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# Hazardous Materials Control

## Learning Objectives:

- To learn what types of hazardous materials are in use in the Institute
- To become familiar with the requirements of WHMIS – WHMIS 1988 and the new WHMIS 2015
- To recognize WHMIS labels, symbols and pictograms
- To become familiar with the contents of Material Safety Data Sheets and Safety Data Sheets
- To learn good working practices recommended when handling hazardous materials

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# Hazardous Materials Control

**Hazardous materials in use in the Heart Institute include the following …..**

- **Radioactive Materials**
- **Biohazardous Infectious Materials**
- **Chemicals**

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# Radioactive Materials

- **Produce ionizing radiation – harmful because has sufficient energy to penetrate cells where it can create changes that may cause biological damage**

- **Natural background radiation – cosmic, terrestrial, bananas, tobacco, man made (smoke detectors) – we are all exposed to this**

- **In Research predominantly the use of radioisotopes**

- **Radiation Safety is based on the ALARA Principle**
  - As Low As Reasonably Achievable
  - Time / distance / shielding / contamination control

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# Radioactive Materials

- **Legislative Oversight**
  - Canadian Nuclear Safety Act / Commission
  - Health Canada
  - Ministry of Labour (Xray Safety)
- **The Heart Institute comes under the umbrella of the TOH Consolidated License**
- **Must comply with TOH Radiation Protection Manual**
- **More detailed training by Radiation Safety and Emergency Preparedness Department**

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# Biohazardous Infectious Materials

- Biohazardous Infectious materials are living organisms such as viruses and bacteria or the product of a living organism such as a biotoxin
- Workers could be exposed to biohazardous infectious materials from exposure to human blood, bodily fluids or tissue in patient care areas or to viruses and bacteria used in research laboratories.
- Legislative oversight is from the Public Health Agency of Canada … they have issued the Canadian Biosafety Standards and Guidelines
- There are also requirements under the Occupational Health and Safety Act and WHMIS
- Specific Biosafety training for users in Research

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# WHMIS

## Workplace Hazardous Materials Information System

**WHMIS = The right to Know(about hazardous materials that are used on the job)**

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# WHMIS 2015

- In 2015 Canada has aligned WHMIS with the Globally Harmonized System (GHS) for classifying chemical hazards and communicating health and safety information
- Why? … currently many different countries have different classification and labeling systems which can be confusing and difficult to comply with .. The UN developed the GHS which will standardize classification and labeling and facilitate communication
- GHS identifies 3 major hazard groups for chemicals:
  - Physical
  - Health
  - Environmental ….. Canada has not adopted this hazard group
- The essential elements of WHMIS remain the same – new pictograms and MSDSs are now SDSs.

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# WHMIS 2015

- The WHMIS 2015 Legislation is currently in force – that means suppliers of hazardous materials may begin to use the new pictograms and SDS format
- A supplier must either choose to comply with WHMIS 1988 or WHMIS 2015 – cannot use both systems
- In 2017 the new regulations will be fully in force
- Means that right now workers need to be familiar with both the old WHMIS and the new

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# Staying the same ….

- **Information Delivery System**
  - System of Labels
  - Use of Material Safety Data Sheets (MSDS) / Safety Data Sheets
  - Worker training programs
- **Application to all Canadian workplaces**
- **Supplier responsibilities**
  - Classify their hazardous products
  - Label appropriately
  - Prepare and provide (material) safety data sheets to customers

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# Staying the same ….

- **Employer responsibilities**
  - Identify all hazardous materials in the workplace
  - Obtain and post all applicable SDSs
  - Ensure workplace labels are applied where required
  - Provide training to employees
- **Worker rights and responsibilities**
  - Right: to know all about the hazardous materials being used on the job
  - Responsible to attend training and apply the knowledge when working with hazardous materials
  - Report any non-compliance items such as missing labels or MSDSs/SDSs to the supervisor

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# WHMIS 1988 …

- **WHMIS 1988 identified 6 hazard classes with 8 symbols**

Class A – Compressed Gases

Class B – Flammable and Combustible Materials

Class C – Oxidizing Materials

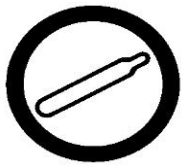
Class D – Poisonous and Infectious Materials

- D1: Immediate and Serious Toxic Effects
- D2: Other Toxic Effects
- D3: Biohazardous and Infectious Materials

