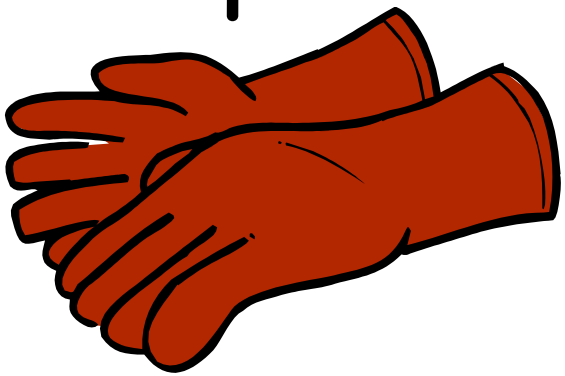
Lab Safety

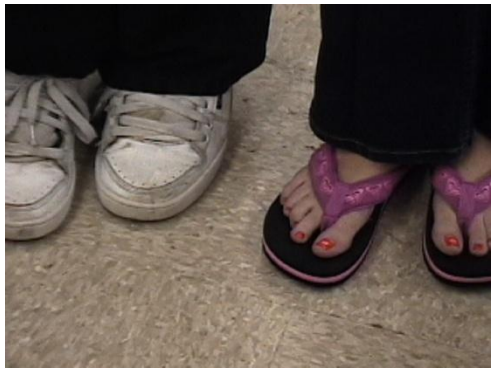
Introduction

1. A chemical lab is potentially hazardous environment
2. Accident and injury can happen anytime
3. Lab safety is everyone's responsibility
4. Lab safety standards and practices must be strictly followed

General Safety Rules

1. Listen to or read instructions carefully before attempting to do anything.
2. Always use appropriate personal protective equipments (lab coat, safety goggles, masks, gloves, no open shoes, no eye lenses)



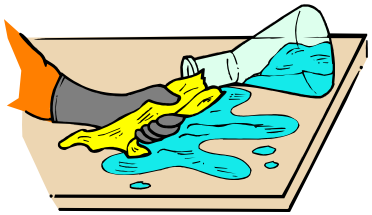


General Safety Rules

3. After handling chemicals, always wash your hands with soap and water.

4. During lab work, keep your hands away from your face.

5. Tie back long hair.
6. Notify your supervisor if any spills or accidents occur.



General Safety Rules

7. Roll up loose sleeves.
8. Know the location of the fire extinguisher, fire blanket, eyewash station, and first aid kit.
9. Keep your work area uncluttered. Take to the lab station only what is necessary.

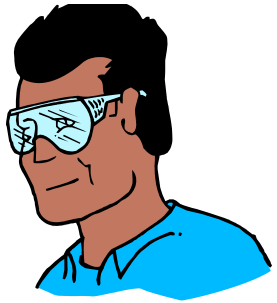
General Safety Rules

10. It is suggested that you wear glasses rather than contact lenses.
11. Never put anything into your mouth during a lab experiment.
12. Clean up your lab area at the conclusion of the laboratory period.
13. Never "horse around" or play practical jokes in the laboratory.

Laboratory Equipment

- Never use any laboratory equipment unless you are trained & have been authorised to do so
- As well as injuring yourself you may cause very costly damage

Chemical Safety



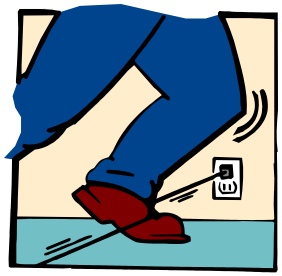
1. Wear protective goggles and a lab apron whenever heating or pouring hazardous chemicals.
2. Never mix chemicals together unless you are told to do so (and then only in the manner specified).
3. Never taste any chemicals (you should never taste anything in the lab).

