



*The Second Practical Lab.*

## *Lab. Safety*





# Why is Lab Safety Important?



- Lab safety is a major aspect of every lab based science class.
- Lab safety rules and symbols are needed so that students do not injure themselves or their classmates.



# Safety(Precautions)in the biochemical lab.

- Laboratory safety rules and safe work practices or standard operating procedures (SOPs) should be established by lab to meet specific operational needs and to reduce the risks associated with laboratory hazards.
- As a condition of entry to a laboratory, all individuals must complete a laboratory safety induction and receive specific training in local safety rules and laboratory procedures relating to their work (including relevant SOPs).





# General Safety Rules:

1. Wear safety goggles to protect eyes from chemicals, heated materials, or things that might be able to shatter.
2. Listen to or read instructions carefully before attempting to do anything.
3. Notify your teacher if any spills or accidents occur.
4. Use apron or gown while entering in Lab.
5. Wear shoes that cover your feet .
6. Always wear gloves while working in lab.
7. Always wear mask while working in lab.
8. After handling chemicals, always wash your hands with soap and water.
9. During lab work, keep your hands away from your face.
10. Tie back long hair.
11. Work areas/surfaces must be disinfected before and after use.



# Lab Safety Rules

12. Label all materials with name, date, and any other applicable information.
13. Dispose of wastes in their proper containers.
14. Do not pour chemicals down the sink.
15. Do not walk about the laboratory with transfer loops, wires, needles, or pipettes containing infectious materials.
16. Know the location of the fire extinguisher, fire blanket, eyewash station, and first aid kit.
17. Keep your work area uncluttered. Take to the lab station only what is necessary.
18. No food or drinks are permitted in the laboratory at any time.
19. Never put anything into your mouth during a biochemical lab experiment.
20. Clean up your lab area at the conclusion of the laboratory period.
21. Never “horse around” or play practical jokes in the laboratory.



# Lab Safety Rules

## 1. Wear Protective clothing .



### Protective clothes

1. **Gloves** are essential.
2. **Lab coats** are required.
3. **Safety glasses ( goggles)** may be required to avoid splashes.





# Lab Safety Rules

2. Laboratory personnel should not wear sandals

## Do NOT Wear:

- Jewelry
- Loose or Baggy clothing

3. Avoid **touching** objects (e.g., pencils, cell phones, door handles) while wearing gloves.

4. Pencils, labels, or any other materials should never be placed in your mouth.

5. Caution must be taken when using gas burners. Be sure gas burners are turned off when finished.





# Lab Safety Rules

6. Long hair must be tied back or covered to minimize fire hazard or contamination of experiments.



7- Do not eat food or drink water in the lab. do not use lab glassware as food or water containers.



8- Protect your hands safety:

- wash hands after every lab.
- Handle glassware, sharp tools and heated containers carefully.



9- electrical safety:

- unplug electrical equipment after use.
- keep all electrical cords and wires away from water .







# Lab Safety Rules

## 10- Chemical safety:

- never touch, taste or smell a chemical unless instructed to do so.
- never mix chemicals unless instructed to do so.
- keep lids on chemical containers when not in use.



## 11-Do not take any cultures out of the lab for any reason.

- All cultures should be handled as potentially pathogenic.
- Liquid cultures must always be kept in a test tube rack.



## 12- Do not engage in practical jokes or horseplay in the lab.

## 13-Keep nonessential books and clothing far away from your work area.



# Keep your lab area clean.



Throw away used paper towels and used gloves, **immediately.**

Don't block the floor in front of the eyewash/shower station.



Don't leave things in the floor because someone will trip over it.

Don't leave cords dangling because someone will trip over them.





# Lab Safety Rules

14-Wipe the bench tops down with disinfectant both before you begin your work and after you have completed your work.



15- Dispose of waste products according to instructions.



16-Report all accidents, no matter how minor, to your supervisor!!

- Always check your glassware and discard any with chips, breaks, or obvious flaws.
- Throw away broken glassware into special glass waste containers