Class E – Corrosive materials

Class F – Dangerously Reactive Materials

- **The symbols were enclosed in a circle such as …**



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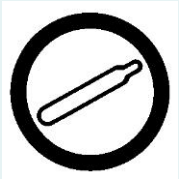
# WHMIS Hazard Classes

| Class | Symbol | Example |
|---|---|---|
| Class A - Compressed Gases – materials that are stored under pressure |  | Oxygen, Nitrous Oxide, Air |
| Class B – Flammable and Combustible Materials – can catch on fire and burn |  | Acetone, Isopropyl Alcohol |
| Class C – Oxidizing Material – can support burning by providing a source of oxygen |  | Oxygen |

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# WHMIS Hazard Classes

| Class | Symbol | Examples |
|---|---|---|
| Class D – Poisonous and Infectious Material<br>3 Subclasses and 3 symbols | | |
| D1 Immediate and Serious Toxic Effects – acutely poisonous materials<br>  | D2 Other Toxic Effects – chronic or long term toxic effects<br>  | D3 Biohazardous and Infectious Materials - living organisms or the product of living organisms that can cause disease<br>  |

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# WHMIS Hazard Classes

| Class | Symbol | Examples |
|---|---|---|
| Class E – Corrosive Materials – strong acids or alkalis |  | Acids – Hydrochloric, Alkalis – Ammonium Hydroxide |
| Class F – Dangerously Reactive Materials – self reactive, reacts vigorously with water or undergo vigorous chemical reactions |  | Picric Acid, Acetylene, Ethylene Oxide |

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# WHMIS 2015 …

- **Applies two major hazard groups – physical and health**
- **Each hazard group includes hazard classes that have specific hazardous properties such as …**
  - Physical – flammability, reactivity or corrosivity etc
  - Health – acute toxicity, eye irritation, respiratory sensitization etc
- **Pictograms are used to show the user what type of hazard is present for the particular hazardous product …. At a glance the user can see, for example, if the product is flammable, toxic etc**
- **Most have a red square on point border with the symbol inside the border …..**

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# WHMIS 2015 Pictograms

| | | | | | |
|---|---|---|---|---|---|
|  | **Exploding bomb** (for explosion or reactivity hazards) |  | **Flame** (for fire hazards) |  | **Flame over circle** (for oxidizing hazards) |
|  | **Gas cylinder** (for gases under pressure) |  | **Corrosion** (for corrosive damage to metals, as well as skin, eyes) |  | **Skull and Crossbones** (can cause death or toxicity with short exposure to small amounts) |
|  | **Health hazard** (may cause or suspected of causing serious health effects) |  | **Exclamation mark** (may cause less serious health effects or damage the ozone layer*) |  | **Environment*** (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 also defines an Environmental hazards group. This group (and its classes) was not adopted in WHMIS 2015. However, you may see the environmental classes listed on labels and Safety Data Sheets (SDSs). Including information about environmental hazards is allowed by WHMIS 2015.

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# Exemptions from WHMIS

- Explosives
- Pesticides
- Radioactive Material
- Manufactured goods
- Tobacco products
- Consumer goods
- Cosmetics, food and drugs
- Wood products

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# WHMIS Labels … 1988 and 2015

- **A source of information on a controlled product**
- **The first element of WHMIS information that directs users to the second element – MSDSs / SDSs**
- **Two types**
  - Supplier
    - Applied by the supplier before the product
    - enters the workplace
  - Workplace
    - Applied in the workplace by the user (when product is decanted or when supplier label is missing or damaged)

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# WHMIS Supplier Labels

## WHMIS 1988:

- Product name
- Reference to the MSDS
- WHMIS Symbol(s)
- Risk statements
- Precautionary measures
- Supplier name
- First aid information

- **Specific WHMIS border**
- **One bilingual label**

## WHMIS 2015

- Product identifier
- Initial supplier identifier
- Pictogram
- Signal word
- Hazard statement
- Precautionary statement(s)
- Supplemental label information

- **No specific border required**
- **Labels must be in English and French – one bilingual label or one English and one French**

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# Signal Word

- **WHMIS 2015 introduces the concept of a signal word**
- **A signal word is a word used to alert a user of a potential hazard of the material and to indicate the severity of the hazard**
- **There are 2:**
  - Danger is used for high risk hazards
  - Warning is used for less severe hazards
- **Signal words must be shown on the label and the "Hazards Identification" section of the SDS**

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# WHMIS Supplier Labels

## WHMIS 1988

(1. the product identifier)
Gasoline

(2. the risk phrase)
Highly Flammable Liquid

(3. the precautionary statement)
Keep Away From Open Flames

(4. the hazard symbol)

(5. reference that MSDS is available)
For Additional Information Refer To Material Safety Data Sheet

(6. first aid)
If Swallowed, Do Not Induce Vomiting

(7. the supplier identifier)
Southern Alberta Institute Of Technology
1301 - 16th Avenue N.W., Calgary, AB, T2M 0L4

## WHMIS 2015

### Product K1 / Produit K1

**Danger**
Fatal if swallowed.
Causes skin irritation.

**Precautions:**
Wear protective gloves.
Wash hands thoroughly after handling.
Do not eat, drink or smoke when using this product.