Chemical Safety

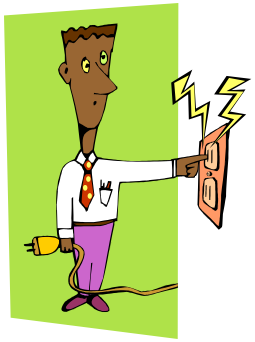
6. Follow the instructions of your teacher when disposing of all chemicals.
7. Wash your hands after handling hazardous chemicals.
8. Never mouth pippette

Electrical Safety

1. Lay electrical cords where no one can trip on them or get caught in them.

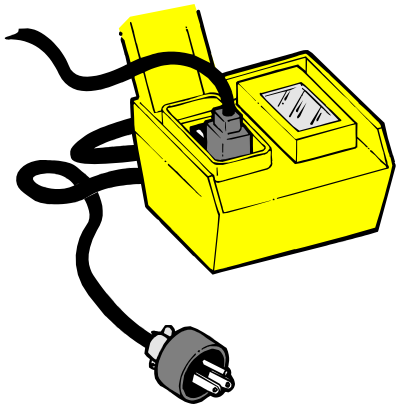


2. Be sure your hands and your lab area are dry before using electrical equipment.
3. Never poke anything into electrical outlets.



Electrical Safety

4. Unplug cords by pulling the plug and not the cord.
5. Unplug all electrical equipment at the end of the lab period.



EMERGENCY PROCEDURES

FOR SPILLS/LEAKS OF HAZARDOUS MATERIALS

Rescue

Alarm

Contain

Evacuate

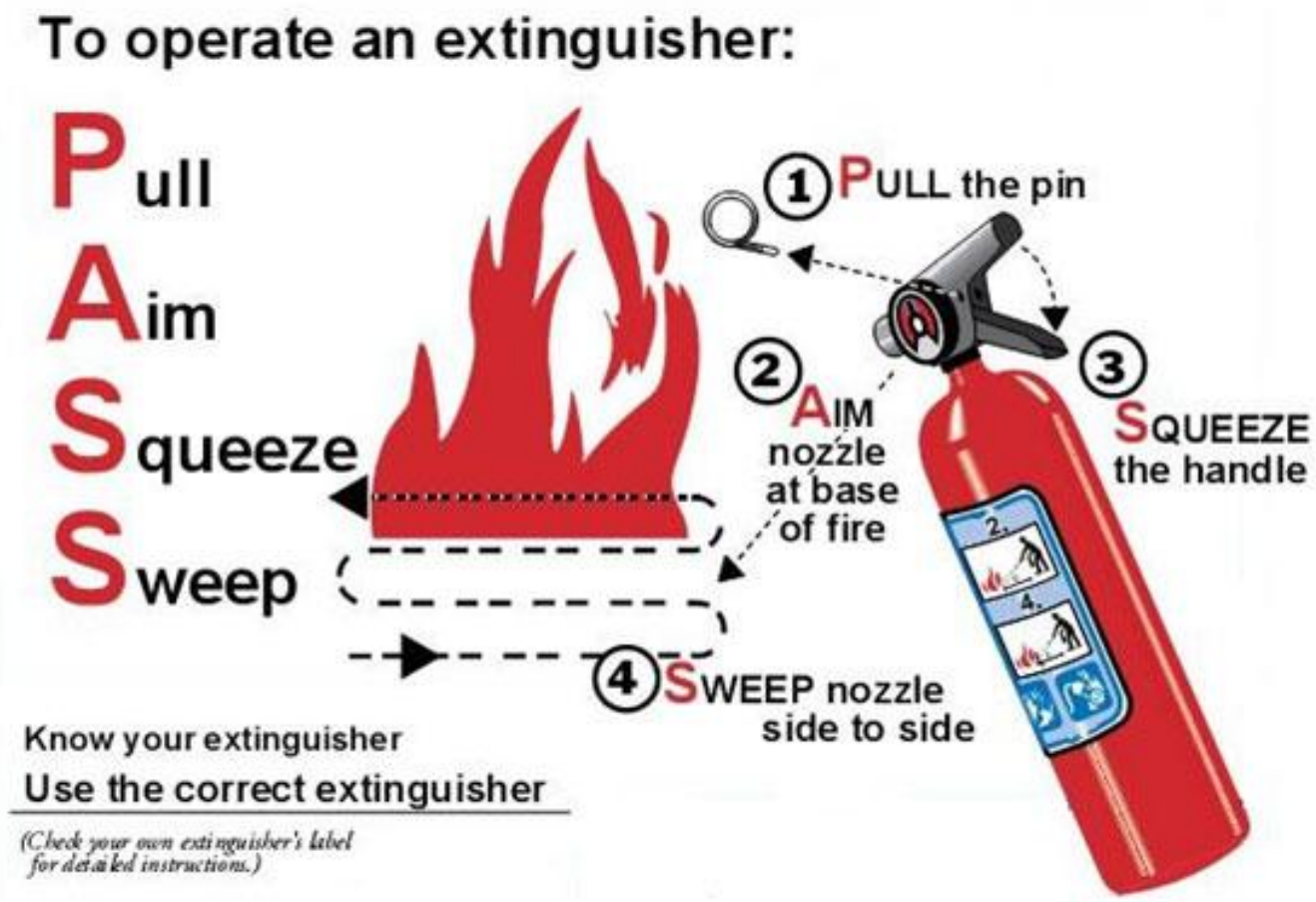
R - Rescue and relocate anyone in immediate danger