# Lab Safety Equipment

• Safety shower



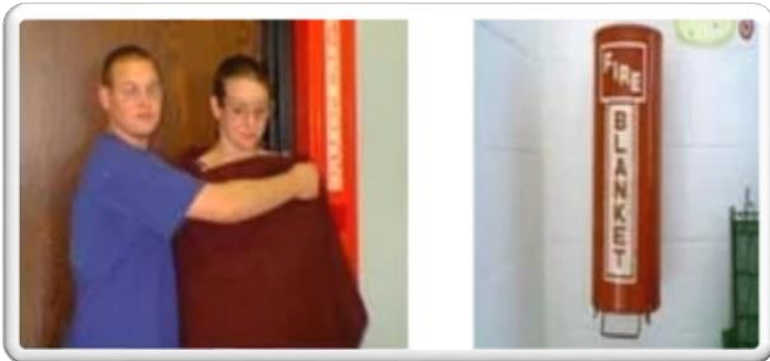
Safety Goggles



• Eye wash



• Fire Blanket












• Fire Extinguisher





# Lab Safety Symbols














 <p>Dangerous to the environment</p>	 <p>Toxic</p>	 <p>Gas under pressure</p>
 <p>Corrosive</p>	 <p>Explosive</p>	 <p>Flammable</p>
 <p>Caution – used for less serious health hazards like skin irritation</p>	 <p>Oxidising</p>	 <p>Longer term health hazards such as carcinogenicity</p>





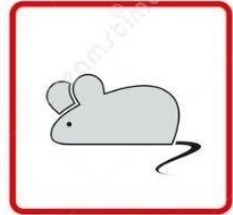
# Lab Safety Symbols

 Explosive H19A-S	 Oxidising H22A-S	 Extremely flammable H20A-S	 Corrosive H18A-S	 Dangerous for the environment H21A-S
 Harmful H15A-S	 Highly flammable H13A-S	 Toxic H16A-S	 Irritant H14A-S	 Very toxic H17A-S

 Harmful	 Explosive	 Corrosive	 Dangerous for the environment
 Flammable	 Toxic	 Oxidizing	
 Radioactive	 Biohazard	 Poison	 Oxidizing
 General danger	 Explosive	 Flammable	 Electrical hazard



# Lab Safety Symbols



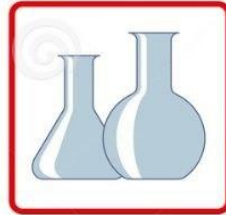
Animal hazard



Sharp instrument hazard



Heat hazard



Glassware hazard



Chemical hazard



Electrical hazard



Eye & face hazard



Fire hazard



Biohazard



Laser radiation hazard



Radioactive hazard



Explosive hazard



# Lab Safety Symbols and Definitions

- Flammable



- Explosive



- Toxic/Poison



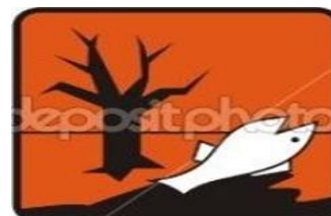
- Irritant



- Corrosive



- Environmental







# Lab Safety Symbols and Definitions

## Flammable -

- Any substance that will burn if exposed to an open flame.



## Toxic/Poison –

- A substance that can lead to death if inhaled, ingested, or absorbed by the skin.



## Irritant -

- A substance that causes inflammation upon contact with skin or mucous membranes.



## Explosive –

- A substance that may explode if exposed to heat or flame.



## Corrosive –

- A substance that can destroy or burn living tissue and can eat away at other materials.



## Environmental -

- Substances that are harmful to the environment. They must be disposed of properly, not washed down the drain.





# Introduction to Biosafety

- **Biosafety**

The application of knowledge, techniques and equipment to prevent personal, laboratory and environmental exposure to potentially infectious agents or biohazards.

- **Objectives of studying biosafety:**

to reduce the potential exposure of the laboratory worker, persons outside of the laboratory, and the environment to potentially infectious agents



# Definition

- **Hazard** is anything that may cause injury, harm or damage. Danger or risk while working in laboratory is called **laboratory hazards(Hazardous agents)**. **Hazard** is an agent which has the potential to cause harm to a vulnerable target.
- The laboratory environment can be a hazardous place to work. Laboratory workers are exposed to numerous potential hazards including physical, chemical and biological or radioactive hazards.
- **Types of Laboratory hazard (Hazardous agents):-**
  1. **Physical hazard** - eg Fire, Injury, noise, radiation, high voltage apparatus, machinery with moving parts.
  2. **Chemical hazard**- eg corrosive, flammable, toxic, carcinogenic, poisonous, explosive
  3. **Biological hazard** - eg pathogenic microorganisms, animals, biological tissues, blood and other body fluids (human and animal).
  4. **Electrical hazard**



## Physical hazard:

- Hazard occurred by physical agent like heat, electrical or sharp materials is called physical hazard. Research facilities inherently have significant physical hazards present. Included here are electrical safety hazards, ergonomic hazards associated with manual material handling and equipment use, handling sharps, and basic housekeeping issues.
- Sharps containers are ubiquitous in labs and following a few safety rules can help prevent getting stuck with accident reports. Use only puncture-proof and leakproof containers that are clearly labeled. Train employees never to remove the covers or attempt to transfer the contents. Make sure these containers are only used for “sharps” and that they get replaced when three-fourths full to prevent overfilling.