Store locked up.
Dispose of contents/containers in accordance with local regulations.

IF ON SKIN: Wash with plenty of water.
If skin irritation occurs: Get medical advice or attention.
Take off contaminated clothing and wash it before reuse.
IF SWALLOWED: Immediately call a POISON CENTRE or doctor.
Rinse mouth.

**Danger**
Mortel en cas d'ingestion.
Provoque une irritation cutanée.

**Conseils :**
Porter des gants de protection.
Se laver les mains soigneusement après manipulation.
Ne pas manger, boire ou fumer en manipulant ce produit.

Garder sous clef.
Éliminer le contenu/récipient conformément aux règlements locaux en vigueur.

EN CAS DE CONTACT AVEC LA PEAU : Laver abondamment à l'eau.
En cas d'irritation cutanée : Demander un avis médical/consulter un médecin.
Enlever les vêtements contaminés et les laver avant réutilisation.
EN CAS D'INGESTION : Appeler immédiatement un CENTRE ANTIPOISON ou un médecin.
Rincer la bouche.

Compagnie XYZ, 123 rue Machin St, Mytown, ON, N0N 0N0 (123) 456-7890

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# Workplace Labels

## WHMIS 1988
## 3 categories of information

- The product identifier
- Safe handling procedures
- Reference to the material safety data sheet

**No requirement for borders or hazard symbols**

## WHMIS 2015
## 3 categories of information

- Product name
- Safe handling precautions – may include pictograms
- Reference to the safety data sheet if available

**No requirement for borders**

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# Material Safety Data Sheets

- Provides detailed information about the potential hazards of a product and how to work safely with the material
- Second element of the "Information System"
- In Canada every material that is controlled by WHMIS must have an accompanying MSDS
- Nine categories of information are legislated – All sections must be completed
- MSDSs expire after 3 years and must be updated

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# MSDS Information

| Section | Content |
|---|---|
| Product Information | Product identifier<br>Manufacturer and supplier names / addresses<br>Emergency telephone numbers<br>Product use |
| Hazardous Ingredients | A list of ingredients<br>Concentration of each<br>Lethal dose<br>Lethal concentration |
| Physical Data | Physical state<br>Odour and appearance / odour threshold<br>Vapour pressure<br>Vapour density<br>Boiling point / evaporation rate<br>pH<br>Specific gravity ….. |

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# MSDS Information ….

| Fire and Explosion Hazard | Characteristics of the substance that make it likely to ignite and burn<br>Flash point<br>Upper and lower flammable limits<br>Auto-ignition temperature<br>Hazardous combustion products<br>Means of extinction |
|---|---|
| Reactivity Data | Chemical stability / instability of the product and chemicals with which it may react dangerously<br>Hazardous decomposition products |
| Toxicological Information | How does the chemical enter the body and what are the short term (acute) and long-term (chronic) health effects of exposure:<br>•Irritant / sensitizer<br>•Carcinogen / mutagen / teratogen / reproductive toxin<br>•Exposure limits<br>•Synergistic products |

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# MSDS Information …

| | |
|---|---|
| **Preventive Measures** | **A description of measures that can be taken to prevent exposure during handling, storage and disposal**<br>**Personal protective equipment**<br>**Engineering controls**<br>**Waste disposal**<br>**Spill procedure**<br>**Storage requirements …….** |
| First aid measures | Specific first aid measures related to the acute effects of overexposure to the product |
| Preparation Data | Who prepared the MSDS information<br>Date of preparation |

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# WHMIS 2015 … Safety Data Sheet

- Summary documents that provide information about the hazards of a product and advice about safety precautions (so essentially the same as an MSDS)
- Every product that is classified as a hazardous product under WHMIS must have an SDS
- 16 Sections are legislated
- No listed expiry date … when the supplier becomes aware of new information the SDS must be updated

