

Maintenance and usage of lab equipments

Centrifuge

What is a centrifuge used for?

- Centrifuges are used in various laboratories to separate fluids, gases, or liquids based on density. In research and clinical laboratories, centrifuges are often used for cell, organelle, virus, protein, and nucleic acid purification.

Centrifuge Rotor Types

- There are two very common rotor designs:
 - fixed angle
 - swinging bucket
- The fixed angle rotor is designed to hold tubes in a fixed position at a fixed angle relative to the vertical axis of rotation (up to about 45°).
- The swinging bucket design allows the tubes to swing out from a vertical resting position to become parallel to the horizontal during centrifugation.

Hot air oven

- This instrument is designed to sterilize the test tubes, or to dry the media plates before inoculation.

Incubator

- This instrument is designed to create stable, reliable environment for incubation of inoculated culture plates and biochemical tests.

Laboratory water bath

- A water bath is laboratory equipment made from a container filled with heated water. It is used to incubate samples in water at a constant temperature over a long period of time.

Water distillation units

- Water distiller is a machine which is used to purify water using distillation process.
- First boiling impure water and after that collecting condensed water in a separate container as distilled water.
- Distilled water is water that has been boiled into vapour and condensed back into liquid in a separate container.

Water deionizer

- For many laboratory and industrial applications high purity water which is essential that is free from ionic contaminants. This type of water is produced by “DEIONIZATION”.
- Deionization is the process by which mineral ions in water are removed and the apparatus used for deionization is known as deionizer.

Desiccators

- Desiccators are sealable enclosures containing desiccants used for preserving moisture-sensitive items for another use.
- A common use for desiccators is to protect chemicals which are hygroscopic or which react with water from humidity.

Colorimetry

- Colorimetry is a technique “used to determine the concentration of colored compounds (analytes) in sample solution” at visible spectrum of light (400 – 800 nm).

Absorptiometry

- The measurement of the amount of radiation absorbed (as by living tissue) especially to determine density.
- Dual-energy X-ray absorptiometry (DXA, previously DEXA) is a means of measuring bone mineral density (BMD) using spectral imaging.

Fluorimetry

Fluorescence:

When a beam of light passes through a substance, the particles would absorb some form of energy and emit the radiation.

It is the emission of electromagnetic radiation, usually visible light, caused by excitation of atoms in a material, which then reemit almost immediately (within about 10^{-8} seconds).

Nephelometry and turbidimetry

- When electromagnetic radiation (light) strikes a particle in solution, some of the light will be absorbed by the particle, some will be transmitted through the solution and some of the light will be scattered or reflected.
- The amount of light scattered is proportional to the concentration of insoluble particle.
- Nephelometry and Turbidimetry are analytical techniques used to measure scattered light.

Photometry

- **Photometry**, from Greek: photo - light and metry - measure.
- **Photometry** is the science of the measurement of light, in terms of its perceived brightness to the human eye.
- A photometer is a device to measure the intensity of light and strength of electromagnetic radiation in the region from UV to IR spectrum.
- Photometers detect the light using photo resistors, photodiodes, and photomultipliers.

Conductometry

- Conductometry is a measurement of electrolytic conductivity to monitor a progress of chemical reaction.
- An electrochemical method of analysis used for the determination or measurement of the electrical conductance of an electrolyte solution by means of a conductometer.

Dialysis

- Dialysis is the process of separating molecules in solution by the difference in their rates of diffusion through a semipermeable membrane, such as dialysis tubing.
- Most common dialysis membranes are made of cellulose, modified cellulose or synthetic polymer (cellulose acetate or nitrocellulose).
- Dialysis is the process used to change the matrix of molecules in a sample by differentiating molecules by the classification of size.

Ultrafiltration

- Ultrafiltration (UF) is a variety of membrane filtration in which hydrostatic pressure forces a liquid against a semi permeable membrane.
- Ultrafiltration which is the convective flow of water and dissolved solute down a pressure gradient caused by hydrostatic forces or osmotic forces. In dialysis, ultrafiltration removes molecules of waste and excess fluids from sample.