

LESSON 01: CHEMICAL SAFETY

Unit 04: Hazard Control

Introduction:

While we cannot always run from the presence of hazards, we can always minimize its effect by conducting activities that help in the control of our exposure. This part of the lesson will give ideas on different measures that are being incorporated to keep ourselves safe from possible effects of our exposure to substances that may have harmful or adverse effects on us and the environment.

Learning Objectives:

After successful completion of this lesson, the students are expected to:

1. Enumerate and discuss the different hierarchy of hazard controls.
2. Demonstrate the knowledge on the use of personal protective equipment.
3. Demonstrate knowledge on preparedness during emergencies.

Course Materials:

The Hierarchy of Hazard Controls

The effect(s) of exposure to chemical hazards can be minimized using different measures of exposure control.



Figure 3: Hierarchy of Hazard Controls. Image Source: "Chemical Safety Training Course Material" downloaded from <https://www.uab.edu/ehs/images/docs/chem/CS101-course-material.pdf>

1. **Elimination:** This is the most effective means of minimizing the exposure of personnel to a chemical hazard. In here, the hazard is physically removed from the work environment.

2. **Substitution:** If elimination is not possible, a chemical that is less hazardous is used to replace the existing more hazardous one.

3. **Engineering Controls:** If the above measures are not available, isolating the people away from the hazard can be done such as the establishment of a safety compartment that separates or limits the exposure of the personnel from the hazard.

4. **Administrative Controls:** The way people handle the chemicals can also be a means to minimize the effects of being exposed to the harmful substance. Changing the way people work is what comprise the administrative controls.

5. **Personal Protective Equipment:** Protecting oneself from a hazard with appropriate personal protective equipment is the first line of defense when limiting the exposure from a hazard. However, this method of exposure control is the least efficient of them all.

The Personal Protective Equipment for Chemical Safety

Personal protective equipment (PPE) are garments and devices that serves as a barrier between the user and the hazard being exposed to. There are several types of PPEs available which are classified in terms of their usage. The ones that are included here are those that are specific for chemical safety.



Safety glasses are used whenever there is a chance of objects striking the eye. They are not appropriate protection from a chemical splash.

IMAGE SOURCE: www.sentrysafetysupply.com



Splash goggles are used when working with liquids.

IMAGE SOURCE: www.ebay.com



Face shield with splash goggles when the splash hazard is high, or the chemicals are particularly dangerous.

IMAGE SOURCE www.rockler.com

Figure 4: Personal Protective Equipment for Eye and Face Protections

Personal Protective Equipment (PPE) can be classified according to the part of the body that it intends to protect.

1. Eye and face protection
 - a) Safety spectacles
 - b) Eye goggles
 - c) Face shields
2. Respiratory protection
 - a) Filtration respirators
 - b) Chemical cartridge devices
 - c) Air-supplying equipment
3. Hand and arm protection
 - a) Gloves
4. Foot and leg protection
5. Torso protection
 - a) Laboratory gowns and coats

However, it should be noted that the use of personal protective equipment has its limitations. Among them are:

1. The use of PPE does not change the fact that the hazard still exists.
2. Wearing a defective PPE offers no protection.
3. Improper wearing of PPE may not give maximum protection.
4. The PPE may be a cause of additional hazard.

Preparing for Emergencies

1. In case of burns and small cuts, look for a laboratory first aid kit and treat self accordingly. Go to the nearest clinic or hospital, as the need arises.
2. In case of laboratory spillage, know the property of the substance that you are to deal with. Make sure to use the appropriate spill kit available. Protect yourself with appropriate personal protective equipment. Confine the spill clean it up and properly dispose.



Figure 5: Spill Kit. Image source www.google.com, www.serpro.co.uk

- In case of chemical splashes, head to the nearest eye wash or eye shower and follow proper procedures as indicated on the product's SDS.



Figure 6: Eye Wash and Shower Stations. Image sources www.zoro.com, www.texasgateway.org

- Check on the labels of the available fire extinguishers near the workplace. In case of fire, make sure that you are using the appropriate type.



| Type of Fire Extinguisher | Type of Fire |
|---------------------------|---|
| Class A | ordinary combustible materials (paper, wood, cardboard, most plastics) |
| Class B | flammable or combustible liquids (gasoline, kerosene, grease, and oil) |
| Class C | electrical equipment (appliances, wiring, circuit breakers, outlets) |
| Class D | combustible materials often found in chemical laboratories (magnesium, titanium, potassium, sodium) |

Figure 7: Fire Extinguisher Classifications Image source: www.medisave.co.uk; safetysuppliescanada.com

- Always put SAFETY FIRST.

Activities and Assessments:

- What are the different hierarchy of hazard controls? Give an example for each
- Give situations when you can appropriately use safety glasses, safety goggles and face shields.
- The lesson on Chemical Safety ends with the slogan "Think Safety First." Why is this so? How are you going to practice during times of emergencies? Cite an example of a situation to answer the question.