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# SDS Information

| Section | Content |
|---|---|
| Identification | Product identifier (name)\ any other means of identification<br>Recommended use / restrictions on use<br>Canadian Supplier<br>Emergency telephone number |
| Hazard identification | Hazard classification<br>Label elements – symbol, hazard statement(s), precautionary statement(s)<br>Other hazards not indicated by classification |
| Composition/Ingredient Information | Chemical name<br>Common name and synonyms<br>CAS number or any unique identifier<br>Chemical name of impurities or additives if any concentration |

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# SDS Information ….

| First aid measures | First aid measures by route of exposure – skin, inhalation, eye contact or ingestion<br>Most important symptoms and effects<br>Immediate medical attention and special treatment if necessary |
|---|---|
| Fire Fighting measures | Suitable / unsuitable extinguishing media<br>Specific hazards arising from the hazardous product<br>Special PPE and precautions for fire-fighters |
| Accidental Release measures | Personal precautions, PPE and emergency procedures<br>Materials and methods for containment and clean up |
| Handling and storage | Precautions for safe handling<br>Conditions for safe storage (including incompatible materials) |
| Exposure Controls / personal protection | Occupational exposure guidelines / limits<br>Appropriate engineering controls<br>Individual protection measures such as PPE |

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# SDS Information ….

| Physical and chemical properties | Properties such as appearance, odour, odour threshold, pH, boiling point, melting point, flash point, flammable limits, etc |
|---|---|
| Stability and reactivity | Reactive or not, incompatible products, hazardous decomposition products, conditions to avoid etc |
| Toxicological information | Description of the various toxic health effects and the data used to identify those effects such as:<br>Routes of exposure<br>Symptoms<br>Delayed and immediate effects, chronic and acute effects |
| Ecological Information | Hazards to the environment, does it bio-accumulate etc.<br>Under WHMIS 2015 this section must be listed but information does not have to be provided |

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# SDS Information ….

| Disposal considerations | Information on safe handling for disposal and methods of disposal, including any contaminated packaging<br>Under WHMIS 2015 this section must be listed but information does not have to be provided |
|---|---|
| Transport Information | Any information related to the safe transportation in accordance with Transportation of Dangerous Goods regulations: UN number, proper shipping name, packing group, special precautions etc<br>Under WHMIS 2015 this section must be listed but information does not have to be provided |
| Regulatory Information | Safety, health and environmental regulations specific to the product<br>Under WHMIS 2015 this section must be listed but information does not have to be provided |
| Other Information | Date of the latest revision of the SDS |

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# Working Safely with Hazardous Materials

- Read the MSDS / SDS…. Know the hazard(s)
- Use / Wear appropriate PPE
- Keep containers closed when not in use
- Use, store or handle in a well ventilated area or in the fumehood
- Keep only the smallest amounts possible in the work area
- Label all hazardous materials
- Practice good housekeeping (decontaminate surfaces frequently)
- Practice good personal cleanliness – frequent hand washing
- Segregate hazard classes in storage
- Report all accidents, spills and exposures to the supervisor

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# Working Safely …….

- **Behave appropriately in the lab – no horseplay, practical jokes or distracting behaviour**
- **Tie back long hair and confine loose clothing or jewelry**
- **Never eat (even chewing gum), drink, apply cosmetics or handle contact lenses in the lab**
- **Clean up spills immediately**
- **Compressed Gases**
  - Store in a cool, dry well ventilated space in a securely fastened upright position
  - Leave protective valve cap in place when not in use
  - Always transport using an appropriate cart / hand truck
  - Label empty containers "EMPTY" and segregate
- **Flammable and Combustible Material**
  - Eliminate ignition sources
  - Store separately from oxidizing materials in approved flammable storage cabinets
  - Minimize the amount in storage

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# Working Safely….

- **Oxidizing Materials**
  - Eliminate ignition sources
  - Store separately from flammable materials
- **Corrosives**
  - Use appropriate personal protective equipment –goggles not glasses
  - Add acid to water not the reverse
  - Store in corrosives or acid cabinet
  - Do not store acids and bases together or under sinks
- **Reactives**
  - Date container when first opened
  - Plan your experiments / know the specific hazards or reactive properties of the chemical you are working with
  - Wear safety glasses with side shields or goggles
  - Do not handle containers where crystals have formed around the cap or lid

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# Remember to take the WHMIS Quiz …

- http://www.classmarker.com/online-test/start/?quiz=dbh5305063e2c256
- **Password: healthandsafety**