
	Note: Confidential business information rules can apply

4. First-Aid Measures	• First-aid measures by route of exposure:
	  • Inhalation
	  • Skin contact
	  • Eye contact
	  • Ingestion
	• Most important symptoms and effects (acute or delayed)
	• Immediate medical attention and special treatment, if necessary

5. Fire-Fighting Measures	• Suitable extinguishing media • Unsuitable extinguishing media • Specific hazards arising from the hazardous product (e.g., hazardous combustion products) • Special protective equipment and precautions for fire-fighters

SDS Section and Heading	Specific Informaton Elements
6. Accidental Release Measures	• Personal precautions, protective equipment and emergency procedures • Methods and materials for containment and cleaning up
7. Handling and Storage	• Precautions for safe handling • Conditions for safe storage (including incompatible materials)
8. Exposure Controls / Personal Protection	• Control parameters, including occupational exposure guidelines or biological exposure limits and the source of those values • Appropriate engineering controls • Individual protection measures (e.g., personal protective equipment)
9. Physical and Chemical Properties	• Appearance (physical state, colour, etc.) • Odour • pH • Melting point/Freezing point • Initial boiling point/boiling range • Flash point • Evaporation rate • Flammability • Lower flammable/explosive limit • Upper flammable/explosive limit • Flash point • Vapour pressure • Relative vapour density • Density and relative density • Solubility • Partition coefficient - n-octanol/water • Auto-ignition temperature • Decomposition temperature • Kinematic viscosity • Particle characteristics
10. Stability and Reactivity	• Reactivity • Chemical stability • Possibility of hazardous reactions • Conditions to avoid (e.g., static discharge, shock, or vibration) • Incompatible materials • Hazardous decomposition products

SDS Section and Heading	Specific Informaton Elements
11. Toxicological Information	Concise but complete description of the various toxic health effects and the data used to identify those effects, including: • Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact) • Symptoms related to the physical, chemical and toxicological characteristics • Delayed and immediate effects, and chronic effects from short-term and long-term exposure • Numerical measures of toxicity, including acute toxicity estimates (ATEs)
12. Ecological Information* **	• Ecotoxicity • Persistence and degradability • Bioaccumulative potential • Mobility in soil • Other adverse effects
13. Disposal Considerations* **	Information on safe handling for disposal and methods of disposal, including any contaminated packaging
14. Transport Information* **	• UN number • UN proper shipping name • Transport hazard class(es) • Packing group • Environmental hazards • Transport in bulk, if applicable • Special precautions
15. Regulatory Information* **	Safety, health and environmental regulations specific to the product
16. Other information	Date of the latest revision of the SDS

+The supplier that must be identified on an SDS is the initial supplier identifier (e.g., the name, address and telephone number of either the Canadian manufacturer or the Canadian importer). There are two exceptions to this requirement. 1) In a situation where a hazardous product is being sold by a Canadian distributor, the distributor may replace the name, address and telephone number of the initial supplier with their own contact information. 2) In a situation where an importer imports a hazardous product for use in their own workplace in Canada (e.g., the importer is not selling the hazardous product), the importer may retain the name, address and telephone number of the foreign supplier on the SDS instead of replacing it with their own contact information.

++The emergency telephone number is a telephone number that will allow the caller to get information about the hazardous product. This number does not have to be a Canadian telephone number. Any restrictions on the use of that number must be stated (e.g., days and hours of operation). If the language spoken at the telephone number is neither English nor French, this should be indicated on the SDS as part of the restrictions on the use of the number.

*These impurities and stabilizing products are those that are classified in a health hazard class and contribute to the classification of the material or substance.

**Each ingredient in the mixture must be listed when it is classified in a health hazard class and is present above the concentration limit that is designated for the hazard class in which it is classified or is present in the mixture at a concentration that results in the mixture being classified in any health hazard class.

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

Canadian Centre for Occupational Health and Safety, 2015, p.24-26)

How to Read an SDS

As you read an SDS, remember that it is meant to help you learn about:

- The hazards of the product communicated through hazard pictograms, signal words, hazard statements.
- How to work safely with the product beyond what is found on the label.
- First-aid measures.
- Emergency measures.

(Canadian Centre for Occupational Health and Safety, 2015, p.27)

Since the SDS format is standardized, once you get used to reading them, it will become quick and easy to find important information regardless of the product or which supplier wrote it.

The Four Main Purposes of the SDS

SDSs have four main purposes. These are:

1. Identification

- Section 1 contains product and supplier identification information. Confirm that the SDS that matches the product you are going to be using. Compare the product name, the supplier, etc.
- Section 3 confirms the ingredients and indicates if there are any trade secrets.

2. Hazards

- Section 2 addresses the product hazards (e.g., hazard class or category). It covers the label elements and may list other hazards which did not result in classification, but are important to be aware of.
- Section 10 provides stability and reactivity data, including conditions to avoid and incompatible materials.
- Section 11 provides additional details about health hazards.

3. Prevention

- Section 7 covers storage and handling precautions.
- Section 8 lists protection measures such as personal protective equipment and exposure guidelines.
- Section 13 may list safe handling for waste and disposal advice.

4. Response

- Section 4 provides first aid and treatment information.
- Section 5 addresses steps to take in the event of a fire.
- Section 6 gives precautions to take during a release or spill.

The remaining sections provide supporting information or information on other laws that apply.

- Section 9 lists the physical and chemical properties.
- Section 12 might list any information about potential effects on the environment.
- Section 14 provides information about the product's hazard while in transport.
- Section 15 may list other applicable regulations.
- Section 16 will have other information such as the date the SDS was written, who wrote it, and references.

(Adapted from Canadian Centre for Occupational Health and Safety, 2015, p.27-28)

Always use products as directed by the manufacturer. If you do not, the information in the SDS and on the label may not apply or be adequate. Additionally, the SDS may not provide all the necessary information or be specific enough for your farm (e.g., what type of respirator or cartridges to use). This is where it is important to refer to your farm's job procedures and safe work practices.

DID YOU KNOW?

SDS's need to be kept current. Two good reasons for this are that:

- Product formulations can and do change for many reasons, such as ingredient cost or availability.
- The science around substances and the studies that relate to them are ongoing. This can be seen in the *Occupational exposure limits for chemical substances* in Schedule 1 of the OHS Code; what is found in these tables can change as a result of regular reviews performed by the American Conference of Governmental Industrial Hygienists (ACGIH).

Multi-Hazard Products

Many products will have more than one hazard class. No matter how many hazard classes are listed for a product, you should always review the SDS and label to find out about the potential hazards of that product. The SDS and label will provide you with information on how to safely handle and store products, in addition to other information such as how to address an exposure or fire.

A common multi-hazard product is unleaded gasoline. It can be classified into:

- Flammable Liquid
- Aspiration Hazard
- Carcinogenicity
- Specific Target Organ Toxicity (Repeated Exposure)
- Specific Target Organ Toxicity (Single Exposure)
- Skin Irritation
- Eye Irritation
- Chronic Aquatic Toxicity

NOTE

Suppliers use ***precedence guidelines*** that determine how information should be provided to users when there are multiple hazards. These precedence guidelines attempt to reduce confusion by allowing only the most protective wording to be used in these situations when there are repetitive messages. This is the reason that you will not see a label with both “Danger” and “Warning” on it. “Danger” is considered the most protective wording, so only it will be used. The other hazards and important advice will be understood after you have read the full label and SDS. It is important to remember that some product hazards may not use a pictogram.

(Adapted from Canadian Centre for Occupational Health and Safety, 2015, p.31)

PICTOGRAMS EXPLAINED

Exploding Bomb Pictogram

Even though the explosive class has not been adopted by WHMIS, you will likely see the class identified.

Due to the high risk of severe injury and significant property damage from incidents involving these products, proper training and hazard recognition is essential. The education and training required for these hazard classes are beyond the scope of this manual.

Hazard Classes Using This Symbol:

- Self-reactive substances and mixtures (Types A & B*)
- Organic peroxides (Types A & B*)

* Both the Flame and Explosive pictograms are used for Self-reactive substances and mixtures (Type B) and Organic peroxides (Type B).

DID YOU KNOW?

The explosives hazard class has six categories:

- Unstable explosive
- Division 1.1 (mass explosion hazard)
- Division 1.2 (severe projection hazard)
- Division 1.3 (fire, blast or projection hazard)
- Division 1.4 (fire or projection hazard)
- Division 1.5 (may mass explode in fire)

(United Nations, 2017, p.305)

Flame Pictogram

Flammable hazards are products that can ignite easily and burn quickly. Fire prevention is key when handling these products. Controlling the fuel (that is, the flammable product), keeping the quantities low and eliminating sources of ignition are the primary ways that we are able to handle flammable products safely.

Hazard Classes Using This Symbol:

- Flammable liquids (Category 1, 2 & 3)
- Flammable solids (Category 1 & 2)
- Aerosols (Category 1 & 2)
- Flammable gases (Category 1A & 1B Flammable gas; Category 1A & 1B Chemically unstable gas; Category 1A Pyrophoric gas))
- Pyrophoric liquids (Category 1)
- Pyrophoric solids (Category 1)
- Pyrophoric gases
- Self-heating substances and mixtures (Category 1 & 2)
- Substances and mixtures which, in contact with water, emit flammable gases (Category 1, 2 & 3)
- Self-reactive substances and mixtures (Types B*, C, D, E & F)
- Organic peroxides (Types B*, C, D, E & F)
- Chemicals under pressure (Category 1** & 2**)

* * Both the Flame and Explosive pictograms are used for Self-reactive substances and mixtures (Type B) as well as Organic peroxides (Type B).

** Both the Flame and Cylinder pictograms are used for Chemicals under pressure, categories 1 & 2.

Potential Hazards of Flammable Products

- **Health Hazards:** Flammable products can also be health hazards; for example, they may be toxic, corrosive, skin irritants, etc.
- **Static Electricity:** A static electric charge can occur when transferring a flammable product from one container to another and can act as a source of ignition.
- **Asphyxiation:** Vapors from flammable liquids may be heavier than air and will build up near the ground and other low-lying areas; these vapors take the place of normal air or oxygen and become an asphyxiation (suffocation) hazard.
- **Toxic By-products from Burning:** As flammable products burn, they produce toxic gases and vapors such as carbon monoxide, hydrogen cyanide, nitrogen oxides, etc.
- **Flashback:** Vapors can spread a long distance and be ignited by a spark, flame or other source of heat; once vapors have ignited, the flames can travel back to the source (e.g., container) of the flammable liquid and an explosion or fire can result.
- **Hot Work:** Hot work is a process that involves welding, soldering, brazing, cutting, grinding, drilling, burning or the melting of metals or other substances. These processes are ignition sources.

(Adapted from Canadian Centre for Occupational Health and Safety, 2015, p.36)

KEY POINTS TO REMEMBER

- Fires need fuel, oxygen and heat to burn.
- Properly bond and ground containers where needed to prevent a build up of static charge.
- Use equipment designed for use with flammables (e.g., safety cans, intrinsically safe/ non-sparking equipment).

Flame Over Circle Pictogram

The basic components for a fire are a source of fuel (such as combustibles), a source of oxygen, and a source of ignition. The air around us contains about 21% oxygen. Oxidizers readily give off oxygen or other oxidizing substances that can increase the risk of fire or explosion.

Oxidizers cannot burn on their own, but they can cause:

- A fire to start quickly, burn hotter and burn rapidly
- A substance that would not normally burn in the air to burn very quickly
- Some combustible materials to burn spontaneously without a source of ignition, such as a flame or spark

Hazard Classes Using This Symbol:

- Oxidizing gases (Category 1)
- Oxidizing liquids (Category 1, 2 & 3)
- Oxidizing solids (Category 1, 2 & 3)

Potential Hazards of Oxidizers

- **Health Hazards:** Oxidizers can also have other hazards; for example, they may be toxic or corrosive
- **Incompatible Materials:** Oxidizers are very reactive. NEVER return unused product to the original container, even if it does not appear to be contaminated

(Canadian Centre for Occupational Health and Safety, 2015, p.40)

KEY POINTS TO REMEMBER

- Never return unused material to the original container.
- Keep the product away from combustible materials as they will fuel a fire.
- Use caution when mixing oxidizers with water and always follow the manufacturer's directions; some oxidizers can generate large amounts of heat when they are mixed with water.

Gas Cylinder Pictogram

Countless products containing gases and mixtures of gases are stored under pressure in cylinders.

Hazard Classes Using This Symbol:

- Gases under pressure
  - o Compressed gas
  - o Liquefied gas
  - o Refrigerated liquefied gas
  - o Dissolved gas
- Chemicals under pressure (Category 1**, 2** & 3)

** Both the Flame and Cylinder pictograms are used for Chemicals under pressure, categories 1 & 2.

Potential Hazards of Gases Under Pressure

- Many gases under pressure have other properties, such as being toxic, flammable, corrosive or reactive
- Compressed gases are hazardous because of the high pressure inside the cylinder and gas can be released accidentally from a damaged or leaking valve
- An unsecured cylinder falling over or a broken cylinder valve can cause compressed gas cylinders to become rockets or spin out of control causing significant injury and damage
- Suffocation (Asphyxiation): Inert gases such as argon, helium and nitrogen can cause injury or death by suffocation if they displace the oxygen in a space
- Frostbite: The gases escaping from a cylinder may be very cold and cause frostbite

(Canadian Centre for Occupational Health and Safety, 2015, p.43)

KEY POINTS TO REMEMBER

Let's look more closely at the four hazard categories of gases under pressure:

Compressed Gas

- Compressed gases are also known as non-liquefied, pressurized or permanent gases. These gases do not become liquid when compressed at normal temperatures or even at very high pressures. Examples of compressed gases include oxygen, argon and nitrogen.

Liquefied Gas

- Liquefied gases are gases that can become liquids at normal temperatures when they are inside cylinders under pressure. These gases exist in a liquid-vapor balance that is achieved when a cylinder is nearly full of liquid and gas fills the space above the liquid. As the gas is removed from the cylinder, liquid evaporates to replace it, which maintains a constant pressure in the cylinder. Examples include propane, anhydrous ammonia and butane.

Refrigerated Liquefied Gas

- Refrigerated liquified gases are liquified gases made partially liquid because of their low temperatures. Examples include helium and nitrous oxide.

