

Name: SADDIQ AKBAR

ID: 14793

Semester: 4th

Program: BS (MLT)

Instructor: Ms. Saima Hadi

Subject: Biomedical

Instrumentation

Date: 21 April 2020

Question .1: What is microscope? And also explain principle of microscope?

Answer:

Microscope: The word microscope is derive from the fusion of the Greek word micros which mean small and skopien, to see.

Microscope is an instrument which used to see a very small object, Microscope is science of investigating small objects and structure using such an instrument.

Principle of Microscope:

Many lenses are arrange in a sequence to see the fine detail of an object .It's based on three important features.

1. **Magnification:** It refer to the amount or degree of visual enlargement of an object. Magnification is measured by multiply, such as 2*,4*and 10* Its indicate the object is large as twice as big, four times as big, ten times as big respectively.
 2. **Resolution:** Separate the detail of two particle in image.
 3. **Contrast:** To produce the details visible to naked eye
The difference in the light intensity between the image and the adjacent background relative to overall background intensity.
-

Question.2: Describe chromatography and also its phases?

Answer:

CHROMATOGRAPHY: chromatography is derive from Greek word Chroma mean “color” and graphein mean to “write”.

Definition: Chromatography is a physical method of separation in which components to be separated or distributed between two phases. one of which is stationary phase while the other is mobile phase move in a definite direction.

History: It was first employed by a Russian scientist Mikhail Tsvet in 1900. He continued to work with chromatography in the first decade of the 20th century primarily for the separation of plants pigments such as chlorophyll, carotenes and xanthophyll.

It is used in analysis purification and isolation.

Phases: There are two phases in chromatography as mention below;

11 **Stationary phase:** the phase over which the mobile phase passes in the technique in chromatography.

The stationary phase is a porous solid (e.g. glass, silica and alumina) that is packed into a glass or metal tube.

12 **Mobile phase:** The mobile phase flow through the packed bed or column. Through the column, different substance distributes relative to their affinity for the two phases.

Question.3: Write down the application of flamephotometry?

Answer:

APPLICATION OF FLAMEPHOTOMETRY:

- To estimate the sodium, potassium, lithium, calcium etc. level in sample of serum urine CSF and other body fluid.
 - Flame photometry is useful for the determination of alkali and alkaline earth metals.
 - Their other Application in other field are also mention below:
-

Pharmaceutical industry: determine concentration of sodium and potassium ions in infusion solution such as NaCl solution, ringer solution or other.

Food Industry: In the production of pre-milk and milk powder and the quality can also be controlled.

Environmental analysis: Measurement of impurities in water.

Chemical industry: For final inspection of chemical product. Concentration determination of sodium and potassium in fertilizer production and in process control.

Question.4: Explain the components of centrifuge?

Answer:

Centrifuge: A centrifuge is a laboratory device that is used for the separation of fluids, gas or liquid, based on density. Separation is achieved by spinning a vessel containing material at high speed; the centrifugal force pushes heavier materials to the outside of the vessel.

A centrifuge is a piece of equipment that puts an object in rotation around a fixed axis, applying a force perpendicular to the axis of spin that can be very strong.

Components of centrifuge: Centrifuges have three basic components;

- **Rotor:** The rotor holds the tubes, bottles, or bags containing the liquids to be centrifuged.
- **Drive shaft:** Different rotor types and sizes, interchangeable with one another, can be mounted on the drive shaft, which connects to the motor.
- **Motor:** The motor provides the power to turn the rotor.
- **Drive Frame:** A tray to which the motor is bolted down to stay in position. It is attached to the legs of the centrifuge lower casing. It determines the distance between the shaft of the motor and shaft of the centrifuge.
- **Upper Casing:** The Upper casing covers the drum of the centrifuge. It blocks contaminants from making contact with the drum and restricts the user of the machine from making contact with moving parts, providing better safety.

- **Lower Casing:** The lower casing acts as a collector for the products discharged from the rotating assembly and transports them to receivers for onward handling. The casing has to keep these separated entities apart. So it can be concluded that the casing as an oil collector at one end and a cake discharge collector at the conical side.
-

Question.5: Write a note on waterbath?

