1st Applications + Safety in chemicals

Year 1: Foundation Block

Practical Biochemistry: DNA Extraction and Purification

Objectives:

It is the first practical class in Biochemistry for medical students in Foundation Block. It will allow orientation of students about commonly used devices and equipments in biochemistry lab. It will also give the students the chance to be exposed to lab safety procedure, a prerequisite for working in laboratories.

It is expected by the end of this practical class, students should be able to:

1. Understand and follow the policy and procedure for Lab safety
2. Understand the principle for extraction and purification of DNA
3. Determine the purity and concentration of the isolated DNA
4. Identify different applications and uses of purified DNA

DNA isolation and purification:

Sample: Nucleated cells
Principle: Lysis of cells, removal of contaminants and isolation of pure DNA
Measurement: UV absorbance at 260nm and 260/280 ratio for the determination of concentration and purity of DNA, respectively

Applications:

Purified DNA can be used for:

1. **Molecular diagnosis of diseases** (e.g., sickle cell anemia)

2. **Forensic applications** (e.g., paternity testing)

3. **Molecular biology research:**
   a. **Amplification techniques:** polymerase chain reaction (**PCR**).
   b. **Southern blotting:** Detection of specific DNA (gene) by hybridization between target DNA sequence and the labeled probe.
   c. **Restriction Fragment length polymorphism (RFLP):** Digestion of DNA by specific restriction enzymes and separation of digestion products (DNA fragments) by electrophoresis.

SAFETY IN CHEMICAL LABORATORIES

Introduction

- A chemical lab is a potentially hazardous environment as it contains hazardous samples, chemicals, materials and equipments
- Accidents and injury ***CAN*** happen any time.
- It is the responsibility of each individual to work safely, so as not to endanger himself, others, or property.
- Everyone using the lab should comply with prescribed safety standards, practices, and procedures.
- Chemicals may cause 2 different hazards:
  - Health hazards
  - Physical hazards

Safe Work Procedures

The cardinal safety rules of the clinical laboratory to be developed, use common sense, and practice the following:

1- Good personal behavior/ habits:

- ALWAYS USE APPROPRIATE PERSONAL PROTECTIVE EQUIPMENTS(lab. coat ,gloves ,masks, goggles, apron, boots, face shield, no open shoes, no eye lenses and cosmetics !!)
- Practice good hygiene when using chemicals.
  - Wash hands frequently.
  - Do not eat, drink, or smoke in the lab.
  - Tie back long hair and use head cover.
- ASK QUESTIONS WHEN IN DOUBT!!

2- Good laboratory techniques.

- Until you have received enough training do not operate new or unfamiliar equipment.
- Read labels and instructions carefully.

- Use chemicals properly.
  - Have knowledge of the chemicals you work with.
  - Never mouth pipette.
  - Handle, use, and dispose off chemicals and biological waste properly.
  - Be careful and avoid any spills of chemicals/hazardous materials when you handle, transport, and store chemicals.
  - In case of any spills, or broken glassware, ask for help of your supervisor.
  - Use volatile and flammable compounds only in a fume hood.
  - Never smell a solvent !! Read the label on the solvent bottle to identify its contents.
  - All blood samples and other body fluids are considered as **potentially infectious**, so should be collected, transported, handled, and processed using strict precautions
  - For disposal of contaminated waste, use containers with yellow plastic garbage bags and for regular waste like paper etc. use containers with black plastic bags.
  - All sharp objects such as needles, scalpels and even broken glassware go in the yellow-red sharps container.

EMERGENCY PROCEDURES

FOR SPILLS/LEAKS OF HAZARDOUS MATERIALS

Rescue

Alarm

Contain

Evacuate

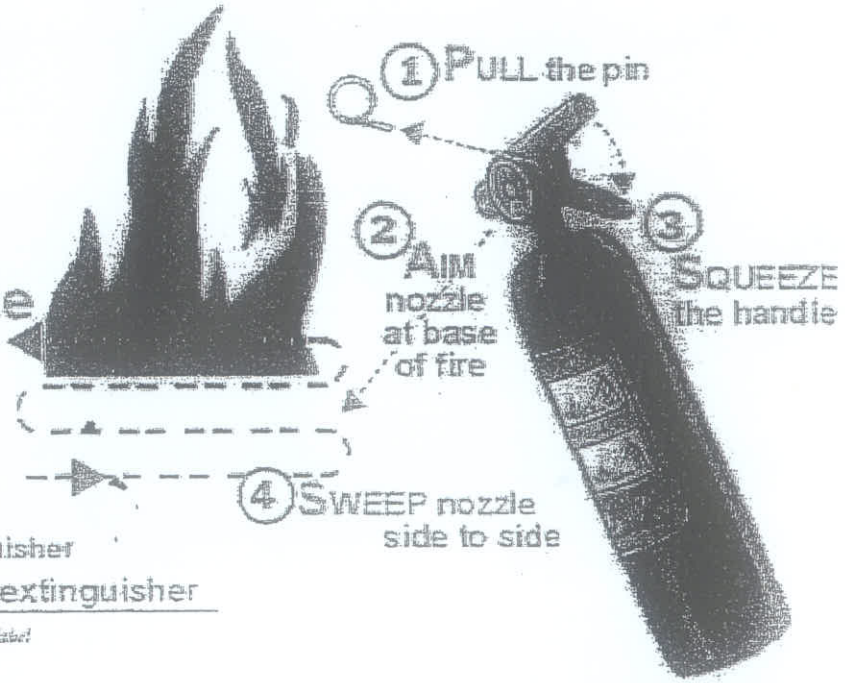
To operate an extinguisher:

Pull

Aim

Squeeze

Sweep



Know your extinguisher

Use the correct extinguisher

(Check your own extinguisher's label for detailed instructions.)