

Non-perforated basket centrifuge, semi continuous centrifuge & super centrifuge

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Semi continuous centrifuge

- It is also known as short cycle automatic batch centrifuge.
- Principle:
 - ✓ This centrifuge is a filtration centrifuge. The separation is through a perforated wall based on the difference in the densities of solid and liquid phases.
 - ✓ The bowl contains a perforated side-wall. During centrifugation, the liquid phase passes through the perforated wall while solid phase is retained in the bowl.
 - ✓ The solid is removed by cutting with a blade.

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- Working:
 - ✓ The perforated basket is allowed to rotate and Liquid feed is inserted to the bowl/basket from side pipe in such a way that it distributes evenly in the basket.
 - ✓ During the process liquid passes through perforated walls and solid remains inside the wall.
 - ✓ The cake is washed with water. The wash escapes from the basket through the filtrate outlet.
 - ✓ The solid is collected after drying by spinning and liquid is collected from outlet.
 - ✓ In this centrifuge after achieving the desired thickness about 50 to 70 mm the feeler cuts off the air supply to diaphragm valve that automatically cuts of the entry of the slurry.

Construction : The construction of a semi-continuous centrifuge is shown in Figure 10-4. It consists of a vertical perforated basket, which is supported from a horizontal shaft driven by a motor. From the open side of the basket, provisions are made at the centre to introduce feed and wash pipe through horizontal tubes. A feeler (not shown) rides over the feed, which is connected to diaphragm valve through air supply. The feeler controls the thickness of the feed. Hydraulic cylinder attachment is made in such a manner that the discharge chute enters from the sides of basket, when discharge of crystals is desirable.

Advantages : Short-cycle automatic batch centrifuge is used when solids can be drained fast from the bowl.

Disadvantage : During discharge, considerable breakage of crystals is possible. Many moving parts are involved making the construction and functioning complicated.