Dissolved Gas

- A dissolved gas occurs when a gas becomes dissolved in another substance. Acetylene, used in welding processes, is a commonly used dissolved gas. Acetylene on its own is very unstable and dangerous.
- Acetylene gas is added to a cylinder that contains a chemically inactive, absorbent filler and a suitable solvent, such as acetone. When acetylene gas is added to the cylinder, it dissolves in the acetone and becomes a stable solution.

Special Considerations of Gases Under Pressure

- Close all valves when cylinders are not in use
- Properly bond and ground containers where needed to prevent a build up of static charge
- Inspect all cylinders and valves for damage and proper labels; listen for hissing sounds during use and never use if the valve is damaged
- Secure cylinders to a wall or rack in an upright position at all times
- Leave cylinder caps in place until immediately before use
- Use the appropriate regulator for the cylinder contents and pressure; ensure that equipment is compatible with cylinder contents and pressure
- Never use homemade adaptors or force connections between cylinder valve and gas handling equipment
- Never tamper with safety devices on cylinders, valves or equipment
- Never apply any lubricant, jointing compound or tape to cylinder valves, fittings or regulator threads
- Keep fittings free of dirt, rust, oil and grease
- Move cylinders using a hand truck or cart designed for that purpose
- Store compressed gas cylinders securely fastened in the upright position with the cylinder valve protection cap in place
- The storage area should not be above 51.7°C (125°F)
- Do not keep cylinders past the date recommended by the supplier
- Properly and promptly dispose of empty, unused and unlabeled cylinders

Corrosion Pictogram

Corrosive products are products that can chemically damage or destroy steel or aluminum. Strong acids (e.g., hydrochloric acid) and strong bases (e.g., caustic soda and ammonia) can corrode metal as well as our skin and eyes.

Hazard Classes Using This Symbol:

- Corrosive to metals (Category 1)
- Skin corrosion/irritation – Skin corrosion (Category 1, 1A, 1B & 1C)
- Serious eye damage/eye irritation – Serious eye damage (Category 1)

Potential Hazards of Corrosive Products

- Containers may weaken and eventually leak or collapse, spilling the contents
- Corrosives can also damage metal equipment and building components
- Many corrosive products can generate large amounts of heat when mixed with water; always add the corrosive to cold water (do not add water to a corrosive) slowly, in small amounts and carefully stir frequently
- Corrosive products often have additional hazards such as reactivity, flammability, and toxicity
- Corrosives are incompatible with many other chemicals and may result in toxic or explosive products if they come into contact with each other
- Always ensure that the container is suitable for the product being stored

(Canadian Centre for Occupational Health and Safety, 2015, p.46)

KEY POINTS TO REMEMBER

- This pictogram indicates that damage caused by the product is severe and likely cannot be reversed.
- Lower hazard categories for the two health classes (e.g., where skin or eye damage will be healed) will use an exclamation mark pictogram or no pictogram in some cases.
- Use corrosion-resistant equipment (e.g., pumps, scoops, etc.) and containers recommended by the manufacturer or supplier.
- It's good practice to mark the date that the container was received and the date it was first opened.
- Do not reuse empty containers as hazardous residue may remain inside.

Skull and Crossbones Pictogram

Products that use this pictogram are fatal, toxic or harmful when:

Inhaled

Swallowed

Contact

Acute toxicity involves harmful effects on an organism after a single exposure or a short-term exposure. The effects follow skin contact or ingestion to a single dose or multiple exposures within 24 hours or inhalation exposure of 4 hours. Acute toxicity results from exposure to the product itself or a product that releases a gaseous substance when in contact with water.

Hazard Classes Using This Symbol:

- Acute toxicity
  - o Oral (Category 1, 2 & 3)
  - o Dermal (Category 1, 2 & 3)
  - o Inhalation (Category 1, 2 & 3)

Potential Hazards of Acute Toxicity

- Other Health Hazards: Toxic products commonly have other health hazards associated with them
- Other Hazards: Toxic products may also be corrosive, flammable or reactive; always read the label and SDS

(Canadian Centre for Occupational Health and Safety, 2015, p.49)

KEY POINTS TO REMEMBER

- There are many categories within the acute toxicity class.
- There are categories that describe the way a product enters the body, such as:
  - > Oral (eaten, drank)
  - > Dermal (skin contact)
  - > Inhalation (breathed in)
- Wherever possible, eliminate the toxic product; determine if you can substitute it with a less hazardous product.
- Open containers slowly and carefully; do not allow it to spill or become airborne.

Health Hazard Pictogram

This pictogram is used for products that cause chronic health effects and those products with targeted health effects. Chronic health effects result from exposures over a period of time, such as days, months or even years. The effects they cause are long-term, such as cancer or skin and respiratory sensitization. These products may cause targeted health effects on a specific organ system (e.g., nerves, lungs, kidneys or liver) at a single exposure or after repeated exposures.

Hazard Classes Using This Symbol:

- Respiratory or skin sensitization – Respiratory sensitizer (Category 1, 1A &1B)
  - These products may at first result in a person experiencing symptoms similar to a cold or allergies. Continued exposure will cause the symptoms to worsen and can cause chest tightness, shortness of breath, difficulty breathing and/or coughing. A severe attack of these symptoms could result in death.
- Germ cell mutagenicity (Category 1, 1A, 1B & 2)
  - Products in this class can cause permanent changes (mutations) to the cells of your body. These changes may be passed on to future generations.
- Carcinogenicity (Category 1, 1A, 1B, & 2)
  - The products in this hazard class can cause cancer or increase the risk of cancer occurring.
- Reproductive toxicity (Category 1, 1A, 1B & 2)
  - This class of products have a negative impact on the reproductive system, such as causing problems with sexual function and fertility in both males and females. It also covers developmental toxicity in offspring.
- Specific Target Organ Toxicity – Single exposure (Category 1 & 2)
  - Refers to specific, non-lethal toxic effects on target organs occurring after a single exposure to a substance or mixture.
- Specific Target Organ Toxicity – Repeated exposure (Category 1 & 2)
  - Refers to toxic effects on target organs, occurring after repeated exposures to the product.
- Aspiration hazard (Category 1)
  - In the context of WHMIS, *aspiration* means a liquid or solid chemical entering the body directly through the nose or mouth, or indirectly from vomiting into the trachea and lower respiratory system. *Aspiration hazard* means refers to the effects of the chemical, such as chemical pneumonia, pulmonary injury, or death.

Potential Hazards of Products Marked with the Health Hazard Pictogram

- Other Health Hazards: Toxic products commonly have other health hazards associated with them
- Other Hazards: Toxic products may also be corrosive, flammable or reactive; always read the label and SDS

(Canadian Centre for Occupational Health and Safety, 2015, p.52-53)

KEY POINTS TO REMEMBER

- Health impacts from these products may not be immediately noticed.
- For some of these products, there is no known safe amount that a person can be exposed to.

Exclamation Mark Pictogram

Products that use this pictogram have health hazards such as eye irritation, skin irritation and skin sensitization.

Hazard Classes Using This Symbol:

- Acute toxicity – Oral, Dermal, Inhalation (Category 4)
  - Products in this category fit in the LD_{50} or LC_{50} values and are used for products known to be harmful if swallowed, inhaled, or when they come in contact with the skin.
- Skin corrosion/irritation – Skin irritation (Category 2)
  - Products in this category can cause reversible damage such as redness or inflammation.
- Serious eye damage/eye irritation – Eye irritation (Category 2 & 2A)
  - This category includes irritant products that cause reversible effects within 21 days of exposure, or products that are severe skin irritants.
- Respiratory or skin sensitization – Skin sensitizer (Category 1, 1A & 1B)
  - Skin sensitization responses involve symptoms such as itching, swelling, blisters, and redness. Someone may not show any symptoms after the first exposure, however following exposures will cause the skin to react. A common sensitizer includes latex which can be found in medical gloves.
- Specific Target Organ toxicity – Single exposure (Category 3)
  - Products in this category can cause irritating effects on the respiratory tract, such as coughing or throat irritation.

KEY POINTS TO REMEMBER

- Health impacts may not be obvious right away.
- Effects are generally reversible and do not last long if proper medical treatment is received and further exposure is prevented.

Potential Hazards of Products Marked With the Exclamation Mark Pictogram

- Other Health Hazards: Toxic products commonly have other health hazards associated with them.
- Other Hazards: Toxic products may also be corrosive, flammable or reactive; always read the label and SDS.

(Canadian Centre for Occupational Health and Safety, 2015, p.55)

Environmental Pictogram

Products that use this pictogram can negatively impact the aquatic environment. While classifying and labelling products in this category is not mandatory in Canada, suppliers may include these hazards on labels and SDSs should they decide to.

Hazard Classes Using This Symbol:

- **Acute Hazards to the Aquatic Environment** consider short-term toxic impacts on aquatic life forms, such as fish, crustaceans, algae, etc.
- **Chronic Hazards to the Aquatic Environment** consider long-term negative impacts on aquatic life forms. Negative impacts include bioaccumulation (buildup of material in an organism) and degradation (persistence, or how long it will remain in the environment). An example of this type of hazard would be reduced spawning or genetic problems in offspring.

(Canadian Centre for Occupational Health and Safety, 2015, p.57)

KEY POINTS TO REMEMBER

- Classification and labelling of products in this category are not mandatory in Canada.
- Keep loading and unloading areas away from surface water drainage systems where possible; if not, protect drains using covers or sandbags.
- Storage areas should have sills to prevent leaks from escaping into sewers and drains.
- Use secondary containment, such as drip trays, to contain leaks or spills; empty trays regularly to avoid overflow and have spare drip trays available.
- Have spill control procedures and equipment ready (e.g., absorbent spill control materials, PPE, etc.).
- Prevent product from contaminating ground water, surface waters and sewer system; protect floor drains, etc. as appropriate.
- Regularly inspect and maintain equipment used for handling the product.

Biohazardous Infectious Materials Pictogram

Biohazardous infectious materials are organisms, or the toxins these organisms produce, that can cause diseases or illnesses in people or animals. Examples of such diseases or illnesses include severe infections, allergies (allergic diseases) and toxic effects (poisoning).

These materials include bacteria, viruses, fungi and parasites and they can live in body tissues, body fluids (blood, saliva, mucus, urine, etc.) and feces.

Hazard Classes Using This Symbol:

- Only Biohazardous Infectious Materials use this pictogram.

(Canadian Centre for Occupational Health and Safety, 2015, p.58)

KEY POINT TO REMEMBER

- These materials should only be used or handled by individuals who receive specialized training in their hazards and how to control them.

Special Considerations of Biohazardous Infectious Materials

Remember the routes of entry from page 11? Pathogenic microorganisms can enter the human body by passing through damaged skin, settling on mucous membranes, being inhaled or being swallowed.

Contact with soil, clay, plant matter, fur, body fluid or excrement may result in an exposure. Cleaning animal holding areas or working directly with animals should be done carefully, with all necessary precautions being taken, such as the following:

- Relevant biohazard protocols
- Procedures and safe work practices
- Good personal hygiene practices
- Personal Protective Equipment (PPE) recommendations

Zoonotic Diseases

Zoonotic diseases are diseases carried by animals and can be transmitted to humans. Common examples include cat scratch disease (bartonellosis) and ringworm (dermatophytosis).

Ticks and fleas that have been feeding on infected animals can also transmit infections. These infestations are treated to improve animal health and to lower the risk of transmission to humans.

HAZARDOUS PRODUCT GENERAL HANDLING AND STORAGE GUIDELINES

The following are general guidelines only, and it is very important that you refer to the SDS for product specific guidance.

Handling:

- As a best practice, always use the smallest amount possible.
- Check the label and SDS for information about the hazards and necessary precautions for the product you are using.
- Prevent a spill, leak or release of vapour; keep lids or valves closed wherever possible.
- Prevent dusts, mists, or residues from building up on surfaces.
- Avoid contact with skin, clothing, or other surfaces.
- Avoid inhalation of dusts, mists, vapours, etc.
- Use in well ventilated areas.
- Protect containers as directed by the SDS; this can include protection from punctures, impacts, freezing, heating, etc.
- Inspect containers before each use to ensure labels are present and readable, and that the containers are in good overall condition.
- Remove contaminated clothing and other materials carefully; wash or discard as appropriate.
- Do not smoke, eat, or drink in handling or other work areas. Wash hands thoroughly after handling (even if you wore gloves) and before eating, drinking, smoking/vaping, or using the toilet.
- Become knowledgeable about the emergency procedures, spill procedures and before use:
    - > Verify the correct type of fire extinguishers are available, fully charged and easy to access.
    - > Verify there are at minimum two different ways to exit the area in the event of a fire.
    - > Ensure eyewash stations and emergency showers are nearby, easy to get at and ready to use; test and inspect these often.
    - > Ensure your emergency response procedures and equipment easily accessible and ready to use.
- Where personal protective equipment is needed, the farm must make certain that workers are trained in its selection, fit, use, and care.
- Follow all applicable by-laws and regulations (e.g., Fire Codes, Occupational Health and Safety Regulations).

Storage:

- When storing, use appropriate spill containment in case of a leak.
- Inspect containers regularly to ensure labels are present and readable, that the lids are tight, and that the containers are in good overall condition.
- Protect containers as directed by the SDS; this can include protection from punctures, impacts, freezing, heating, etc.
- Store away from incompatible products and materials; these will be listed in the SDS.
- Use storage equipment designed for/appropriate for the material (e.g., flammables should be stored in a grounded flammables cabinet).
- Post warning signs.
- Store away from ignition sources (e.g., heat, sparks, open flames), even if the product may not be flammable, the packaging may be.
- Avoid storing large quantities of products wherever possible.
- Many commonly used products should be stored in a cool, dry, well-ventilated area away from direct sunlight and exits (or the path of travel to an exit).
- Ensure unauthorized individuals, children, pets, and/or livestock cannot access hazardous products or their storage areas.
- Do not smoke, eat, or drink in storage areas. Wash hands thoroughly after working in a chemical storage area.
- Understand and practice emergency procedures and spill procedures;
    - > Verify the correct type of fire extinguishers are available, fully charged and easy to access.
    - > Verify there are at minimum two different ways to exit the area in the event of a fire.
    - > Ensure eyewash stations and emergency showers are nearby, easy to get at and ready to use; test and inspect these often.
    - > Have your emergency response procedures and equipment easily accessible and ready to use.