A - Alert others by activating the building fire alarm

C - Confine the emergency by closing the doors

E - Evacuate immediately.
Do not use elevators. Use stairs.

Fire Extinguisher



Learn how to be always safe

1. Learn emergency procedures, and be familiar with the location of fire exits, fire extinguishers, blankets, water showers, eye fountains and first aid
2. Report all accidents, injuries and spills to your supervisor
3. Report any and all signs and symptoms of exposure to your supervisor

Biological safety

1. All biological samples are considered potentially infectious
2. Should be handled and processed using strict precautions

Waste Disposal

1. For disposal of contaminated waste, use containers with with yellow plastic garbage bags
2. Regular waste like paper etc go in the containers with black/white plastic bags
3. All sharp objects such as needles, scalpels and even broken glassware go in the yellow-red sharps container

Two choices !!

or

DNA Extraction and Purification

Lab Equipments (To be used in this experiment)

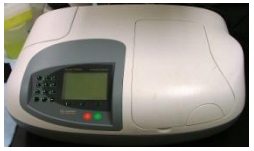
Automatic pipettes

Microcentrifuge

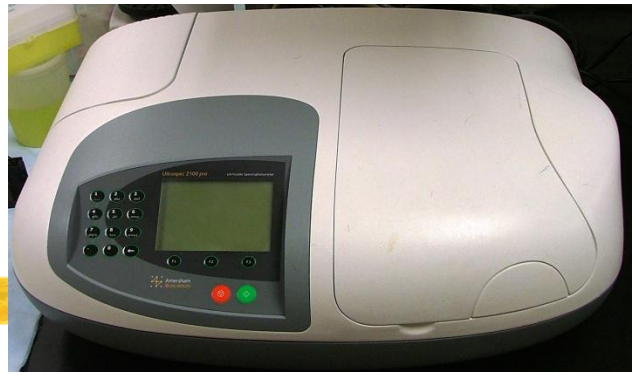
Vortex

Water bath

UV-spectrophotometer



Spectrophotometer



Most of visible spectrophotometers are composed of:

- Light source which works with visible wavelengths (400-700 nm)
- Monochromator filter for choosing desired wavelength
- Sample holder (cuvette)
- Detector
- Meter or recorder

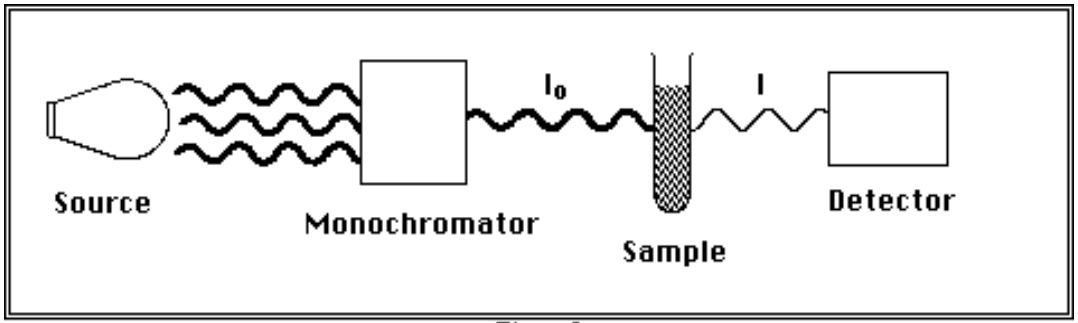


Figure I

DNA Extraction

- Principle:
  1. Lysis of nucleated cells
  2. Removal of contaminants:

