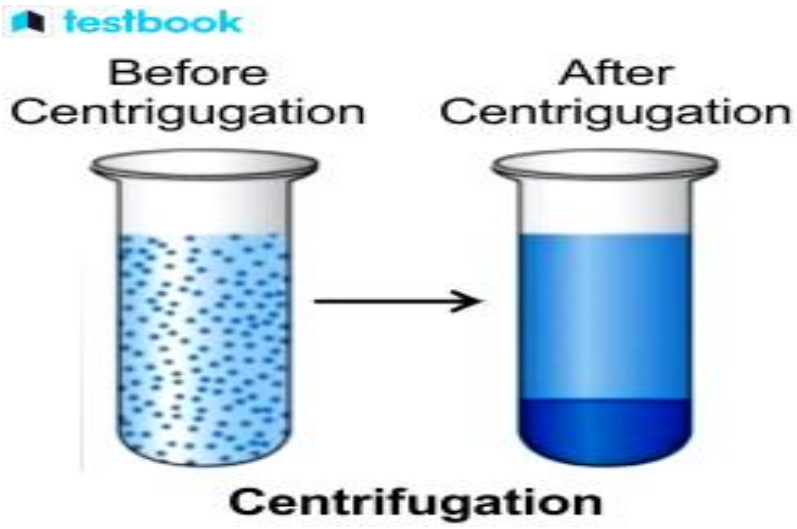
Centrifuges :

A centrifuge is a device for separating particles(the particles are usually cells, subcellular organelles, or large molecules) from a solution according to their size, shape, density, viscosity of the medium and rotor speed.

In a solution, particles whose density is higher than that of the solvent sink (sediment), and particles that are lighter than it float to the top. The greater the difference in density, the faster they move.

If there is no difference in density (isopycnic conditions), the particles stay steady.

A centrifuge is used to separate particles or macromolecules: -Cells -Sub-cellular components -Proteins-Proteins -Nucleic acids.



Basis of separation:

Size -Shape -Density Methodology: Utilizes density difference between -the particles/macromolecules and the medium in which these are dispersed. Dispersed systems are subjected to artificially induced gravitational fields.

Principles Work Of Centrifuges:

The basic physics work of centrifuges is gravity and generation of the centrifugal force to sediment different fraction . Centrifugal field (G) depend on :

1-Angular velocity (w) in radians/ sec .

2-Radial distance (r in cm) of particle from axis of rotation .

G = w2 r

Types of centrifuges:

There are many types of centrifuges, but the basic principle is the same, all use centrifugal force:

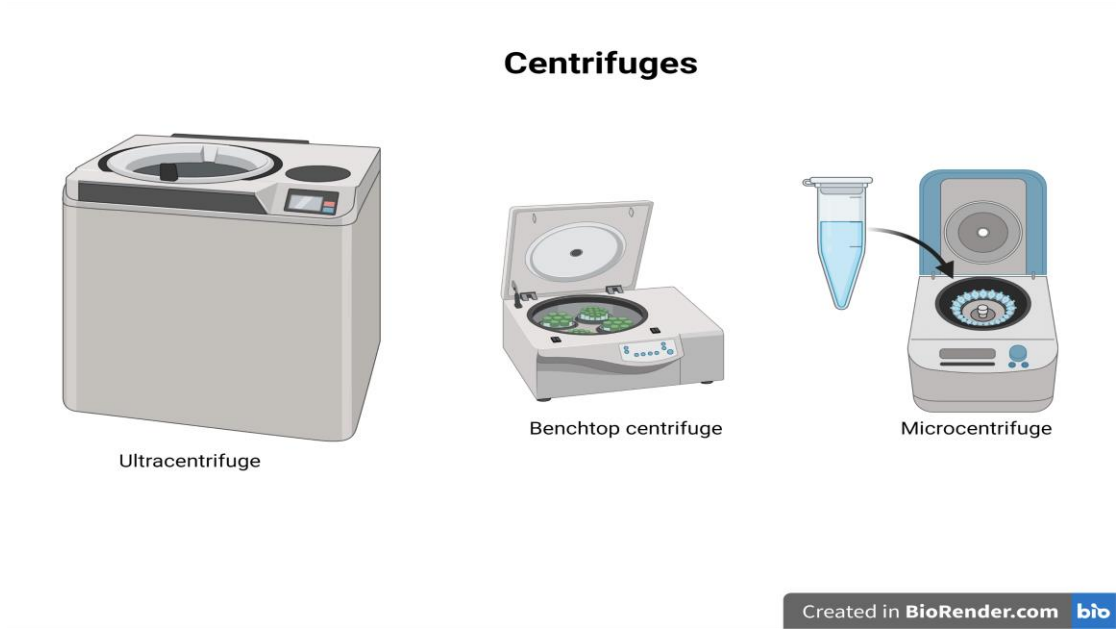
1- Desk top centrifuges (Low speed centrifuges) : - It is very simple and small. - maximum speed of 3000 rpm. - Don't has any temperature regulation system . - Used normally to collect rapidly sedimenting substance such as blood cell

2- High speed centrifuges: -Maximum speed of 25000 rpm. - Temperature maintained at 0 – 40 C by thermocouple. - Used to collect microorganism, cell, large cellular organelles. Useful in isolating sub cellular organelles (nuclei , mitochondria and lysosomes(

3-Ultracentrifuges : - Operate at speed of 75000 rpm . - Rotor chamber is sealed and evacuated by pump to attain vacuum . - Refrigeration system temperature 0 – 40 C .

There are two types of ultracentrifuge :

A- Analytical centrifuge.
B- Preparative centrifuge.



Parts Of Centrifuges:

1-Speedmeter : increasing and decreasing of speed .

2- Timer : control of time .

3- Speed indicator .

4- Head with sample holder .

5- Cover .

6- Electric motor(attached head for carrying sample).

Power for centrifuges:220 – 240V

Application Of Centrifuges:

1- Remove cellular elements from blood to provide cell free plasma or serum for analysis .

2- Isolate chemical precipitated protein from an analytical specimen .

3- Separate protein bound from free ligand in immunochemical .

4-Separate lipid components