MODULE

3

Pesticides

At the end of this module, participants will:

1. Understand what a pesticide is and recognize the different types available and their uses.
2. Learn about pesticide formulations, active ingredients, and formulants.
3. Be introduced to pesticide regulations and categories, including pesticide schedules.
4 Review pesticide selection best practices.
5. Learn the importance of, and how to read, a pesticide label.
6. Recognize how pesticides enter the body, the symptoms of an exposure, and how to protect yourself from them.
7. Learn the about the safe storage of pesticides, including treated seed.
8. Explore the effects of pesticides on reproductive health.

INTRODUCTION

Pesticides are substances used for the purpose of preventing or killing pests, and a pest is an unwanted organism, such as a weed, animal, or insect. The use of pesticides on a farm or ranch will vary depending on the type of operation. Understanding how to work with pesticides in a safe and effective manner is important for you, the other people working on your farm, your neighbours, your livestock, and the environment!

The effects of pesticides can be dangerous and improper use or handling can:

- Be harmful to humans
- Contaminate water or soil
- Kill livestock, pets, bees, birds and other animals
- Contaminate food
- Kill crops or other desired plants

(Alberta Government, 2008)

DID YOU KNOW?

Data from the Calgary Health Region's Poison and Drug Information Service reported that 26,614 Albertans were acutely poisoned by pesticides. Of these, 49% were children under the age of six.

(Boyd, 2007, p.8)

RESOURCE

To obtain a Farmer Pesticide Certificate, visit: https://www.alberta.ca/farmer-pesticide-certificate.aspx for more information.

Common Types of Pesticides

INSECTICIDES

Description:

- Organochlorines (not used in North America or Europe)
- Organophosphates and carbamates
- Pyrethroids
- Rotenoids

Examples:

Bug sprays, insect repellents, ant bait, commercial farm sprays, flea shampoos, tick collars and moth balls

HERBICIDES

Description:

- Bipyridyls
- Phosphonomethyl amino acids (glyphosate)
- Chlorophenoxy compounds

Examples:

Weed killers, weed and feed lawn products, stump treatments

FUNGICIDES

Description:

- Dithiocarbamates

Examples:

Rose sprays, commercial farm sprays, treated seeds

FUMIGANTS

Description:

- Phosphine/aluminium phosphide

Examples:

Phostoxin, Gastoxin, Weevilcide

(Canadian Centre for Occupational Health and Safety, 2021)

DID YOU KNOW?

While glyphosate is an organophosphate compound, it is widely used as a herbicide in Canada.

Pesticide: Substances or devices used for the purpose of preventing, repelling, attracting, killing or managing pests.

Pest: An unwanted organism that harms humans, plants or animals; may be an insect, bacteria, fungi, weed, virus, etc.

Pesticide Formulation

Pesticides contain one or more active ingredients and what are called formulants.

Active ingredients are the parts of the pesticide that give it the desired effect or outcome. An active ingredient may be a chemical, but it could also be a bacteria.

Formulants are the other ingredients that make up the pesticide. These ingredients do not have an effect on the pest, but they are often necessary to support or enhance the effects of the active ingredients or do other things like make the pesticide easier to use and last longer.

Pesticide formulations may be solids, liquids or gases. The most commonly used formulations are listed in the following table.

Common Pesticide Formulations

Name and Abbreviation	Description	Advantages	Disadvantages	Typical Use
SOLIDS				
Bait	Pellets or liquid are mixed with an attractive substance. Many are solids, though there are liquid, paste, gel and injectable baits as well.	May be ready to use. Easy to spot treat. Easy to apply.	Children, pets, or wildlife may play with or eat it. Risk to non-target organisms.	Insects, rodents, birds or slugs.
Dry Flowable (DF) or Water Dispersible Granules (WDG)	Made into small pellets or granules. Forms a suspension in water.	Lower inhalation risk. Less dusty than wettable powders.	Spray mix needs constant agitation. Can cause increased wear on nozzles and pumps.	Insects, disease or weed control.
Dust (D)	Fine particles.	Usually ready to use. Simple application equipment.	Easily inhaled. Easily drifts. Even distribution is difficult to achieve. Moisture may cause clumping.	Animal powder or seed treatment.

Common Pesticide Formulations (continued)

Name and Abbreviation	Description	Advantages	Disadvantages	Typical Use
SOLIDS				
Ear Tags/Vapor Strips and Pet Collars (Impregnates}	Solid material that slowly releases vapor.	Ready to use.	Children may want to play with them. May get mishandled or hazards not controlled if treated like regular ear tags.	Animal ear tags. Fly control.
Granules (G)	Dry materials/grains.	Ready to use. Minimal drift. Simple application equipment.	Some dust is produced. Difficult to achieve even distribution. May be eaten by birds/ animals. May require moisture to release active ingredient.	Soil treatment for insect or weed control.
Pellets (P)	Like granules, but have a more uniform shape and weight.	Ready to use. Minimal drift. May be used for spot application.	Some dust is produced. Needs special application equipment. May be eaten by birds/ animals. May require moisture to release active ingredient.	Rodent and slug control.
Soluble Powder (SP)	Dry powder or granules. Dissolves in water to form a spray solution.	Once mixed, does not need agitation.	Dust can be hazardous if inhaled or ingested.	Sprays for weed and insect control.
Wettable Powder (WP or W)	Fine particles form a suspension in water.	Do not dissolve in water. Less likely to be absorbed by skin than emulsifiable concentrates. Easy to store use and handle.	Inhalation risk when handling. Not easy to mix. Needs constant agitation. Increased wear on nozzles and may clog screens or filters.	Sprays for insect, disease and weed control.
Impregnated Fertilizer	Granular fertilizer containing a low amount of herbicide.	Single step application. Low concentration.	Fertilizer may not be required.	Soil application.

Name and Abbreviation	Description	Advantages	Disadvantages	Typical Use
GASES				
Fumigants	Active ingredient is delivered in the form of a gas. May be liquid, or solid.	Toxic to many types of pests and stages of pests. Good penetration of target areas and difficult to reach areas under proper conditions. Often a single treatment is enough.	Highly toxic to non-target organisms. Treated area must be well contained/sealed. Requires special application equipment. May require certain temperatures.	Greenhouses, mushroom houses and graineries. Pre-plant soil treatment.
PACKAGING				
Water-Soluble Packets	Pre-weighed wettable powder (WP) or soluble powder (SP) in a special packaging that dissolves in a spray tank.	Low applicator exposure during mixing and loading. No container to dispose of.	Pre-measured packages may not be the correct amount for the field.	Fungicides, insecticides.
LIQUIDS				
Aerosol (A)	Two main types: 1. Pressurized, ready to use spray cans 2. Non-pressurized fog generators (create fine mist or fog)	Ready to use versions are easy to use and store. Mixing is not usually required. Low concentration of the active ingredient.	Inhalation hazard. Specialized uses. Pressurized container hazards (e.g., if heated or punctured).	Sprays mostly used for home and garden insecticides. Fogs may be used in greenhouses, barns or outdoor mosquito control.
Emulsifiable Concentrate (E or EC)	Milky colored suspension in a spray.	Easy to use and mix. Does not increase wear on nozzles or equipment.	Easy to over or underdose. May be flammable, corrosive, or be absorbed easily though the skin.	Sprays for insect, disease and weed control.
Flowable (F)	Fine particles suspended in a liquid.	Easy to handle. Low exposure risk. Rarely clogs nozzles.	Needs agitation before and after mixing. Increased wear on nozzles. Spills may be harder to clean up.	Sprays for insect, disease and weed control.

Common Pesticide Formulations (continued)

Name and Abbreviation	Description	Advantages	Disadvantages	Typcial Use
LIQUIDS				
Gel	Semi-liquid emulsifiable concentrate. Used with water soluble packaging.	Easy to handle. Low exposure risk. Reduced risk of spills.	Cannot measure amounts smaller than the package size; limited to the package volume. Must be kept dry.	Herbicides and insecticides.
Micro-encapsulated Pesticides (M)	Pesticide is surrounded by a plastic coating that when mixed with water and sprayed, breaks down slowly.	Lower hazard to the applicator. Easy to use. Reduced volatility, odor and phytotoxicity.	Needs agitation. Can be very hazardous to bees. Longer restricted entry times or pre-harvest intervals for more toxic types.	Insecticide and pheromone sprays.
Solution (S)	Dissolved in liquid. Forms a solution that does not settle or separate.	Ready to use options reduce risk of exposure. Easy to mix. Does not increase wear on nozzles.	High concentration of the active ingredient may increase the risk of exposure while mixing.	Sprays for weed control.
Ultra low volume concentrate (ULV)	Very high concentration of active ingredient. Developed for use as is or slightly diluted in ULV equipment.	Little or no mixing. Few products available.	Needs special application equipment.	Insecticide sprays in greenhouses or forestry.

(Adapted from Alberta Government, 2008, p.1-4 & National Association of State Departments of Agriculture Research Foundation, 2014, p.51-62)

KEY POINTS TO REMEMBER

Animal Systemics are a type of pesticide that is applied externally or orally to animals to treat fleas, worms, and other internal parasites. They can be found as pour-on's, sprays, dusts, capsules, food additives, pastes, and liquids.

Active Ingredient: The ingredient in a chemical formulation, such as a pesticide, that produces the intended effect.

Agitation: Using motion to blend the components (ingredients) of a mixture to create a uniform (consistent) product. The type of motion may be a circular motion, a back and forth motion, or a rapid and irregular motion inside of a container.

Emulsifiable: A liquid that cannot be dissolved in or become a uniform mixture with another liquid, but very small droplets of it can be dispersed (scattered) throughout the other liquid. While the two liquids can be mixed, if left alone, they will separate again.

Fluid: A substance without a fixed shape and that flows easily, such as a liquid or a gas.

Formulants: All of the parts or ingredients in a pesticide except the active ingredient.

Micro-encapsulated: A material surrounded by a thin layer of a biodegradable substance that together form a tiny capsule. The material is released as the capsule is broken down, melted or dissolved.

Mixing: The process of combining different materials in a way that produces a uniform (consistent) product.

Mixture: A combination or a solution composed of two or more substances in which they do not react.

Suspension: A uniform mixture of particles in a fluid. When a solid does not dissolve in a liquid, a suspension is formed.

Volatile: A substance that evaporates easily at normal temperatures. A substance that can change state (e.g., from a liquid to a gas) very quickly and unexpectedly.

Pesticide Regulations and Categories

Health Canada's Pest Management Regulatory Agency (PMRA) is responsible for the Pest Control Products Act. The PMRA is responsible for protecting human health and the environment while balancing the needs of the agricultural and forestry sectors. The Pest Control Products Act regulates the products used for the control of pests in Canada.

Federally, pest control products are classified by the intended use and by toxicity into one of four pesticide classes:

- Domestic (household use)
- Commercial (agricultural and industrial use)
- Manufacturer (for use by the manufacturer only)
- Restricted (due to health and safety concerns to humans, plants, animals and/or the environment, these products have additional conditions regarding labelling, distribution, limitations of use and qualifications of the users)

(Queen's Printer for Ontario, 2021)

Provinces and territories may further regulate registered pesticides.

Alberta has the Environmental Protection and Enhancement Act (EPEA) which contains the Pesticide (Ministerial) Regulation; Pesticide Sales, Handling, Use and Application Regulation; and Environmental Code of Practice for Pesticides.

Alberta has further broken the federal classes of pesticides, which are identified on the product label, into four categories based on a pesticides:

- Potential to harm human health
- Potential hazard to the environment
- Label use patterns

These four categories are called the **Pesticide Schedules.**

SCHEDULE 1 PESTICIDES

- Federally labelled restricted and some commercial pesticides.
- Most are fumigants and vertebrate toxicants.
- Can only be sold to genuine farmers, certified applicators and their assistants or pesticide service registration holders.
- Can only be used by genuine farmers and certified applicators.

SCHEDULE 2 PESTICIDES

- Federally labelled agricultural and industrial (commercial) pesticides.
- Can only be sold to genuine farmers, certified applicators and pesticide service registration holders.
- Can only be used by genuine farmers, certified applicators and their assistants or pesticide service registration holders.

SCHEDULE 3 PESTICIDES

- Federally labelled domestic pesticides for use by homeowners.
- May be sold to anyone and used by householders around their own homes.
- If using the pesticides as a service, the applicator must hold a pesticide applicator certificate, or they can be supervised by a certified applicator; this is also required when the pesticides are used in and around multi-family dwellings, day-care facilities, hospitals, nursing homes and schools.

SCHEDULE 4 PESTICIDES

- Federally labelled domestic and commercial pesticides may be sold to and used by anyone.
- These pesticides do not represent a significant risk to people or the environment when used as directed.
- Includes such products as:
  - > Antimicrobial pesticides (e.g., laundry additives, swimming pool chemicals, disinfectants and wood preservatives)
  - > Animal repellents
  - > Insect growth regulators & insect repellents for use on pets and people
  - > Ready-to-use domestic insecticides & pressurized aerosols (e.g., hornet and wasp sprays, ant traps, fly baits and strips, mosquito coils)
  - > Insecticides applied directly to livestock or their enclosures
  - > Metered mist application equipment
  - > Plant growth regulators and pruning paints
  - > Rodenticides that are ready-to-use baits
  - > Diatomaceous earth (silicon dioxide)
- When a product has a certification statement indicated on the label, then the product becomes a Schedule 2 pesticide and follows the requirements of Schedule 2.

(Alberta Government, 2021)

Pesticide Selection Best Practices

Choose the pesticide formulation that will be the most effective while minimizing any potential harmful effects. Always consider:

- The risk to the person applying it, bystanders, and any organisms that are not intended targets of the product
- How harmful it is to the environment and wildlife
- The potential for damage to crops
- The safety equipment and application equipment to be used

(Alberta Government, 2021)

When considering what type of pesticide formulation to use, you will also want to think about the hazards associated with the form it is in.

KEY POINTS TO REMEMBER

- Skin will absorb liquid more easily than it will absorb powder.
- Formulations (e.g., emulsifiable concentrates) may be absorbed more easily than water solutions.
- Some adjuvants may increase the amount of pesticide that sticks to or spreads on the skin, in turn increasing the amount of pesticide absorbed by the skin.
- The smaller the particle size used, the more hazardous it is likely to be.
- A fine dry dust will easily enter the air where it may be breathed in or land on and contaminate nearby surfaces.
- A pellet will produce less dust that can enter the air and reduce the amount that may get breathed in or contaminate nearby surfaces.