# Physical hazards

## Physical hazards

Noise

Projectiles

Heating devices

Moving machinery  
accidents

Slipping





## Physical hazard:

### Precautions

1. Always wear gloves, apron, and mask while working in lab.
2. Do not use cracked or broken glass wares.
3. Use tongs and/or protective gloves to handle hot objects.
4. Never reach across an open flame or burner.
5. When heating a test tube, move it around slowly over the flame to distribute the heat evenly.
6. When lighting a burner, wait until the striker is in place before you turn on the gas.
7. Lay electrical cords where no one can trip on them or get caught in them.
8. Be sure your hands and your lab area are dry before using electrical equipment.
9. Unplug cords by pulling the plug and not the cord.
10. Unplug all electrical equipment at the end of the lab period.
11. Keep fire extinguisher in biochemical lab.



# Biological hazard:

- Hazard occurred by biological agents like blood, other body fluids, experimental animals etc is called biological hazard.
- Biological hazards include potential exposures to allergens, infectious zoonotic (animal diseases transmissible to humans), and experimental agents such as viral vectors. Allergens, ubiquitous in animal research facilities, are one of the most important health hazards, yet they are frequently overlooked.

# Definition



- **Precaution**
  - a measure taken in advance to prevent something dangerous, unpleasant, or inconvenient from happening.
- **Rationale**
  - a set of reasons or a logical basis for a course of action or a particular belief



# Precautions:



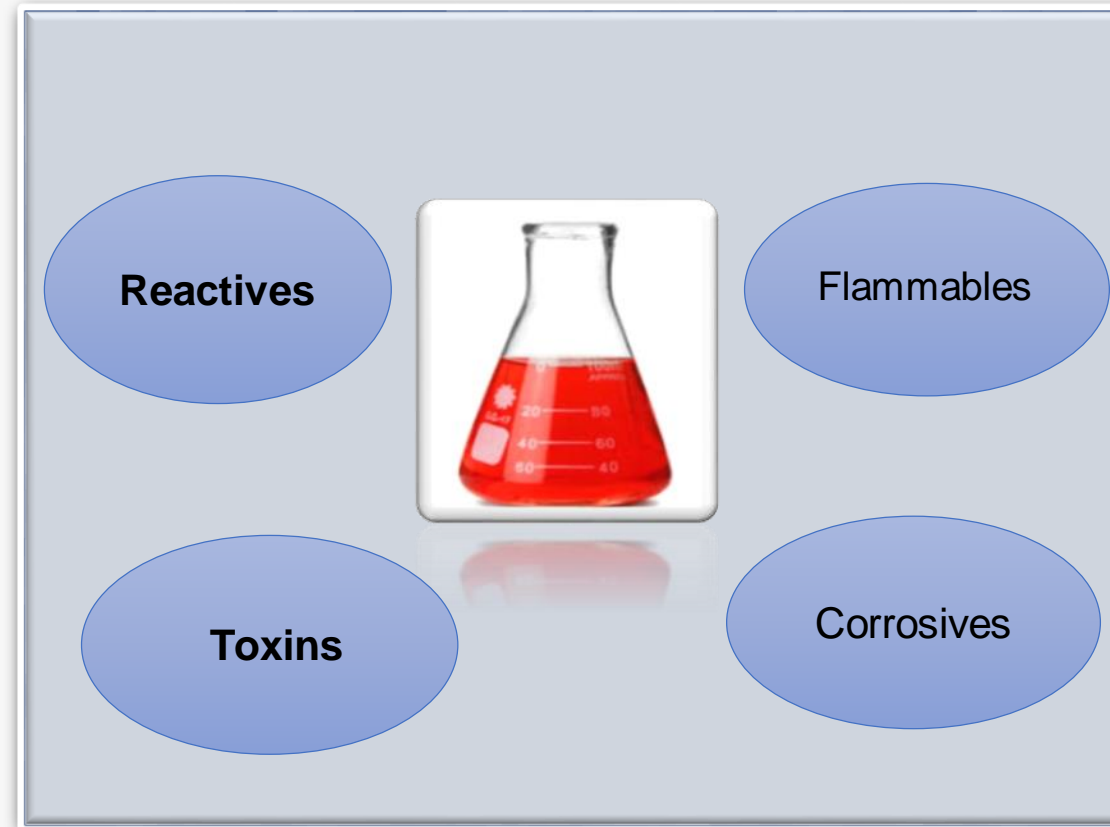
- 1. Always wear gloves, mask and apron while working in lab.
- 2. Use sodium hypochlorite as a disinfectant.
- 3. Properly dispose blood sample.
- 4. Properly dispose blood collected syringe.
- 5. Handle properly experimental animals.



