Terminology

1. Chemical hazard is a chemical substance that could potentially cause harm to the human body or even cause loss of life.

a) Health Hazard These substances may cause serious health effects, such as cancer, mutated genes or a damaged respiratory system.

b) Flammable These substances may cause a fire hazard due to spontaneous combustion or flammable gas.

c) Harmful These substances may cause less serious health effects, such as irritation to the skin, eyes or respiratory system.

d) Corrosives These substances may corrode or burn metals, skin and eyes. Examples include acids or bases, such as hydrochloric acid.

e) Explosives These substances, such as TNT, may explode or react with themselves.

f) Oxidizing These substances are oxidizing gases, liquids or solids.

g) Environmental Hazards These substances, such as zinc oxide, may cause damage to an aquatic environment.

h) Toxic These substances may cause death or poisonous effects from short exposure.

2. Biological hazards are organic substances that present a threat to the health of people and other living organisms.

a) Biological agents: Some biological hazard examples under this classification include bacteria, viruses, parasites, and fungi (such as yeasts and molds). These are commonly considered harmless if kept under control, while some may cause serious risks and diseases to animal or humans like the COVID-19 virus.

b) Biotoxins : These refer to a group of substances with a biological origin that are toxic and poisonous to humans. Often, biotoxins are produced by plants, bacteria, insects, or certain animals, among others. Continuous exposure to these may cause, at the very least, a series of inflammatory reactions throughout the body.

c) Blood and blood products : While blood isn't considered a biological hazard, it can still bring potential risks if it's contaminated or its source is in any way infected. Also, blood products such as red blood cells, white blood cells, plasma, tissues, and platelets are also hazardous if not properly handled.

e) Environmental specimens: Generally, these refer to plants, soil, or water that potentially contain the first two types of biological hazards—biological agents and biotoxins.

3. Physical hazard is an agent, factor or circumstance that can cause harm with contact.

a) Temperature

Both very cold and very hot temperatures can be dangerous to your health. In a very hot environment, the most serious concern is heat stroke, and in a cold environment, hypothermia and frostbite. While there is no maximum temperature specified, legislation does include a range of acceptable temperatures for various circumstances.

b) Noise

Noise is one of the most common workplace health hazards. In heavy industrial and manufacturing environments, as well as in farms, cafeterias, permanent hearing loss is the main health concern. Annoyance, stress and interference with speech communication are the main concerns in noisy offices, schools and computer rooms.

c) Radiation

Sunlight is the greatest source of ultraviolet (UV) radiation. Man-made UV sources include UV lamps, arc welding, and mercury vapour lamps. UV radiation is widely used in industrial processes and in medical and dental practices for a variety of purposes. Excessive exposure to UV radiation is associated with skin cancer, sunburn, accelerated skin aging, and eye disease.

LABORATORY SAFETY RULES

The following safety rules must be followed at all times in the laboratory. The chemical laboratory is not necessarily a dangerous place. Intelligent precautions and a proper understanding of techniques to be followed make the chemistry laboratory no more dangerous than any other classroom.

1. **Safety goggles (department approved) must be worn in the lab at all times.** Glasses and contact lenses are not acceptable eye protection. Students who do not follow this rule will be asked to leave the lab immediately.

2. **Never eat or drink in the lab.** Food may pick up toxic chemicals.

3. **Never inhale fumes or vapors.** Use fume hoods for dangerous or irritating chemicals. Always waft odors toward your nose with your hand.

4. **Never taste any chemical.** Some chemicals are very corrosive and poisonous in very small quantities.

5. **Never perform an unauthorized experiment and never work in the lab without an instructor in charge**. An accident may happen when mixing simple chemicals.

6. Never remove anything (chemicals, glassware, etc.) from the lab.

7. Label all containers to identify their contents.

8. **Never put anything back into a reagent bottle.** Once a reagent has passed the mouth of its container, it has passed the point of no return. Always take as little of a chemical as possible. Use only clean, dry spatulas for removing chemicals from bottles. Properly dispose of excess chemicals.

9. Leave chemicals in their proper place. Do not carry original containers of chemicals to your benchtop.

10. **Avoid touching hot objects.** Burns are a common accident in the chemistry lab. Be careful when using hot plates and objects which have been heated on them. Use beaker tongs to remove hot containers from the hot plate.

11. **Rinse spills off skin immediately**. Rinse off any chemicals spilled on the skin immediately with large amounts of water.

12. **Clean up broken glassware immediately**. Place it in the labeled crock at the front of the lab. Obtain replacement glassware from the instructor.

13. **Properly dispose of waste chemicals**. Certain liquids can be poured into the sink and flushed with water while others are poured intodesignated waste containers. Most solid wastes are placed in designated crocks. Your instructor will provide disposal instructions each lab.

14. **Notify your instructor immediately of all accidents**.

15. **Learn to locate and operate** (if applicable), the safety shower, fire extinguisher, eye-wash fountain, fire blanket, and fire exit.

Laboratory Glassware and Plasticware

Laboratory glassware is made of borosilicate glass, while plasticware refers to a set of equipment made from different types of plastic materials. Plasticware is flexible and easier to handle, whereas, glassware is best suited for conducting vigorous reactions and heating chemicals despite its brittle nature.

Glassware items such as:

- **Bulb and graduated pipettes.** These are used to transport specific amounts of fluids from one place to another.
- **Burettes.** These are used to dispense exact quantities of liquid into another vessel.
- **Beakers.** Simple containers used to hold samples and reagents.
- **Condensers.** Specifically used to cool heated liquid.
- **Retorts.** These are used for distillation purposes.
- **Funnels.** The tapered neck of a funnel allows easy pouring of a liquid into a narrow orifice.
- **Petri dishes.** Shallow dishes used to culture living cells.
- **Graduated Cylinders.** Similar to beakers, these cylindrical vessels have volumetric markings to allow for monitoring of volume.
- **Vials.** Small bottles used to store samples or reagents.
- **Slides.** Used to hold items under a microscope for inspection and study.
- **Stirring Rods.** Used to mix solvents and samples together.
- **Desiccators.** A container designed to absorb moisture from a substance.