Pesticide Risk

"Women who are pregnant or planning a pregnancy, especially those currently engaging in agricultural activities, should be informed of the implications of exposure before conception and during the pre- and peri-natal periods, and assisted in making decisions that are appropriate for their individual work and home situations."

(Roberts, J. R., & Reigart, J. R., 2013)

How Pesticides Work

Pesticides enter the organism's body through ingestion, inhalation or absorption through protective cuticles and cell membranes. Once inside the body, the type of damage it will cause (also called the **mode of action**) may include:

- Destruction of tissues upon contact
- Prevent photosynthesis from occurring
- Paralyze the nervous system of the organism
- Stop cell division from occurring
- Prevention of enzyme activity or synthesis

(Alberta Government, 2008)

In addition to a pesticides mode of action, it can also be either a **contact pesticide** or a **systemic pesticide**.

Contact Pesticides: These are pesticides that take effect when they come into contact with the organism, such as a limb or a leaf. This type of pesticide typically takes effect immediately and the severity of the effect depends on the exposure (e.g., quantity, length of time, etc.).

Systemic Pesticides: This type of pesticide is absorbed by the organism and travels through its body to a place where it will take effect.

Mode of Action: The action a pesticide takes on an organism; the type of damage that it inflicts.

Pesticide Labels

A pesticide label is made up of several panels that contain important information about the pesticide. Sometimes all of the necessary information does not fit on these panels; when this happens, a separate booklet will be included. **A pesticide label is a legal document, which means that the product must be used as intended and directed and it is illegal to do otherwise.**

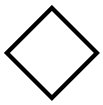
Like in WHMIS, it is essential that the label be readable at all times. If a label becomes hard to read, a new label must be obtained from the supplier and secured to the container.

(Government of Canada, 2011)

Elements of a Pesticide Label

Trade or Product Name	The trade or product name is the distinctive brand name or trademark for the product. It will typically stand out on the pesticide label and may also describe the formulation, use or active ingredient(s).
Use Category	As discussed on pages 61, the four use categories are domestic, commercial, manufacturer and restricted.
Formulation	As discussed on page 57, the pesticide formulation contains active ingredients and formulants. This list of ingredients, like a recipe, is the formula for the pesticide.
Precaution Symbols	Labels will contain **signal word warnings** and corresponding diagrams to communicate the type and **degree of the hazard** to the user (see charts below).

TYPE OF HAZARD	
Symbol	**Meaning**
	Toxic
	Flammable
	Corrosive
	Explosive

SEVERITY OF HAZARD		
Symbol	**Signal Word**	**Degree of Hazard**
	Caution	Low Hazard
	Warning	Moderate Hazard
	Danger	High Hazard

Pest Control Product Registration Number	A unique number assigned to a pesticide by the Pest Management Regulatory Agency when the product registration was granted. This number is needed in the event of an accidental poisoning, claims of misuse or liability claims.
Guarantee	A statement that identifies the pesticides common name and the concentration of the active ingredient(s) in the product.
Net Contents	A statement about how much product is in the container. A dry formulations net contents are given in dry weight measures and a liquid formulations net contents are given in liquid measures.
Name and Address of the Registrant	This is the name, address and sometimes a telephone number of the registrant. Sometimes the name and address of a Canadian Agent may be required instead. The registrant or agent can be contacted for additional information when required.
Precautions	These statements will indicate the routes of entry and types of injury and damage the pesticide would cause upon exposure. Precautionary information may include: • Dermal (skin) toxicity or irritation statements • Oral toxicity or irritation statements • Eye irritation statements • Chronic toxicity statements • Inhalation toxicity or irritation statements, including ingredients that may cause severe allergic reactions • Safe use and handling statements Other types of statements may include: • **Specific Action for Protective Clothing:** These statements are used to advise you on the use of personal protective equipment, for example “Wear goggles when mixing the product.” • **General Precaution:** These are statements that the manufacturers want you to be aware of, such as “Do not contaminate food or feed.” • **Environmental Hazard:** These statements used to protect the environment, for example, “Do not contaminate water when disposing of equipment washwaters or rinsates.” • **Special Toxicity:** These statements are used when the pesticide is particularly hazardous to animals, for example “This product is highly toxic to bees.” • **Physical or Chemical Hazard:** Like WHMIS, these statements tell you about the fire, explosion and chemical hazards of the product, for example, “Keep away from heat, sparks and open flame.” • **Training Requirement:** These statements indicate the type of training required by the user, for example, “For use by qualified pesticide applicators only.” • **Ventilation Requirement:** These statements indicate where special ventilation measures need taken, for example, “Use in well ventilated areas only.”

Toxicological Information	This information is essential for treatment if a person is injured or poisoned by the product. It includes the symptoms of poisoning, antidote (if known) or remedial measures and identity of other ingredients (such as petroleum distillates) in the product that may effect treatment. In the event of a suspected poisoning, provide the physician with a copy of the label.
First Aid	These statements provide practical information about immediate actions to be taken in event of exposure to the pesticide.
Directions for Use	This section provides information on how to safely use the pesticide. It includes the pest species that are the intended targets of the product, dosage rates, timing of application and limitations for use of the product.
Storage, Disposal, Spill Cleanup, Transportation and other Information	This information gives the directions for storage and disposal of the product and its container. When using pesticides, always ensure to follow provincial and municipal regulations.
Notice to the User	This notice states that the user must use the product as directed by the instructions on the label. For example, following the application rates, application frequency and only using it on the pests for which it is intended.
Notice to the Buyer	This is optional on pesticide labels, and often referred to as a guarantee. It basically states that the seller can only guarantee the product if it is used as directed and that the buyer accepts the risks associated with using the product.

(Alberta Government, 2008)

NOTE

The front panel of a pesticide label may inform you of special warnings, such as eye and skin hazards.

DID YOU KNOW?

Safety Data Sheets (SDSs) supplement a product label and are an important part of the hazard communication process. SDSs provide additional information about the hazards, safety and environmental protection measures that should be taken when using the product.

Even though pesticides do not fall under the Hazardous Products Act, some manufacturers may still provide SDSs for their products. As workers should already be trained in WHMIS and be familiar with labels and how to read an SDS, it is easy to understand how WHMIS supports the safe handling, use and storage of pesticides on your farm.

Poisoning

A poison is a substance that is capable of causing injury, illness or death to a living organism when introduced or absorbed. While pesticides are intended to be toxic to a specific pest, they may also be toxic to other organisms, such as humans, livestock, or pets.

The strength (or potency) of a poison depends on its toxicity; even substances with a low toxicity can have serious health effects when absorbed over a sufficient period of time or if the exposures are frequent enough. The ways in which pesticides can enter the body are called routes of entry.

How Poisons Enter the Body

Ingestion

You can ingest pesticides by:

- Swallowing contaminated food or drink
- Placing contaminated equipment or objects in your mouth
- Licking it from your lips or fingers

Inhalation

Pesticide dusts, mists and vapors can be breathed into your body.

Absorption

- Through the Eyes
  The eyes can absorb large amounts of pesticides; splashes, spills, mist in the air and rubbing your eyes with contaminated hands can result in an exposure.
- Through the Skin (Dermal Exposure)
  Pesticides can be absorbed into the body through the skin. Direct contact with the pesticide, its mist and contaminated clothing or objects can result in an exposure. Our skin is thinner in some areas of the body than it is in other areas. These thinner areas, such as your forehead or groin, will absorb pesticides at a higher rate than areas with thick skin, such as the palm of your hand. Cracked skin, sores and other wounds also allow pesticides to enter to your body easily.

Inhalation

Absorption

Swallowing

Potency: The amount of a substance necessary to product an effect; the chemical strength or efficacy of a substance.

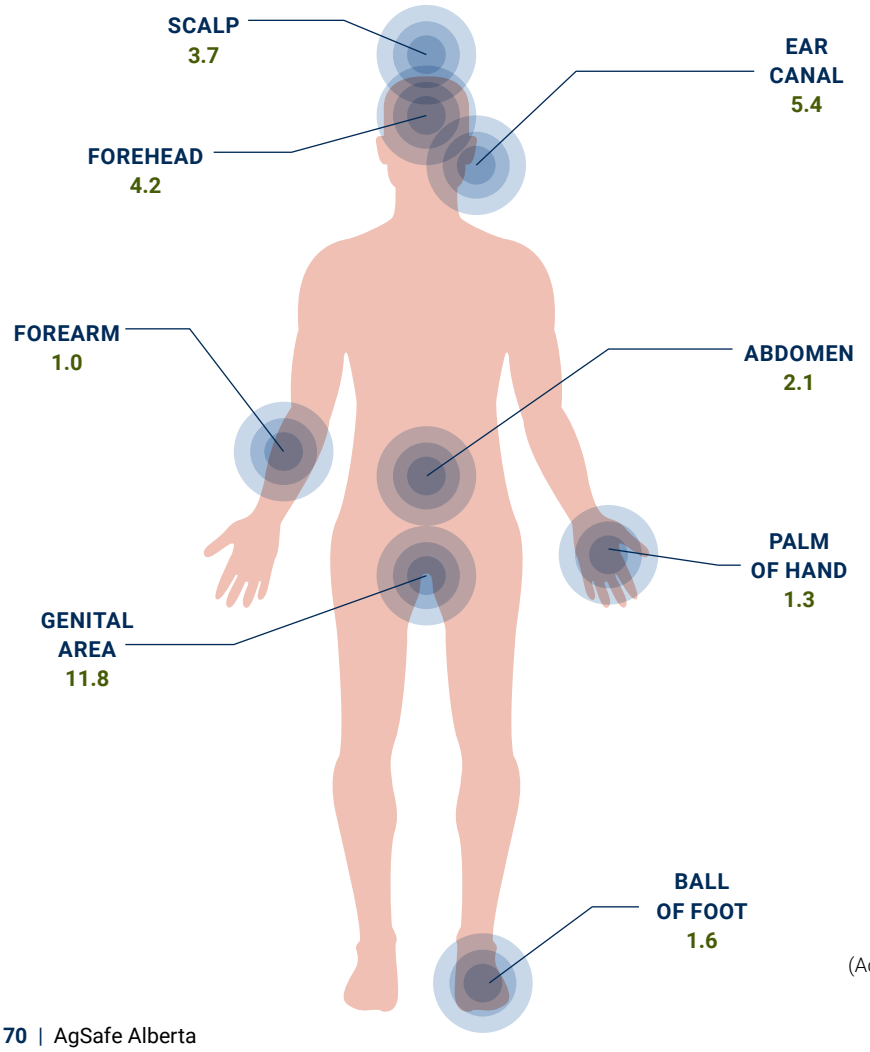
Routes of Entry: The ways that a chemical enters the body, such as through inhalation, ingestion, absorption and injection.

Absorption: When a substance is taken into the body of a person or animal through the skin and/or blood stream; the blood then carries the substance throughout the body and into tissues.

Poison: A substance capable of causing the illness or death of a living organism when introduced or absorbed.

Pesticide Absorption Rates

Pesticide absorption rates will be different depending on which part of the body it is in contact with. Body parts are compared to the forearm, which has a rating of 1.0. The higher the number, the higher the rate of absorption.



(Adapted from Alberta Government, 2008)

Symptoms of Poisoning

It is important to be aware of the signs and symptoms of poisoning. Even mild symptoms should receive medical attention. Symptoms will vary between different pesticide types and different people, so if someone begins to experience any form of physical discomfort after being exposed to a pesticide, it should be treated as a symptom of poisoning. People with certain health conditions, such as asthma or heart conditions, may be more easily affected by a pesticide exposure. For this reason, it is recommended that anyone who will be working with pesticides consult with their physician prior to doing so.

NOTE

Some symptoms may come on quickly, while others may take 24 hours or more.

General Symptoms of Poisoning

Severity	Mild Symptoms	Moderate Symptoms	Severe Symptoms
Less Severe	Headache	Trembling	Very Rapid Breathing
	Fatigue	Loss of Coordination	High Fever
	Skin/Eye/Throat Irritation	Blurred Vision	Muscle Spasms
	Loss of Appetite	Confusion	Loss of Reflexes
	Nausea	Rapid Pulse	Unconscious
	Dizziness	Chest Pressure	Not Breathing
	Perspiration	Difficulty Breathing	
	Weakness	Flushed or Yellow Skin	
	Diarrhea	Abdominal Cramping	
More Severe		Vomiting	

(Alberta Government, 2008)

DID YOU KNOW?

It is possible that you may develop a reaction to a pesticide after being exposed to it several times, this is called sensitization. Allergic reactions to pesticides have the potential to be severe and life threatening, even when the exposure was of short duration or to a very small amount.

General Pesticide Considerations

When working with pesticides, remember to:

- Read the label and SDS prior to using a pesticide.
- Be familiar with the signs and symptoms of poisoning as well as the first aid procedures.
- Do not keep any unnecessary items on you while handling or applying pesticides as they may become contaminated.
- Always practice good hygiene when working with pesticides; wash hands and face thoroughly before eating, drinking, smoking, or using the restroom.
- Practice good communication; rope or flag off the area and use signage to help keep people away. Ensure people, livestock and pets are not near the area when spraying or allowed into the area until after the time specified by the manufacturer.
- Only perform tasks which you have been trained and deemed competent to perform. Be familiar with the job hazard assessment for the task and the farms procedure in addition to the manufacturer's directions.
- Use all recommended PPE and equipment.
- Ensure that someone else knows where you are, what you are doing and schedule regular check-ins as per your farms working alone policy and procedure.
- In the event of an exposure, health care providers will need to know about product that was used; keep the product label, insert and/or SDS readily accessible.
- Always shower thoroughly when you have finished working with the pesticide. Remember to clean under your fingernails.
- Should you spill any of the pesticide on your body, immediately wash it off as per the label and SDS. Properly remove and handle any contaminated clothing so as not to increase your exposure to it or contaminate items around you.

- Restrict who has access to the pesticide and where it is stored; lock the building where possible.
- Store pesticides in their original or other appropriate and properly labelled containers.
- Ventilate pesticide storage areas.
- When hand spraying, avoid standing downwind.
- When spraying pesticides using a tractor without a cab, wear all required PPE.

DRIFT CONSIDERATION

Pesticide spray should be applied evenly over the target area, with efforts taken to minimize drift. This protects the operator, bystanders, water sources and the environment in general. Drift is influenced by:

- **Weather conditions** (e.g., temperature, humidity, wind speed or thermal inversion)
- **Nozzle type and height**
- **Boom pressure**

NOTIFYING YOUR NEIGHBOURS PRIOR TO APPLICATION

It is good practice to advise your neighbours before you spray pesticides, especially if the field being sprayed borders their property.