# Chemical hazards

## Examples:

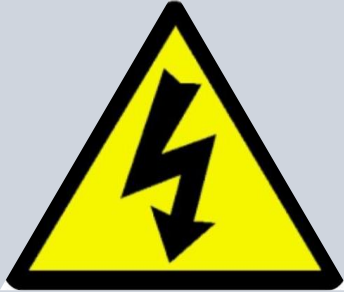
1. Spilled to your skin
2. Inhalation of chemical
3. Ingestion (pipetting)s





# Electrical hazards

Electrical hazards



Toxins



## Chemical hazard:

- Hazard occurred by different chemicals is called chemical hazard.
- Cleaning agents and disinfectants, drugs, anesthetic gases, solvents, paints, and compressed gases are examples of chemical hazards. Potential exposures to chemical hazards can occur both during use and with poor storage.
- The use of chemicals in research laboratories is inevitable, and the potential for harm or injury could be significant if they are misused or mishandled.



## Precautions :

1. Always wear gloves, mask and apron while working in lab.
2. Wear protective goggles and a lab apron whenever heating or pouring hazardous chemicals.
3. Never taste any chemicals (you should never taste anything in the lab).
4. If you need to smell the odor of a chemical, waft the fumes toward your nose with one hand. Do not put your nose over the container and inhale the fumes.
5. Never pour water into a concentrated acid. Acid should be poured slowly into water.
6. Follow the instructions of your teacher when disposing of all chemicals.
7. Wash your hands after handling hazardous chemicals.

# Precautions



- 1. Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in areas where specimens are handled.
  - **Why: To avoid the specimen being contaminated.**
- 2. Food and drink are not stored in refrigerators, freezers, cabinets, or on shelves, countertops, or bench tops where blood or other potentially infectious materials are stored or in other areas of possible contamination.
  - **Why: To avoid cross-contamination and ingestion.**

# Precautions



3. Long hair, ties, scarves and earrings should be secured.

- **Why: To avoid hair or accessories going into chemicals and samples.**

4. Appropriate Personal Protective Equipment (PPE) will be used where indicated: Lab coats or disposable aprons should be worn in the lab.

- Why: To protect you and your clothing from contamination.**

5. Lab footwear should consist of normal closed shoes.

- Why: To protect all areas of the foot from possible puncture from sharp objects and/or broken glass and from contamination from corrosive reagents and/or infectious materials.**

# Precautions



6. Gloves should be worn for handling blood and body fluid specimens, touching the mucous membranes or non-intact skin of patients, touching items or surfaces soiled with blood or body fluid, and for performing venipunctures and other vascular access procedures.

**Why: To avoid touching the blood or other body fluids of patients that may have infectious diseases.**

7. Protective eyewear and/or masks may need to be worn.

**Why: To protect your eyes when contact with hazardous aerosols, caustic chemicals and/or reagents is anticipated.**



# Precautions



8. Frequent hand washing is an important safety precaution, which should be practiced after contact with patients and laboratory specimens.

**Why: To prevent the spread of infections and “germs” (a general term for microbes such as viruses).**

9. Laboratory work surfaces must be disinfected daily and after a spill of blood or body fluid with a 1:10 dilution of Clorox in water.

**Why: To prevent the spread of diseases that may come from the blood or body fluids of the patient.**

10. Never work alone in the laboratory. No student may work in the science classroom without the presence of the teacher.

**Why: When accidents happen, no one can help you if you are alone.**

# Precautions



11. Be prepared for your work in the laboratory. Never fool around in the laboratory.

**Why: Playing and joking around in the laboratory may cause accidents.**

12. Dispose of all chemical waste properly.

**Why: Leaving chemical waste hanging around may put others in danger for we don't know if it is hazardous or not.**

13. Labels and equipment instructions must be read carefully before use.

**Why: To avoid mistakes in what chemicals are used and how equipment are handled.**

# Precautions



14. Know the locations and operating procedures of all safety equipment including: first aid kit(s), eye wash and fire extinguisher. Know where the fire alarm and the exits are located.

**Why:** In case of accidents and emergencies, you already know where to go and what to do. It also avoids panic when times arise.

15. Know what to do if there is a fire drill during a laboratory period; containers must be closed, and any electrical equipment turned off.

**Why:** When come across real situations, you would know what to do to lessen the damage.