Medical laboratory instrument

Lecture Three

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Centrifugation

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

Typical centrifuge operating speed classifications are:

Low speed < 8000 rpm
Medium speed 8000 ~30000 rpm
High speed 30000 ~ 80000 rpm
Ultracentrifuge > 80000 rpm

Laboratory centrifuges

A centrifuge is used to separate particles or macromolecules such as :

- -Cells
- -Sub-cellular components (mitochondria, ribosome, membranes)
- -Proteins
- -Nucleic acids (DNA, RNA).
- - Salts

Basis of separation:

1- Size and shape,
2- The volume fraction of solids present.
3- The density difference between the particle, the liquid and the viscosity.

Applications of a Medical Centrifuge:

1-Blood Sample Separation*:*
It is capable of separating blood samples into upper plasma layer, a thin interface layer consisting of white blood cells and platelets as well as a lower layer consisting of red blood cells.

2-DNA/ RNA Separation*:*
3-There are several other applications of a medical centrifuge that includes study of viruses, proteins, nucleic acids, polymers and blood .
4- Used for many different applications like in the petroleum industry as well as cosmetic industry.

Centrifuge Models

1- Fixed-angle rotor

The rotor mainly made of aluminum. There are boreholes with a specific angle (like 45°)

2- Swing-out rotor = horizontal rotor

This rotor is particularly useful when samples are to be isolated in density gradients.

3. Vertical rotor: sample tubes are held in vertical position during rotation.
This type of rotor is not suitable for pelleting plasmid DNA, RNA, and lipoprotein isolations.