It is not to obtain their permission, but to show care and consideration for them and their operation. This will also allow them to take any measures they feel may be appropriate; for example, they may choose not to allow anyone to enter the field that borders yours until after the pesticide manufacturers recommended time-period has passed.

Personal Protective Equipment (PPE)

The type(s) of personal protective equipment (PPE) required depends on the:

- Toxicity, volatility and formulation of the pesticide
- Type and duration of the exposure
- Application method being used

When a label or SDS specifies a type of PPE, ensure that the correct type is worn. Sometimes a label will indicate that a type of PPE is required by using such statements as “avoid breathing dusts or fumes”, “keep out of eyes” or “avoid skin contact”; reading the SDS will provide you with additional or more specific information.

NOTE

All PPE worn should be clean and in good condition. Should PPE become damaged or contaminated (e.g., gloves), ensure to replace them immediately.

Personal Protective Equipment (PPE): Equipment worn by workers to minimize exposure and protect against hazards in the workplace; examples include respirators, ear muffs, and chemical aprons.

Toxicity: The property of a substance being harmful to a living thing and the level of harm it can cause.

Volatility: A quality that describes how readily a substance vaporizes; for example, gasoline evaporates rapidly and is called a volatile liquid.

Common types of PPE for Pesticide Application

Head Protection	• The head and neck absorb chemicals more readily than other areas of the body. Protecting your hair, ears and scalp from spray, dusts and powders is important. • A hood that attaches to the coveralls and fits closely is best.
Gloves	• The hands and forearms are commonly exposed to pesticides, such as when handling, mixing, spraying and cleaning equipment. • Wearing gloves and ensuring that they are the correct type is critical. • Gloves should be unlined, chemical resistant, well-fitting and cover the wrist and lower part of the forearm. Gloves should be worn under the sleeve of your coveralls.

Coveralls	• Coveralls provide an extra layer of protection (in addition to long sleeve shirts and full-length pants). • Wear the type of coveralls best suited for the product and task. • Cloth coveralls breath better than disposable coveralls, but disposable coveralls repel moisture better and do not need to be laundered. • Regardless of the type of coverall used, keep the pant legs of the coveralls worn on the outside of the boot and not tucked into it.
Boots	• Unlined neoprene or high chemical resistant rubber boots should be used. As mentioned earlier, keep the pantlegs of your coveralls over the boots.
Goggles and Face Shields	• These protect the eyes and skin of the face from vapors, dust and splashes. • The type of goggles used should be approved for pesticide use, fit well, and often indirectly vented. • Face shields alone will not typically provide the amount of eye protection necessary.
Ear Plugs	• Ear plugs need to be worn when dusts and sprays are likely to contaminate the head. • Ear plugs should be disposable and changed often.
Respirator	• There are several types of respirators, so it is critical to ensure that the one used has been carefully selected and deemed appropriate for the respiratory hazard(s) present, the task, and other relevant factors. • When wearing a half-facepiece or full-facepiece air-purifying respirator, ensure that it is equipped with the correct type of filter, cartridge, or cannister. • Anyone using a respirator should not have a medical condition that will prevent them from using one, must be trained and competent in its use, care, and maintenance, and will need to pass a fit test prior to using it for work purposes.
Apron	• An apron protects the abdominal and genital areas (which absorb chemicals more easily than the hand or forearm) and should be worn when handling concentrated pesticides.

(Alberta Government, 2018)

NOTE

What Not to Wear
Do not wear items that will absorb chemicals. These items may be made from natural rubber, plastic, leather or cloth. For example, watch bands, baseball caps, belts, boots or shoes, etc.

KEY POINTS TO REMEMBER

Protection Considerations for Tractors
Some tractor cabs have activated carbon cartridges and filters to remove chemicals from the air. If your tractor is equipped with these items, ensure it is used in accordance with manufacturers recommendations (including the replacement of cartridges and filters).

Pesticide Storage

When working with pesticides, it is important to recognize that each pesticide will have its own specific storage instructions.

Generally, pesticides should be stored as follows:

- After having read the label and SDS for storage instructions.
- In a secure building with appropriate signage that can be locked to restrict access.
- In a well-ventilated area where temperatures are controlled.
- In a well-lit area to ensure labels are easily read and that leaking or damaged containers will be easily seen.
- On cement or another material that will not allow for spilled fluids to be absorbed.
- Away from wells, ditches, bodies of water, drains, and areas that may flood; consider storing on non-porous shelves or at minimum on raised pallets to prevent water damage to containers.
- With labels that are securely attached and easy to read. Immediately replace peeling labels or labels that cannot be read.
- Only store in approved containers; never store pesticides or any other chemical in food or beverage containers.

- Avoid storing large quantities; store only as much as is needed.
- Store over spills trays or in a diked area, and with spill kits kept readily available.
- Keep containers tightly closed when not in use.
- Containers should be regularly inspected for leaks or damage and remove any expired or unwanted product for appropriate disposal.
- In an area that is not next to a space that is occupied by people, livestock, food storage or food processing.
- Keep an inventory of the pesticides stored on your farm both at the storage location for easy access and at another location in the event of an emergency.

Pesticide Disposal

Use caution when disposing of expired, contaminated or unwanted pesticides, as they must be treated as hazardous waste and therefore cannot be sent to the landfill, buried, or disposed of by burning.

Empty pesticide containers should be triple rinsed and punctured in order to be ready for disposal. The agricultural fieldman at your municipal or county office will be able to assist in locating a disposal site.

For more information regarding proper disposal, contact:

Environmental Services Association of Alberta at 780-429-6363 or 1-800-661-9278

Alberta Environment's Recycle Information Line at 1-800-463-6326

Steps for Triple Rinsing Pesticide Containers

1. Empty container contents into the sprayer tank and drain in a vertical position for 30 seconds.
2. Add water to container to about 1/5 full.
3. Shake container thoroughly, empty into sprayer tank and drain for 30 seconds.
4. Repeat procedure two more times.
5. Puncture or break open triple-rinsed container so it cannot be reused. Do not puncture unrinsed containers, as it will leak and expose the person handling the container and the area it is being handled in to the concentrated pesticide.
6. Dispose of all plastic and metal containers at a pesticide container collection site.

(Alberta Agriculture and Forestry, 2018, p.76)

Treated Seed Considerations

It can be hard to think of seed as being dangerous, but treated seed can be. It is dyed bright, unnatural colors to help us recognize that it is not normal seed and must be treated like a pesticide. Efforts must be taken to prevent exposures to those working with or near it, non-target organisms, and water sources. The label needs to be read, the manufacturers directions must be followed, and care must be taken to prevent exposures to those working with it or near it, non-target organisms (e.g., birds, livestock, and pets), and the environment.

Key points to remember about treated seed include:

- Do not use treated seed for feed, food or other unintended purposes; keep it away from children, pets and livestock as it is harmful to them.
- Do not leave treated seed that has spilled or ignore any treated seed that remains on the soil surface. Be sure that it is collected or covered as appropriate.
- The dusts from treated seed can be toxic to bees and other pollinators, so it is important to minimize the amount of dust that may drift onto blooming plants.
- Read the bag label for minimum planting depths and restrictions (e.g., grazing restrictions).
- Wear all required Personal Protective Equipment (PPE), follow all farm specific safe work procedures and practice good hygiene.

Pesticide Exposure on Reproductive Health

Both men and women need to be exceptionally careful when handling pesticides, the equipment used to mix or apply them, and when working near where pesticides are or have been applied.

Data supports associations between negative health outcomes from both acute and chronic low-level exposures to pesticides, such as disruption of the endocrine system (which can impact everything from reproduction to immune and nervous system function), certain types of birth defects, and both adult and childhood cancers. This remains a challenging area of study, largely because it is unethical to expose control groups to these products in order to study their effects.

NOTE

"Pesticide exposures can interfere with all developmental stages of reproductive function in adult females, and have been associated with sterility in males, spontaneous abortion, diminished fetal growth and survival, as well as childhood and adult cancers."

(Sutton, P., et al, 2011, p. 4)

KEY POINTS TO REMEMBER

Pesticide Exposure and Health

Exerpts from the Environmental Protection Agency's (EPA) 2013 publication, Recognition and Management of Pesticide Poisonings 6th Edition state:

1. "Evidence of neurodevelopmental toxicity arising from chronic, low-level exposure in gestational or early postnatal life is accumulating."
2. "A body of research associates pesticide exposure with ADHD and autism."
3. "Data support associations between occupational pesticide exposure and cancers in both adults and children."
4. "The pediatric cancer types with the most compelling evidence for an association with pesticides are leukemia and brain tumors."
5. "…there is relatively consistent evidence for an increased risk of developing some types of childhood cancers following preconception and/or prenatal exposure to pesticides. The strongest evidence appears to be for ALL, the most common form of childhood leukemia. Maternal exposure to insecticides and paternal occupational exposure appear to carry the greatest risk."

(Roberts, J. R., & Reigart, J. R., 2013)

RESOURCE

To obtain more information about pesticide exposures or to read the complete publication, visit www.epa.gov/pesticide-worker-safety/pesticide-poisoning-handbook-complete-document

Pesticide Exposure Risks and Reproductive Health Outcomes for Men and Women

Health Outcome	2,4,5T Chlorophenate Wood Preservatives	Other Chlorophenoxy Herbicides	Other or Unspecified Herbicides	Organo Phosphate Insecticides
CHILDHOOD CANCER				
Leukemia	Paternal		**Prenatal**	
Lymphoma				
Brain	Paternal		Prenatal	
Neuroblastoma				
Wilm's tumor			Prenatal	
Other Cancers			Prenatal (Germ Cell)	
Delayed Conception		Prenatal	Prenatal	Prenatal
Spontaneous Abortion	Paternal	Prenatal, **Paternal**	Prenatal, Paternal	Prenatal, Paternal
Stillbirth	Paternal		Prenatal	Prenatal
Preterm Birth	Paternal	Prenatal	Paternal	Prenatal
Fetal Growth Deficit	Paternal	Prenatal	Prenatal	Prenatal

Health Outcome	Other or Unspecified Insecticides, Repellants	Fungicides (Any)	Ethylene Oxide (Fumigant)	Unspecified Pesticides	Soil Fumigants
CHILDHOOD CANCER (CONTINUED)					
Leukemia	**Prenatal**, Paternal	Paternal		Prenatal, Paternal	
Lymphoma	Prenatal			Prenatal, **Paternal**	
Brain	**Prenatal**, Paternal	Prenatal, Paternal		Prenatal, **Paternal**	Prenatal
Neuroblastoma	Prenatal, Paternal			Prenatal, Paternal	
Wilm's tumor	Prenatal			Prenatal, Paternal	
Other Cancers	Prenatal, Paternal (Germ Cell)			Prenatal, Paternal (Germ Cell, Bone, Soft Tissue Sarcoma, Eye Tumors)	
Delayed Conception	Paternal	Paternal		Prenatal, Paternal	
Spontaneous Abortion	Prenatal, Paternal	Prenatal, Paternal	**Prenatal**, Paternal	Prenatal, Paternal	
Stillbirth	Prenatal	Prenatal		Prenatal, Paternal	
Preterm Birth	Prenatal	Prenatal		Prenatal, Paternal	
Fetal Growth Deficit	Prenatal	Prenatal		Prenatal, Paternal	

Pesticide Exposure Risks and Reproductive Health Outcomes for Men and Women

Health Outcome	2,4,5T Chlorophenate Wood Preservatives	Other Chlorophenoxy Herbicides	Other or Unspecified Herbicides	Organo Phosphate Insecticides
BIRTH DEFECTS				
Neural Tube	Paternal	Prenatal	Prenatal	
Cardiac	Paternal	Prenatal	Prenatal	
Orofacial	Paternal	Prenatal		Prenatal
Musculoskeletal	Paternal	Prenatal	Prenatal	Prenatal
Urinary Tract	Paternal	Prenatal		
Male Genital	Paternal	Prenatal, Paternal	Prenatal	
Adult Cancer - Testicular				
Problem Behaviours			Paternal	
Childhood Lung Infections				
Allergies				

Adapted and condensed from University of California San Francisco, Pesticides Matter,
A Primer for Reproductive Health Physicians, Table 2: The Strength of Epidemiologic Evidence of Relationships Between Reproductive Health Outcomes and Pesticide Exposure
(Sutton, P., et al, 2011)

Health Outcome	Other or Unspecified Insecticides, Repellants	Fungicides (Any)	Ethylene Oxide (Fumigant)	Unspecified Pesticides	Soil Fumigants
BIRTH DEFECTS (CONTINUED)					
Neural Tube	Prenatal	Prenatal		Prenatal, Paternal	
Cardiac	Prenatal			Prenatal, Paternal	
Orofacial	Prenatal			Prenatal, Paternal	
Musculoskeletal	Prenatal			Prenatal, Paternal	
Urinary Tract				Paternal	
Male Genital	Prenatal			Prenatal, Paternal	
Adult Cancer - Testicular				Prenatal, Paternal	
Problem Behaviours					
Childhood Lung Infections				Prenatal	
Allergies				Prenatal	

Table Term Explanations

- Paternal refers to the male partner having been exposed prior to conception.
- Prenatal refers to the female partner having been exposed prior to conception.
- Lactational or Childhood refers to the child being exposed through the ingestion of breastmilk or another form of exposure during childhood.
- Delayed Conception (prenatal or paternal exposure) refers to the male or female partner having been exposed prior to conception.
- Exposure periods in bold indicate several epidemiologic studies (including at least one case control or cohort study) found fairly consistent associations and evidence of exposure-risk relationships.
- Exposure periods not in bold indicate relationships where the epidemiologic studies where limited (e.g., in small studies, ecological studies, limited control of potential confounders, inconsistent results, etc.).

MODULE

4

Veterinary Drugs and Medicated Feeds

At the end of this module, participants will:

1. Better understand the information found on veterinary drug and medicated feed labels.
2. Explore the different types of medicated feed labels.
3. Be introduced to high hazard veterinary drug and medicated feed handling.
4. Review hazard control measures for the storage and disposal of medicine and sharps.