     Any substance other than DNA, e.g., proteins
  3. Measurement: UV absorbance at 260nm and 280nm

     Purity of DNA solution: 260/280 ratio

     DNA concentration: Absorbance at 260nm

DNA Extraction

- **Steps:**
  - Lysis: of nucleated cells using lysis buffer
  - Binding: of DNA to the membrane of spin column
  - Wash: using wash buffer
  - Elution of pure DNA

Measurements

- Dilute the sample of purified DNA:

  Add 400 µL of AE to the purified DNA

Done by the spectrophotometer

- Measure the Absorbance at 260nm
- Measure the Absorbance at 280nm
- Assess the DNA purity: 260/280 ratio (Accepted ratio: 1.7 - 1.9)
- Calculate DNA Conc.: Provided A260 = 1.0, DNA is 50 µg/ml, unknown DNA conc. can be calculated by cross multiplication

A260 = 1.0	DNA conc. = 50 µg/ml
A260 = 0.5	DNA conc. ?

- Calculate DNA Yield: DNA Volume x DNA conc.

DNA Yield:

- If you have

Volume of DNA solution: 200 µl (0.2 ml)
DNA conc.: 30 µg/ml

Then the yield (µg) = Volume x Conc.
0.2 ml x 30 µg/ml
= 6.0 µg

DNA 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

DNA Applications CONT'D

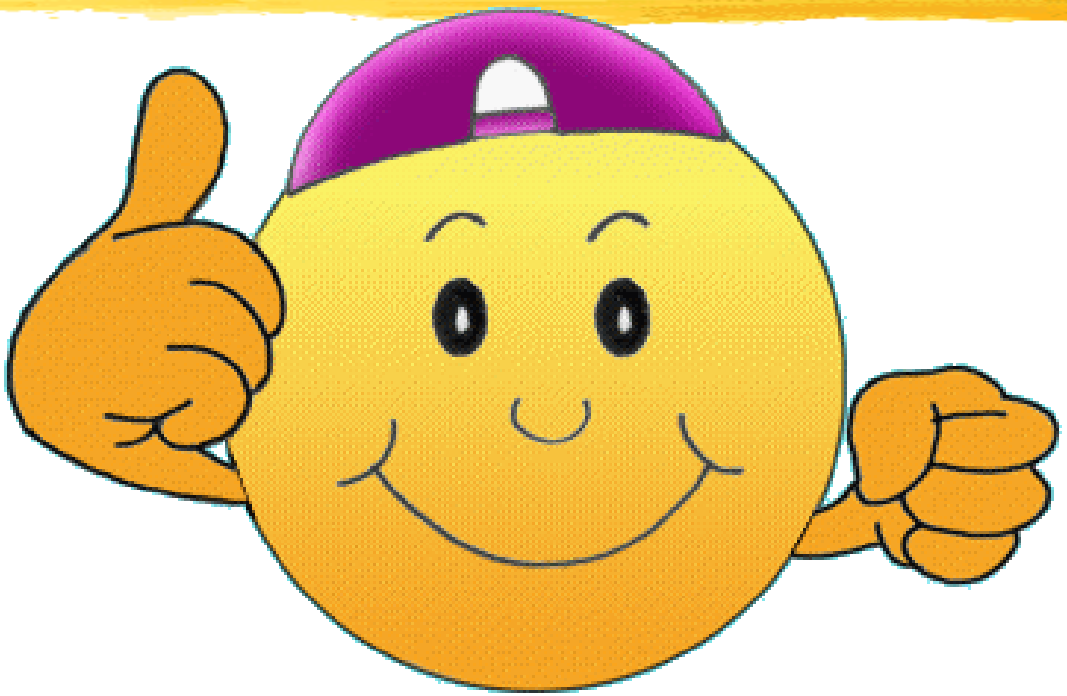
Molecular techniques using purified DNA:

a. **Amplification techniques:** polymerase chain reaction (**PCR)**

b. Southern blotting

c. Restriction Fragment length polymorphism (RFLP)

GO FOR IT !



GOOD LUCK !