Answer:

Waterbath: Waterbath is a device which is used in the laboratory to incubate sample in water maintained at a constant temperature.

Temperature may be controlled digitally or by dial and once set, the water cycles on and off to ensure constancy of temperature.

Some waterbath have an additional shaking or stirring mechanism that can be set at varying speeds.

Components of waterbath:

1. A trough of insulated metal, usually stainless steel or of heat-resistant glass, with without, an insulated lid.
2. An electric element to heat the water contained in the trough.
3. A propeller or stirrer to circulate the water in the trough in order to maintain a uniform temperature throughout the trough.
4. A thermometer to check the temperature. This may be built-in or placed separately in the trough.
5. A thermostat to maintain the temperature at a constant level.

Operation:

1. Fill the trough with clean distilled water to a desired level
2. Switch on the machine.
3. Set the thermostat to the desired temperature and allow the water to warm to that temperature.
4. Check the temperature from the thermometer.
5. Place the containers that are to be warmed or incubated in the trough.

Precautions and Maintenance:

1. Clean the trough's interior.
 2. Change the water daily or use de-ionized water to prevent encrustation of the trough, stirrer, heat probe and thermostat with the salts contained in raw water.
 3. Closed the lid to ensure the prevention of water evaporation.
 4. Periodically check the temperature of water with an external as well as internal thermometer.
 5. The thermometer should be placed in such a way that it is away from the heating element and the walls
-

Question.6: Explain the types of centrifuge?

Answer:

Centrifuge: A centrifuge is a device for separating particles from a solution according to their size, shape, density, viscosity of the medium and rotor speed.

Types of centrifuge:

There are four major types of centrifuges. They are:

1. **Small Bench Centrifuges:** They are used to collect small amount of material that rapidly sediment like yeast cells, erythrocytes etc. They have maximum relative centrifugal field of 3000-7000 g.
2. **Large Capacity Refrigerated Centrifuges:** They have refrigerated rotor chamber and have capacity to change rotor chambers for varying size. They can go up to maximum of 6500 g and use to sediment or collect the substances that sediment rapidly like erythrocytes, yeast cell, nuclei and chloroplast.
3. **High Speed Refrigerated Centrifuges:** They can generate speed of about 60000g and are used to collect micro-organism, cellular debris, larger cellular organelles and proteins precipitated by ammonium sulphate.

4. Ultra Centrifuges:

(a) Preparative ultracentrifuge:

It can produce relative centrifugal force of about 600000g and its chamber is refrigerated, sealed and evacuated. It is employed for separation of macromolecules/ligand binding kinetic studies, separation of various lipoprotein fractions from plasma and deprotonisation of physiological fluids for amino acid analysis.

(b) Analytical ultracentrifuge:

It is capable of operating at 500000 g. Three kinds of optical systems are available in analytical ultracentrifuges: a light absorption system, and the alternative Schlieren. System and Rayleigh interferometry system, both of which detect changes in the refractive index of the solution.

Types based on Rotor are mention as below;

1. **Swinging Bucket Rotors:** The swinging bucket rotor has buckets that start off in a vertical position but during acceleration of the rotor swing out to a horizontal position
2. **Fixed Angle Rotors:** In fixed angles the tubes are located in holes in the rotor body set at a fixed angle between 14° and 40° to the vertical.
3. **Vertical Tube Rotors:** They are considered as zero angle fixed angle rotors in which the tubes are aligned vertically in the body of the rotors at all times.
4. **Zonal Rotors:** The zonal rotors may be of the batch or continuous flow type. The former being more extensively used than the latter, and are designed to minimize the wall effect that is encountered in swinging- bucket and fixed angle rotors, and to increase sample size.
5. **Elutriator Rotors:** The elutriator is a kind of continuous flow rotor that contains recesses to hold a single conical shaped separation chamber, the apex of which points away from the axis of rotation.

THE END