INTRODUCTION

Vaccines, anti-parasitics, medicated feeds, and other products present pharmaceutical hazards in livestock care environments. When handling these products, don't underestimate the potential dangers to humans or other animals, especially if these products are administered externally or are mixed with feed.

It is critical that you read the label, know how to use the product safely, follow the manufacturers recommendations, wear all required personal protective equipment (PPE) and know what the signs of an exposure are.

KEY POINTS TO REMEMBER

The Golden Rules for Hazardous Products

Remember to read the label, SDS, and/or package insert:
1. Before buying the hazardous product.
2. Before using the hazardous product.
3. Before storing the hazardous product.
4. Before disposing of the hazardous product.

Think about what could go wrong when using veterinary drugs and medicated feed products and how following these rules will help keep you and others on your farm safe from the hazards of these products.

General Information Found on Drug Labels

The drug label explains how to use the drug safely and receive the optimal, intended benefit of it. The federal Food and Drugs Act outlines what information must appear on a drug label to ensure its safe use and storage.

The package insert (or leaflet) that may accompany the drug typically contains detailed and critical information beyond what can be found on the label. It is important to read the insert completely and ensure that you understand it; failing to do so could put yourself, the animal, the food safety and the food quality at risk.

Package inserts are not attached to the drug container but may found with the drug packaging or could be sent to the retailer separately. If you find yourself missing an insert, speak to your veterinarian or contact the manufacturer.

Information on a Veterinary Drug Label

In addition to the manufacturer's label, a dispensing label must be created and attached to the veterinary drug by the veterinarian. This is done because the manufacturer's packaging will only provide the user with part of the necessary information for use, however the veterinarian is not required to duplicate information that is already on the manufacturer's label.

Using Unit

For example, the using unit could be a bottle.

For Veterinary Use Only

Indicates that the product is intended for animal use only.

Dispensing Label Information

This information is specific to the prescription and will not appear on the manufacturer's label.

- Name of **client or owner name**
- Name of **prescribing veterinarian and veterinary practice** where the prescribing veterinarian is employed
- Name of **dispensing veterinarian and veterinary practice** where dispensing veterinarian is employed
- Identification of the **specified animal or group of animals** for which medication is dispensed
- **Total quantity** of drug dispensed
- **Directions for use** in the animals for which drug is prescribed, including dose, frequency, and duration of treatment.

Manufacturer's Label Information

If medication is being dispensed in packaging that is not the manufacturer's original packaging, such as a pill bottle, the following information must appear on the dispensing label.

- **Name of drug dispensed and its concentration.** A product's brand name is registered with the Veterinary Drugs Directorate (VDD), which is a division of Health Canada. The active ingredient contained by the drug as well as its concentration will be located below the brand name. The active ingredient produces the desired effect of the medicine.
- **For Veterinary Use Only.** All drugs intended for animals will have Veterinary Use Only printed on the label immediately before or after the name of the product. These drugs should always be used with caution, as while they are beneficial to animals when used properly, they can be deadly to humans and animals when used incorrectly.
- **Drug Identification Number (DIN).** In Canada, all legally sold drugs must be assigned a Drug Identification Number (DIN). Health Canada requires manufacturers to provide data which supports product safety and effectiveness.

- **Using Unit.** This is the amount of the medication in the manufacturer's packaging that is expected to be used as a unit when dispensed. For example, if the product comes in a bottle, the bottle must have a dispensing label.
- **Minimal withdrawal time** (where applicable) as prescribed.
- **Storage precautions and any toxic warnings or other precautions** appearing on the manufacturer's label.

(Alberta Veterinary Medical Association, 2017, p.15-16)

Other Label Information

- The **manufacturer's name and address**, which enables you to contact them to obtain more information.
- Instructions on **how to use, store and handle the drug.**
- **Lot Number.** Lot numbers are assigned by the manufacturer and act as useful references if a recall or product investigation is required.
- **Expiry Date.** An expiry date is assigned by the manufacturer. This is the date after which the product should not be used.

(Alberta Veterinary Medical Association, 2017, p.15-16)

Extra-Label Use

When a drug is used on a species not listed on the label, or when it is used in some other way that is not indicated by the label, it is considered extra-label use (sometimes referred to as off-label use). Extra-label use is typically not recommended as the results may be uncertain, particularly where residues are concerned.

It is legal for a veterinarian to prescribe a drug for extra-label use and they will provide you with the necessary information. Your veterinarian is a resource, so it is recommended that you contact them with drug questions and concerns.

(Government of Canada, 2014)

How Do Dosages Get Calculated?

When manufacturers and veterinarians prescribe recommended dosages, they must take into account many things. For example, they consider:

- The weight of the animal
- The size of the dose
- How it will be administered (e.g., will it be given orally?)
- Where it will be administered (e.g., if injected, will it be into a muscle or just under the skin?)
- How often it will be administered (e.g., two times a day?)
- The duration and frequency of the treatment (e.g., once a day for a week every year?)

Sample Labels for Common Mixed Feeds

MEDICATED FEED

- Brand Name (optional)
- Feed Name
- Form of Feed (if other than mash)
- Medication, Level and Approved Claim (per Medicating Ingredient Brochure [MIB])
- Registration Number (if required)
- This feed contains added selenium at mg/kg (if selenium is added)
- Guaranteed Analysis
- Required guarantees per Table 3 for the specific feed type
- Either a complete list of ingredients (if required for that feed type) or the following statement: "A list of ingredients used in this feed may be obtained from the manufacturer or registrant"
- Directions for Use (per MIB for medication level/claim)
- Warnings (per MIB for medication level/claim)
- Cautions (per MIB for medication level/claim)
- Selenium Caution(s) if selenium added per (6): "Directions for use must be carefully followed" (all species) and "Do not use in association with another feed containing supplemental selenium" (ruminants only)
- Notes (if required by the MIB for medication level/claim)
- BSE Statement if feed contains "prohibited material": "Feeding this product to cattle, sheep, deer or other ruminants is illegal and is subject to fines or other punishment under the Health of Animals Act"
- Registrant's Name and Address (if registered); OR
- Name and Address of Manufacturer or Person who Caused it to be Manufactured (if not registered)
- Net Weight (kg)

MEDICATED FEED CUSTOMER FORMULA

- Brand Name (optional)
- Feed Name
- Feed Form (if other than mash)
- Medication, Level and Approved Claim (per MIB)
- Name and Address of the Person Who Caused the Feed to be Manufactured
- Directions for Use (per MIB for medication level/claim)
- Warnings (per MIB for medication level/claim)
- Cautions (per MIB for medication level/claim)
- Notes (if required by the MIB for medication level/claim)
- BSE Statement if feed contains "prohibited material": "Feeding this product to cattle, sheep, deer or other ruminants is illegal and is subject to fines or other punishment under the Health of Animals Act"
- Name and Address of the Supplier of the Feed
- Net Weight (kg)

(Canadian Food Inspection Agency, 2021)

MEDICATED FEED VETERINARY PRESCRIPTION

- Brand Name (optional)
- Feed Name (must include name and amount of medicating ingredient)
- Medication and Level (per vet prescription)
- Medication Claim (per vet prescription, if any)
- Name and Address of the Person Who Caused the Feed to be Manufactured
- Name of Veterinarian Who Issued Prescription
- Form of Feed (if other than mash)
- This feed contains added selenium at mg/kg (if selenium is added)
- Guaranteed Analysis
- Required guarantees per Table 3 for the specific feed type
- Either a complete list of ingredients (if required for that feed type) or the following statement: "A list of ingredients used in this feed may be obtained from the manufacturer or registrant"
- Directions for Use (including duration of use as per vet prescription)
- Warnings (per vet prescription)
- Cautions (per vet prescription)
- Selenium Caution(s) if selenium added per (8): "Directions for use must be carefully followed" (all species) and "Do not use in association with another feed containing supplemental selenium" (ruminants only)
- BSE Statement if feed contains "prohibited material": "Feeding this product to cattle, sheep, deer or other ruminants is illegal and is subject to fines or other punishment under the Health of Animals Act."
- Name and Address of Manufacturer
- Net Weight (kg)

MEDICATED FEED CONSULTANT FORMULA

- Brand Name (optional)
- Feed Name
- Form of Feed (if other than mash)
- Medication, Level and Approved Claim (as per MIB)
- Name and Address of Purchaser of Feed
- This feed contains added selenium at mg/kg (if selenium is added)
- Guaranteed Analysis
- Required guarantees per Table 3 for the specific feed type
- Either a complete list of ingredients (if required for that feed type) or the following statement: "A list of ingredients used in this feed may be obtained from the manufacturer or registrant"
- Directions for Use (per MIB for medication level/claim)
- Warnings (per MIB for medication level/claim)
- Cautions (per MIB for medication level/claim)
- Selenium Caution(s) if selenium added per (6): "Directions for use must be carefully followed" (all species) and "Do not use in association with another feed containing supplemental selenium" (ruminants only)
- Notes (if required by the MIB for medication level/claim)
- BSE Statement if feed contains "prohibited material": "Feeding this product to cattle, sheep, deer or other ruminants is illegal and is subject to fines or other punishment under the Health of Animals Act"
- Name and Address of the Manufacturer or Person Who Caused it to be Manufactured
- Net Weight (kg)

(Canadian Food Inspection Agency, 2021)

Compendium of Medicating Ingredients Brochure (CMIB)

The Compendium of Medicating Ingredient Brochures (CMIB) is an additional source of information. This document lists the medicating ingredients permitted by Canadian regulation to be added to livestock feed. This includes drug products used under a veterinarian's prescription as well as products considered over the counter.

This CMIB specifies the:

- Species of livestock
- Level of medication
- Directions for feeding
- Purpose for which each medicating ingredient may legally be used
- Brand of each medicating ingredient that is approved for use in Canada

(Canadian Food Inspection Agency, 2019)

DID YOU KNOW?

The CMIB establishes labelling requirements to ensure compliance to prescribed labelling standards (e.g., medication level, approved claim, directions for use, warnings and cautions). Medicated feed manufactured, used, or sold in Canada must be prepared in such a way as to adhere to the specifications of the Compendium of Medicating Ingredient Brochures.

Individual Medicating Ingredient Brochures (MIB's)

Individual Medicating Ingredient Brochures (MIB's) refer to a specific drug or specific combination of drugs used in livestock feed medication. Drugs can be found using one of the four indexes:

- Medicating ingredient name
- Brand name
- Approved livestock species
- Name of sponsor/manufacturer

(Canadian Food Inspection Agency, 2019)

EXAMPLE

The MIB's provide the directions for use, warnings, cautions and accepted compatibilities. For example:

Warning: When mixing and handling this product, avoid inhalation, oral exposure, and direct contact with skin or eyes. Use protective clothing, impervious gloves, and a dust mask.

Operators should wash thoroughly with soap and water after handling. If accidental eye contact occurs, immediately rinse thoroughly with water. If irritation persists, seek medical attention. (Required on premix and supplement labels only).

Caution: Do not use in animals hypersensitive to tilmicosin. Tilmicosin is known to be toxic for horses. Do not allow horses or other equines access to feeds containing tilmicosin. The safety of tilmicosin has not been established in boars used for breeding. Do not use in any feed containing bentonite. Bentonite in feeds may affect the efficacy of tilmicosin. (Required on premix and supplement labels only). Keep out of reach of children. (Required on premix and supplement labels only).

RESOURCE

For more information on the CMIB or IMB's, visit https://inspection.canada.ca

High Hazard Product Handling

Name: Micotil 300®

Micotil 300® (tilmicosin phosphate) is an injectable animal antibiotic used to treat bovine and ovine respiratory disease, sometimes called shipping fever. Human exposure to this product occurs through injection, puncture wounds, cuts in the skin, skin contact or contact with mucous membranes. This product has cardiotoxic effects, that is, it reduces the heart's ability to contract and causes a rapid heartbeat. These effects can be fatal, and there is no antidote for this product.

Resource

The manufacturer of this product, Elanco, has published a Micotil® Safe Handling & Use Training document, available at https://www.elanco.ca/products-services/beef/micotil

(Eli Lilly and Company, 2017)

Name: Pulmotil Medicated Premix®

Pulmotil Medicated Premix® is a medicated feed containing tilmicosin phosphate that is used to treat respiratory disease in beef cattle, swine and rabbits. Just because it is a feed product, does not mean that it is not dangerous. When mixing and handling this product, it is important to avoid inhalation, oral exposure, and direct contact with skin or eyes. Exposure to tilmicosin in humans can result in chest pain, increased heart rate, dizziness, headache, and nausea. Ingestion of tilmicosin can be fatal.

Resource

Pulmotil AC for Animal Use, visit https://www.drugs.com/vet/pulmotil-ac.html

(Drugs.com, 2021)

Controlling the Hazards of Veterinary Drugs & Medicated Feeds

Good control of the veterinary drug and medicated feed products on your farm can help prevent meat from being contaminated with drug residue and unintended exposures to people, livestock and pets.

- As with all hazardous products, it is critical that workers are trained in their safe use and handling.
- Do not use veterinary drugs or medications unless it is necessary; not only does this result in an increased risk of exposure, but unnecessary use can be both costly and time consuming.
- Where possible, speak to your veterinarian to see if there is a less hazardous drug that may be used in its place.
- Purchase medicines and medicated feed products in as low of quantity as possible.
- Check expiry dates prior to purchasing them.
- Ensure everyone handling and administering the product is aware of its hazards, symptoms of exposure, and has been trained and deemed competent to use it.
- Ensure all necessary PPE (e.g., elastomeric respirator with filter cartridges, puncture resistant gloves, etc.) are used and that contaminated PPE is handled, laundered or disposed of appropriately.
- Organize items so that those that are going to expire first are used first.
- Inventory and organize of your drug cabinet regularly.
- Dispose of expired products properly.
- Lock or restrict access to medications and medication feed product storage areas to prevent unauthorized access.

Storing Medications

Different types of medicines and medicated feed products require different storage methods. It is essential that you read the label and insert for specific information on proper storage methods.

