CENTRIFUGATION

The centrifuge uses centrifugal force (the force generated when an object rotates around a single point), for separating solids suspended in a liquid by sedimentation or liquids of diverse density. The rotational movements allow forces much greater than gravity to be generated in controlled periods of time. Centrifuges are generally used in the laboratory in processes such as the separation of solid components from biological liquids through sedimentation and for conducting multiple tests and treatments.

So, sedimentation of suspended and some dissolved particles occurs due to centrifugal force.

The operation principle

1. It separates particles from samples such as blood or urine. This gives cell-free plasma or serum for different tests

2. A centrifuge is used to separate two different kinds of liquids with different densities. For example, separating lipid components from other components of plasma or serum.

Parts of a Centrifuge

Centrifuge consist of the following parts as shown in figure 2:

1. Motor: Electric motor is a part of the centrifuge which helps to drive.

2. Control Panel: The control panel placed on the front casing serves the purpose of controlling centrifuge operation.

3. Chamber: The entire system is housed within a chamber.

4. Rotor: Rotors in centrifuges are the motor devices that house the tubes with the samples. Centrifuge rotors are designed to generate rotation speed that can bring about the separation of components in a sample.

5. Sample: That to be separated.

6. Latch: the latch keeps the centrifuge lid closed in the event of tube breakage or other problems while the centrifuge is operating.

7. Lid.

8. Screen.

9. Drive shaft

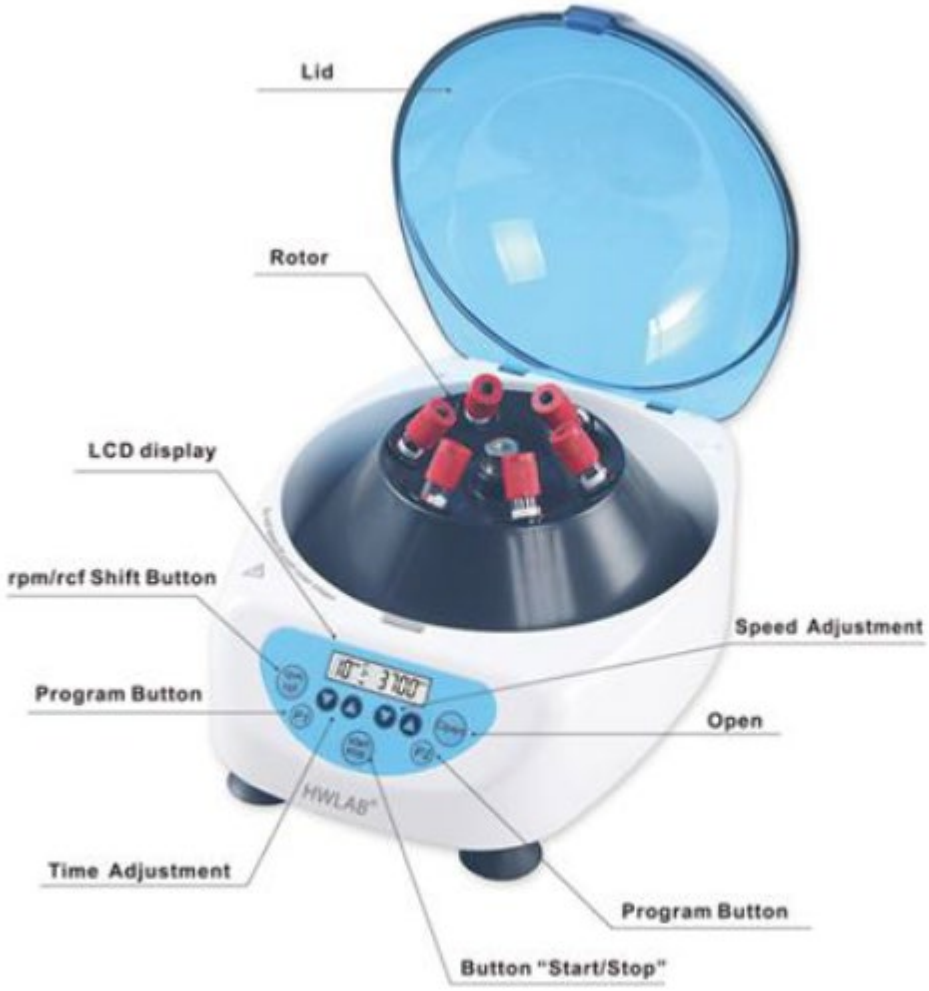

Figure 1: shows centrifuge

safety precautions should be taken when working with a centrifuge

❖ Ensure a sturdy, level work surface

❖ Balance the centrifuge: Running an unbalanced centrifuge may cause significant damage, and injure the operator. Ensure all sample tubes are evenly filled. If additional tubes are required for balancing, fill them with water or a liquid of similar density to the sample

❖ Do not open the lid while the rotor is moving: Many centrifuges have a “safety shutoff”. However, this will only stop power to the rotor,

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which will still spin due to its own inertia for some time until it is slowed to a stop by friction.

❖ If the centrifuge is shaking, pull the plug: A little vibration is normal, but excessive amounts can mean danger. First, double check that the tubes are correctly balanced. If this does not resolve the issue, do not operate the centrifuge until it has been serviced by the manufacturer or dealer.

Force in centrifuge Principles

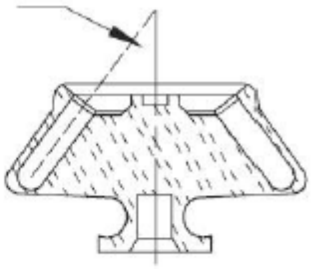
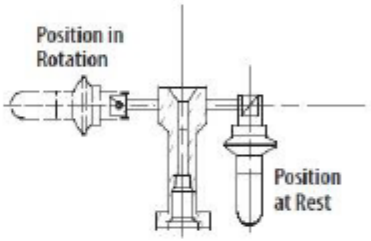
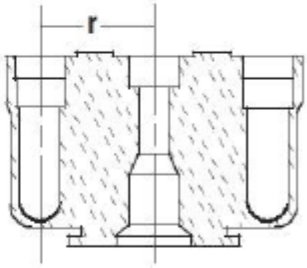
Sedimentation force on particle opposed by :

1- Flotation Force

2- Frictional Resistance

3- Diffusion

Types of Rotor

Type of rotor	Characteristic	Cross- section
Fixed angle	Sedimenting particles have only short distance to travel before pelleting. Shorter run time. The most widely used rotor type	
Swinging buckets	Longer distance of travel may allow better separation in density gradient centrifugation. Easier to withdraw supernatant without disturbing pellet.	
Vertical tube	Keeps tubes parallel to the rotational axis. Thus, separate bands are formed across the tube's diameter, not its length	
Almost vertical tube	For gradient centrifugation when some sample components do not participate in the gradient.	

Common faults in this device are:

1. The motor, specifically carbon brushes (carbon brushes),

2. Motor's internal coil

3. for electronic faults, they include the power supply, control panel and screen

Centrifuge care and maintenance

1. Keep the centrifuge properly lubricated.

2. Ensure all users are aware of how to properly operate the centrifuge

3. Pay close attention to noise, vibration, shaking, or grinding and stop the unit immediately if this occurs.