Generally speaking:

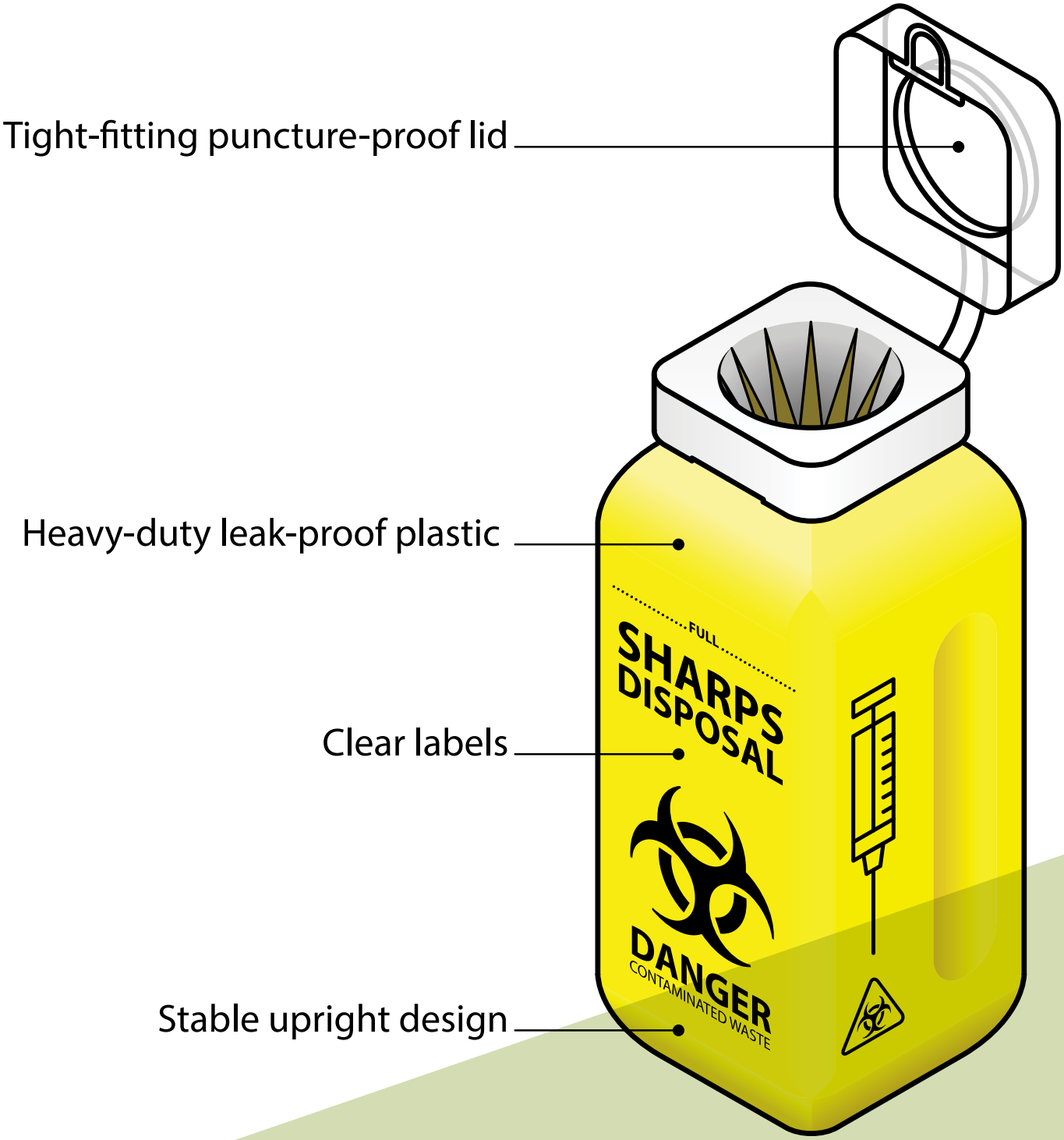
- Antibiotics, vaccines, and hormones are all heat sensitive and should be refrigerated.
- Vitamins, sedatives, stimulants, and minerals are sensitive to light and should be stored away from bright light and/or in dark containers.
- Most should be stored in a dry place and protected from moisture. Storage areas should a be secured to restrict access by unauthorized persons, children, livestock and pets.

Disposing of Medicine

- Expired, contaminated or unneeded medicines must also be handled appropriately.
- Unexpired, unopened medications can often be returned to where they were purchased from. Used and expired drugs should be treated in a manner similar to sharps.
- Modified live virus vaccines should be made non-infectious prior to disposal in order to prevent the infection of people or animals. This is commonly achieved by freezing, autoclaving, burning or by adding bleach to the bottle.
- Do not attempt to clean bottles. Speak to your local veterinarian for guidance on disposal.

Disposing of Sharps

- Sharps, such as needles and syringes, should be kept separate from other waste, kept out of landfills and not disposed of by burning.
- Use a labelled, puncture proof, rigid container with a sealed lid for the disposal of sharps.
- Do not use a container that can be easily opened by children or animals.
- Sharps containers can commonly be obtained from a veterinary clinic.
- Ask your local veterinary clinic if they accept filled sharps containers.


Tight-fitting puncture-proof lid
Heavy-duty leak-proof plastic
Clear labels
Stable upright design
FULL
SHARPS DISPOSAL
DANGER
CONTAMINATED WASTE

MODULE

5

First Aid for Chemical Exposures

At the end of this module, participants will:

1. Be aware of first aid measures for chemical exposure.

INTRODUCTION

As with all forms of first aid, it is important to act quickly and remain calm. Having an emergency response plan developed for chemical exposures is important, as is being able to identify the type of chemical, and determine the type of exposure (e.g., inhalation, ingestion or absorption through the eyes or skin) that occurred. The actions taken next will depend upon the type of exposure and the severity of the symptoms.

NOTE

It is important to refer to the SDS, pesticide product label, or product insert for first aid and other critical information.

Taking Action

Flushing Skin or Eyes

It is important to start flushing skin or eyes immediately after contact with a chemical. The manufacturer or supplier may also specify what type of cleansing agent to use or alternatives in cases where water may not be appropriate.

While most sources recommended rinsing or flushing skin or eyes for 15 to 20 minutes following contact, there is not sufficient scientific evidence to properly address this. For this reason, the Canadian Centre for Occupational Health and Safety recommends tailoring the length of time you flush based on the known effects of the product where reasonable; these recommended times are as follows:

- 5 minutes for non-irritants or mild irritants
- 15-20 minutes for moderate to severe irritants and chemicals that cause acute toxicity if absorbed through the skin
- 30 minutes for most corrosives
- 60 minutes for strong alkalis (e.g., sodium, potassium, etc.)

(Canadian Centre for Occupational Health and Safety, 2022)

Antidotes

In most cases, antidotes are the exception and not the rule. While activated charcoal is sometimes thought of as an antidote, it is not a first aid procedure and should only be administered by emergency medical services.

Cyanides and organophosphate pesticides are examples of chemicals that have true antidotes. You can contact the manufacturer/supplier or someone who is certified in medical toxicology or occupational medicine to find out if a product does have an antidote, if it would be appropriate to store the antidote onsite and if there is any special first aid training required to administer it. In some special situations, it may be reasonable to request your local hospital to stock an antidote that must be administered by a medical professional.

(Canadian Centre for Occupational Health and Safety, 2022)

Antidote: A medicine or remedy that acts against (counteracts) the effects of a particular poison.

During a medical emergency such as poisoning, dial 9-1-1 or go to the nearest emergency department as soon as possible.

You will want to be prepared to answer such questions as:

- The age, gender and weight of the victim.
- Condition of the victim (e.g., are they breathing, conscious or showing other symptoms?).
- The time of the poisoning.
- The type of exposure (e.g., inhalation, ingestion, absorption through the skin or eyes).
- Product name listed on the label.
- Never induce vomiting or give the victim water or milk following the ingestion of a chemical unless advised to do so by emergency medical services or a physician.

RESOURCE

Poison and Drug Information Service (PADIS) offers free and confidential advice to the public and health care professionals on poisons, chemicals, medicines, and herbal supplements.

PADIS can be reached tollfree on their 24/7 hotline at 1-800-332-1414.

Glossary

Absorption: When a substance is taken into the body of a person or animal through the skin and/or blood stream; the blood then carries the substance throughout the body and into tissues.

Accidental Release Measures: "The steps to be taken in response to spills, leaks, or releases of a hazardous product to prevent or minimize adverse effects on people and property" (Canadian Centre for Occupational Health and Safety, 2021).

Acid, Acidic: A chemical with a pH value of less than 7 on the pH scale.

Acute: Of sudden onset, lasting a short time or requiring short-term medical care.

Acute Dose: The amount of a substance administered or received over a very short period of time (minutes or hours), usually within 24 hours.

Acute Toxicity: Immediate health effects after being exposed to a toxic product. The effect can come from a single exposure, or several exposures over a short period of time, such as over a 24-hour period or within four hours of inhalation.

Acute Toxicity Estimate (ATE): "A numerical value that is used to evaluate acute toxicity. For an ingredient, the ATE is the LC_{50} or the LD_{50}, if available, or a converted acute toxicity point estimate that is based on an experimentally obtained range or the classification category. For a mixture, the ATE is calculated for oral, dermal and inhalation toxicity based on the ATE values for all relevant ingredients and the percentage concentration in the product" (Alberta of Government, Labour, 2018, p.39).

Active Ingredient: The ingredient in a chemical formulation, such as a pesticide, that produces the intended effect.

Aerosols: Any non-refillable receptacle containing a gas compressed, liquefied or dissolved under pressure, and fitted with a release device allowing the contents to be ejected as particles in suspension in a gas, or as a foam, paste, powder, liquid or gas.

Agitation: Using motion to blend the components (ingredients) of a mixture to create a uniform (consistent) product. The type of motion may be a circular motion, a back and forth motion, or a rapid and irregular motion inside of a container.

Air-purifying Respirators: A type of respirator that removes contaminants from the air being breathed in by filtering out particulates and/or absorbing gases or vapors.

Alkali, Alkaline: A chemical with a pH value greater than 7 on the pH scale; can also be called a base or basic.

Allergic Reaction: An abnormal immune response in a person who has become excessively sensitive to a specific substance.

Antidote: A medicine or remedy that acts against (counteracts) the effects of a particular poison.

Aqueous: Like water or contains water, such as a solvent or other medium.

Aromatic: Having a strong smell.

Aromatic Solvent: A solvent that contains an aromatic hydrocarbon, such as products that come from benzene, that can go through the skin (thus entering the blood and tissue) and may be inhalation hazards; examples include xylene or toluene.

Asphyxiant: A vapor or gas that deprives a person of oxygen, resulting in unconsciousness or death (suffocation); there are two types, simple asphyxiants and chemical asphyxiants.

Aspiration: The entry of a liquid or solid chemical directly through the oral or nasal cavity, or indirectly from vomiting, into the trachea and lower respiratory system.

Atmospheric Pressure: The pressure within the Earths atmosphere; the pressure applied by the weight of the atmosphere.

Auto-ignition Temperature: The lowest temperature at which the vapor from a liquid will ignite without a source of ignition.

Base, Basic: A chemical with a pH value greater than 7 on the pH scale; can also be called alkali and alkaline.

Bioaccumulation: The buildup of a material in an organism.

Biohazardous: Viruses, bacteria or toxins that can cause diseases in people or animals.

Boiling Point: The temperature at which a liquid changes to a vapor.

Bonding: Making an electrically conductive connection between a discharge container and a receiving container; this is done to prevent an electrical spark from being created by static discharge when transferring a liquid.

Carcinogen: A substance that is capable of causing cancer.

Carcinogenicity: The ability or likelihood to produce cancer.

Carrier: A substance used to support or carry another substance; a material mixed with active ingredients to make a formula.

CAS Registry Number: A number assigned to a specific chemical by the Chemical Abstracts Service. CAS Numbers are used internationally to identify specific chemicals or mixtures.

Caustic: A corrosive chemical with a pH value greater than 7 on the pH scale that is able to burn or corrode tissue. May also be called a base or alkali.

CCOHS: Canadian Centre for Occupational Health and Safety

Central Nervous System (CNS): The part of the nervous system consisting of the brain and spinal cord through which sensory impulses are transmitted and motor impulses occur and which coordinates the activity of the entire nervous system.

Chemical: The name given to a substance or a mixture of substances.

Chemical Asphyxiant: A substance the prevents oxygen from entering the bloodstream and cells of the body; it can prevent the blood from taking up oxygen (e.g., carbon monoxide) or stops the body from using oxygen (e.g., hydrogen cyanide).

Chemical Formula: A way to represent a substance using the symbols of the elements that compose it. For example, water is made up of two hydrogen atoms and one oxygen atom; its chemical formula is H_2O.

Chronic: A problematic condition or illness that lasts for a long time or happens repeatedly.

Chronic Illness: An illness that lasts for a long time or that happens repeatedly.

Chronic Toxicity: Adverse effects that result from repeated doses or exposures to a substance over a relatively long period of time.

Combustible: Able to catch fire or burn easily.

Combustible Dusts: Any fine material that has the ability to catch fire and explode when mixed with air; in WHMIS, there is a hazard class in the physical hazards group for combustible dusts.

Common Name: The name that the product is known by in daily life. May also be called the Common Chemical Name.

Compound: A chemical substance made up of two or more separate elements.

Contact Pesticides: These are pesticides that take effect when they come into contact with the organism, such as a limb or a leaf. This type of pesticide typically takes effect immediately and the severity of the effect depends on the exposure (e.g., quantity, length of time, etc.).

Controlled Products: Hazardous products.

Controlled Products Regulations (CPR): Federal legislation that specifies the hazard criteria for controlled products and requirements for product labels and SDSs.

Corrosive: The ability to gradually destruct or eat away at something, such as skin or metal.

Canadian Standards Association (CSA or CSA Group): A standards organization that develops standards in many areas and provides training and advisor services; composed of industry, government and consumer group representatives.

Decomposition: Breakdown of a material or substance into simpler substances by heat, chemical reaction, electrolysis, decay, or other processes.

Dermal: Skin or relating to the skin.

Dermatitis: Red, swollen, itch and/or painful skin resulting from contact with an irritating substance or an allergic reaction to the substance.

Dose: The amount of a substance received at one time.

Drug Identification Number (DIN): An eight-digit number assigned by Health Canada to a drug product that uniquely identifies all drug products sold in a dosage form in Canada and is located on the label of prescription and over-the-counter drug products. This number identifies the manufacturer, product name, active ingredient(s), strength(s) of active ingredient(s), pharmaceutical form and route of administration.

Dust: Fine, tiny particles of matter.

Embryotoxicity: Being toxic to an embryo resulting from a substance entering the mother's body and crossing the placental barrier.

Emulsifiable: A liquid that cannot be dissolved in or become a uniform mixture with another liquid, but very small droplets of it can be dispersed (scattered) throughout the other liquid. While the two liquids can be mixed, if left alone, they will separate again.

Evaporation: The transformation of a substance from a liquid or solid state into a vapor.

Explosive limits: The upper and lower amounts (concentrations) of a vapor in the air between which an explosion will occur if an ignition source is introduced.

Exposure: Being exposed to or coming into contact with something, such as a hazardous product.

Exposure Limit: The highest amount of a substance that an organism can come into contact with and not have adverse effects occur.

Extra-Label Use: When a veterinary drug is used on a species not listed on the label, or when it is used in some other way that is not indicated by the label, it is considered extra-label use.

Eye Irritation: The changes that occur in the eye following exposure to substance, that are fully reversable within 21 days of the exposure.

Flammable: Easily set on fire, burnable or ignitable.

Flammable Limits: The upper and lower amounts (concentrations) of a vapor in the air between which an explosion or flame will occur if an ignition source is introduced.

Flammable Range: The amount (concentration) range in which a gas or vapor is flammable in the air.

Flashpoint: The lowest temperature at which a liquid gives off enough vapor to create a flammable air-vapor mixture.

Fluid: A substance without a fixed shape and that flows easily, such as a liquid or a gas.

Formula: A list of ingredients, like a recipe.

Formulants: All of the parts or ingredients in a pesticide except the active ingredient.

Fugitive Emission: The unplanned or unwanted escape, leak, or discharge of a substance (e.g., a dust, mist, gas, liquid, solid, vapour or fume) from equipment or containers.

Fumes: Very fine, solid particles that are suspended, such as in smoke, vapor or gas.

Gas: A substance that is in a gaseous state (where its particles have neither a defined volume or shape) at an ordinary temperature and pressure.

Genetic: Relating to genes or heredity.

Germ Cell Mutagenicity: "Hazardous products classified in this hazard class may cause or are suspected of causing genetic defects. These products are liable to lead to an increased occurrence of mutations in the germ (reproductive) cells" (Canadian Centre for Occupational Health and Safety, 2021).

Global Harmonization System (GHS): A globally recognized system created and used to support consistent uniform hazard System communication by using the same set of rules to classify hazards, as well as keeping the same format and information that is to be included on safety data sheets (SDS) and product labels worldwide.

Globally Harmonized System of Classification and Labelling of Chemicals (GHS): A globally recognized system created to support consistent hazard communication by using the same set of rules to classify hazards, as well as keeping the same format and information that is to be included on safety data sheets (SDS) and product labels worldwide.

Hazard: Any source of possible damage, harm, danger or negative health effect on someone or something.

Hazard Category: The division of criteria by which something is judged within each hazard class; for example, flammable liquids have four hazard categories. These categories compare hazard severity within a hazard class.

Hazard Class: A grouping of products according to their physical or health hazards; for example, flammable solids.

Hazard Not Otherwise Classified (HNOC): Used when further documentation to classify or code something is insufficient or does not exist; refers to a workplace hazard not covered by the Globally Harmonized System.

Hazardous Product: Any product which is classified as a hazard (e.g., physical hazard, health hazard, simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified). May also be considered any product that is controlled, restricted or banned by a governing authority.

Hazardous Product Act (HPA): Federal legislation aimed at the suppliers, manufacturers and importers of controlled products to communicate the hazards associated with their products through the use of product labels and SDSs.

Hazard Statement(s): Short, standardized sentences used to describe the most serious hazards of a product.

Health Hazard: A chemical that poses a hazard to health or is able to cause a health effect; in WHMIS, there is a Health Hazards Group which contains 12 Health Hazard Classes, such as acute toxicity or carcinogenicity.

Ignition Source: A source of temperature and energy that helps cause ignition of flammable or combustible materials or substances. A flame, static discharge, or sufficient heat from a process or event can all be ignition sources.

Incompatibility: When some chemicals come into contact with each other, there may be a chemical reaction between them. Sometimes the reactions can be violent (e.g., explosions) or they may produce toxic gases (e.g., when ammonia and bleach come into contact).

Ingestion: The process of taking a substance into the body by eating or drinking it.

Inhalation: The act of inhaling or breathing in of a substance such as a gas, vapor, fume, mist, or dust.

Immediately Dangerous to Life or Health Atmosphere (IDLH): "An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere" (Occupational Safety and Health Administration, 2009, p.8).

Irritant: A substance which causes inflammation or other discomfort to the body (e.g., eye, skin or respiratory system) which is reversible.

Label: A piece of material, such as paper or plastic, that is attached to the container or package of a hazardous product and which provides information about it.

LC_{50} (Lethal Concentration 50): The LC_{50} number refers to the concentration of a chemical in the air or in water which will kill 50% of a group of test animals.

LD_{50} (Lethal Dose 50): The LD_{50} is the amount of a substance that when given all at once to a group of test animals, kills 50% of them.

Mean: In mathematics, this is a quantity that has a value between those of the extreme members of some data set; commonly thought of as the average.

Micro-encapsulated: A material surrounded by a thin layer of a biodegradable substance that together form a tiny capsule. The material is released as the capsule is broken down, melted, or dissolved.

Mist: Tiny droplets suspended in air that are produced by scattering or distributing a liquid over an area or by the condensation (when a vapor or gas changes into a liquid form).

Mixing: The process of combining different materials in a way that produces a uniform (consistent) product.

Mixture: A combination or solution of two or more substances that do not react (do not experience a chemical change as a result of an interaction between the products).

Mode of Action: The action a pesticide takes on an organism; the type of damage that it inflicts.

Mutagenicity: An agent or substance able to cause mutations in cells and/or organisms.

Mutation: A permanent change to the amount or structure of the genetic material in a cell.

National Fire Protection Agency (NFPA): A global non-profit organization devoted to eliminating death, injury, properly and economic loss resulting from fire, electrical and related hazards.

National Institute for Occupational Safety and Health (NIOSH): A United States federal agency that conducts research and makes recommendations for the prevention of work-related injuries and illnesses and is a part of the Centers for Disease Control and Prevention.

Normal Atmospheric Pressure: A unit of pressure that is equivalent to the mean sea-level atmospheric pressure (the pressure within the atmosphere) on Earth.

Occupational Health and Safety Act: Assigns obligations, responsibilities and duties to individuals and organizations.

Odour Threshold: The smallest amount of a substance present (minimum concentration) at which an odor can be detected by smell.

Off-Label Use: Refer to Extra-Label use.

Oncogenic: Relating to or causing the development of a tumor or tumors.

Oral: Relating to the mouth; taking something into the body through the mouth.

Organism: An individual form of life, such as an animal, plant, etc. that is capable of growth, development and reproduction.

Occupational Safety and Health Administration (OSHA): A group that is part of the United States Department of Labor that was created to ensure safe and healthy working conditions by setting and enforcing standards as well as providing training, outreach, education and assistance.

Over the Counter: Drug products that can be used without veterinarian or physician approval.

Oxidation: A change in a chemical resulting from the loss of electrons (by a molecule, atom or ion) during a reaction. Oxidation is a reaction where a substance combines with oxygen.

Oxidizing Material: Liquids or solids that can decompose (breakdown) easily to release oxygen or other oxidizing substances.

Parts Per Billion (ppb): A term that expresses the number of units of a given substance that exist as a part of a greater substance comprised of one billion parts. Used to express low concentrations of something.

Parts Per Million (ppm): A term that expresses the number of units of a given substance that exist as a part of a greater substance comprised of one million parts. Used to express low concentrations of something.

Personal Protective Equipment (PPE): Equipment worn by workers to minimize exposure and protect against hazards in the workplace; examples include respirators, ear muffs, and chemical aprons.

Pest: An unwanted organism that harms humans, plants or animals; may be an insect, bacteria, fungi, weed, virus, etc.

Pest Control Product Registration Number: A unique number assigned to a pesticide when the product registration was granted.

Pesticide: Substances or devices used for the purpose of preventing, repelling, attracting, killing or managing pests.

Physical Hazard: A chemical that poses a physical hazard, such as an explosion; in WHMIS, there is a Physical Hazards Group which contains 19 Physical Hazard Classes, such as gases under pressure and combustible dusts.

pH: A measure of the acidity or alkalinity of a substance.

pH Scale: A scale of 0 to 14 used to describe the acidity or alkalinity of a solution, where 0 is highly acidic, 7 is neutral and 14 is extremely basic. pH stands for “potential of Hydrogen”.

Photosynthesis: The process used by plants to covert light energy into chemical activity; sunlight is used to create food for the plant from carbon dioxide and water.

Pictogram: A diamond shape border with special symbol used to show what kind of hazard is present; the only exception to this is the biohazardous infectious material symbol which has a round black circle for a border.

Poison: A substance capable of causing the illness or death of a living organism when introduced or absorbed.

Potency: The amount of a substance necessary to product an effect; the chemical strength or efficacy of a substance.

Precautionary Statement(s): Standardized phrases that communicate information on how to prevent or minimize the harmful effects of the product.

Reaction: A chemical process where one or more substances are transformed or changed into one or more different substances.

Reactivity: How likely a substance is to experience a chemical reaction, which commonly (but not always), releases energy.

Readily Available: Easily accessed by all workers; not locked somewhere. Uncomplicated to find and obtain.

Reproductive Toxicity: Negative effects on sexual function and fertility in mature or fully grown organisms, as well as negative effects on the development of their offspring.

Respiratory Sensitization: An allergic reaction in lung tissue after having become sensitized to a substance; individuals can have severe reactions even if the amount they are exposed to is very small.

Responsibilities: The tasks or duties that people in the various roles are expected to complete as a function of their job.

Risk: The probability or likelihood that an adverse effect will occur.

Roles: Positions that are held by various people on the farm.

Routes of Entry: The ways that a chemical enters the body, such as through inhalation, ingestion, absorption and injection.

Safety Data Sheet (SDS): A document that contains detailed information about a product. Its purpose is to inform users on what the hazards of the product are, how to use the product safely, how to recognize symptoms of exposure, and what to do in the event of an incident.

Sensitizer: A sensitizer is a substance that causes an allergic reaction in skin or lung tissue after repeated exposures. Once sensitized, individuals can have severe reactions to further exposures, even if the amount they are exposed to is very small.

Serious Eye Damage: Damage to eye tissue, or serious physical decay of vision, following exposure of eye tissue to a substance; this damage or decay is not fully reversible.

Signal Word: "A word used to alert the reader to a potential hazard and to indicate the severity of the hazard." (Canadian Centre for Occupational Health and Safety, 2021).

Simple Asphyxiants: "Hazardous products classified in this hazard class may displace oxygen in air and cause rapid suffocation. These products are gases that are liable to cause asphyxiation by the displacement of air" (Government of Alberta, 2018, p.47).

Skin Sensitization: An allergic reaction of the skin after having become sensitized to a substance; individuals can have severe reactions even if the amount they are exposed to is very small.

Smoke: A collection of very small solid, liquid and gas particles resulting from incomplete combustion.

Solvent: A substance that can dissolve another substance, such as water dissolving another substance (solid, liquid, or gas) to form a solution.

Solubility: The ability of a substance to be dissolved in a solvent.

Specific Target Organ Toxicity (STOT)—Repeated Exposure: Specific target organ toxicity resulting from repeated exposure to a substance or mixture.

Specific Target Organ Toxicity (STOT)—Single Exposure: Specific, non-lethal target organ toxicity resulting from a single exposure to a chemical.

Suffocation: Death that is a result of being unable to breath or from a lack of air.

Supplemental Information: Information that may be required based on the products classification and may also include hazards not included in the GHS, physical state, routes of exposure, or even precautionary actions.

Supplier Label: "Provides basic identification and hazard information on a hazardous product or its container. This label is provided as a condition of sale by the supplier (manufacturer, processor, packager or importer) of a hazardous product" (Alberta of Government, Labour, 2018, p.29-6).

Suspension: A uniform mixture of particles in a fluid. When a solid does not dissolve in a liquid, a suspension is formed.

Synthesis: A process of combining ingredients or elements into a whole or single entity (chemical compound).

Systemic Pesticides: This type of pesticide is absorbed by the organism and travels through its body to a place where it will take effect.

Teratogen: An agent that causes the malformation of an embryo (birth defects) or increases the frequency of an anomaly in the population.

Threshold Limit Value (TLV): A term used to express the occupational exposure limit of chemical substance to which workers can be exposed day after day, without negative effects.

Time Weight Average (TWA): The relative amount of a material a person is exposed to, averaged over the total exposure time, such as an 8-to-12-hour workday.

Treated Seed: Seed that has had biological organisms, biological products and/or chemical ingredients applied to it to for the purpose of supressing, controlling or repelling plant pathogens or other pests.

Toxic Substance: Any substance that can cause injury or illness, or one that is suspected of being able to cause injury or illness under some conditions.

Toxicity: The property of a substance being harmful to a living thing and the level of harm it can cause.

Trade Name: The commercial or trademark name of a product.

Trade Secret: Ingredients or formulations that are protected that do not have to be included on a label or SDS; trade secrets are considered valuable and confidential information that give the company a competitive edge.

Transportation of Dangerous Goods (TDG): "Federal legislation that controls the conditions under which dangerous materials may be transported on public roads, in the air, by rail or by ship. Its purpose is to protect the health and safety of persons in the vicinity of transport accidents involving those materials" (Government of Alberta, 2018, p.48).

United Nations Number (UN Number): A four-digit number that identifies hazardous materials and articles (such as explosives, flammable liquids, oxidizers, toxic liquids, etc.) in the respect to international transport.

Unstable: The reactivity and tendency to decompose of a compound or mixture.

Vapour: The gaseous form or state of a substance.

Vapour Density: The density of a gas or vapor compared to the weight of an equal volume of air. The vapor density of air is equal to 1.

Volatile: A substance that evaporates easily at normal temperatures. A substance that can change state (e.g., from a liquid to a gas) very quickly and unexpectedly.

Volatility: A quality that describes how readily a substance vaporizes; for example, gasoline evaporates rapidly and is called a volatile liquid.

Workplace Hazardous Material Information System (WHMIS): The system used in Canada for classifying and labeling hazardous products in the workplace.

Worksite Label: "A work site label is used at the workplace in some circumstances during the storage, handling and use of a hazardous product, such as during production or when products are transferred to another container" (Alberta of Government, Labour, 2018, p.29-7).

Zoonotic Disease: A disease that is carried by animals and can be transmitted to people.

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