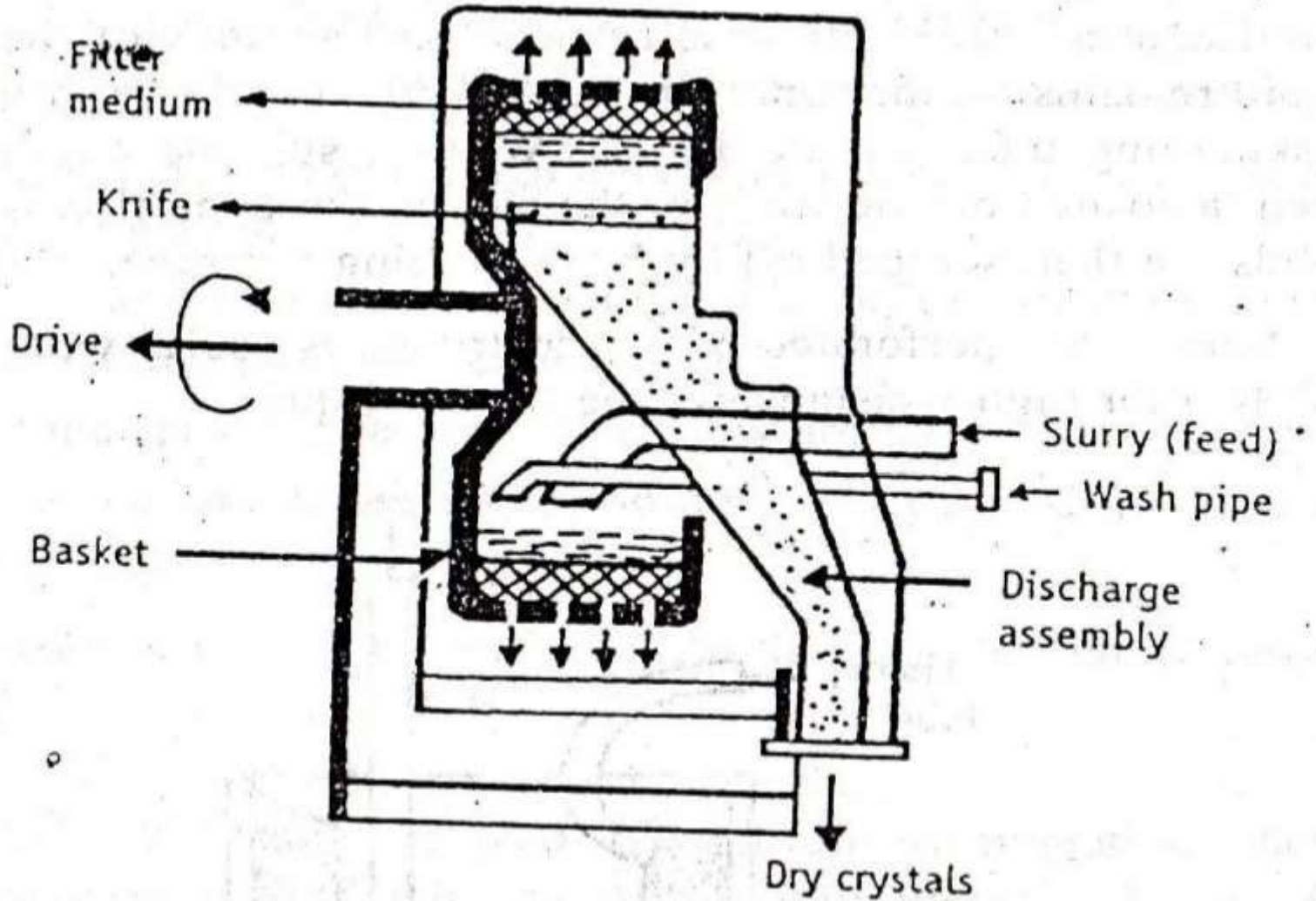


Figure 10-4. Construction of semi-continuous centrifuge.

Non-perforated basket centrifuge

- Principle:
- ✓ This is sedimentation type centrifuge so separation takes place on the basis of difference in their densities without presence of perforated/porous medium.
- ✓ During centrifugation solid remains at side wall of the basket while liquid remains at the top which is collected by skimming tube.

Construction:

- ✓ It consist of basket made up of stainless steel. The basket is placed on the vertical shaft.
- ✓ Basket contains inlet tube and skimming tube.

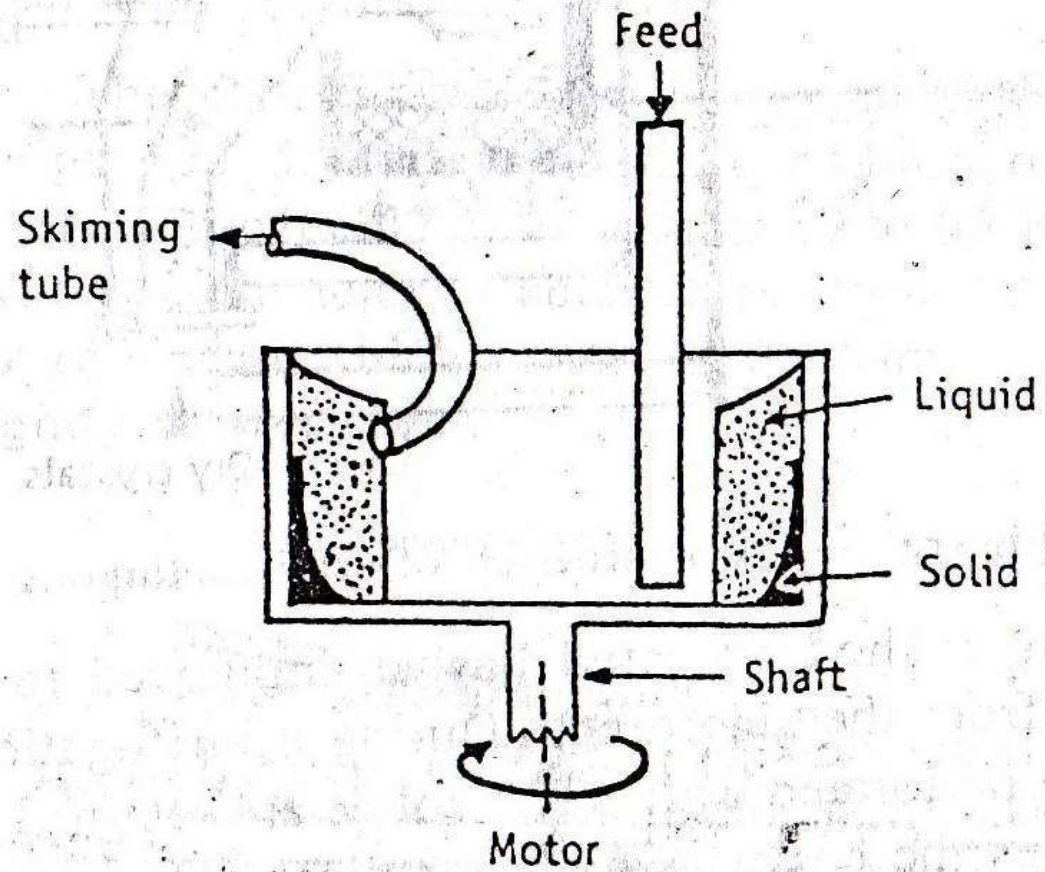


Figure 10-3. Construction of non-perforated basket centrifuge.

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- Working:
 - ✓ The suspension is fed continuously into the basket. During centrifugation solid phase is retained on the sides of the wall while liquid remains on the top.
 - ✓ The liquid is collected with skimming tube and solids are scraped off by using scrapper from the basket.
 - Uses:
 - ✓ It is useful when the deposited solids offer high resistance to the flow of liquid.
 - Advantages:
 - ✓ Cost is less than other centrifuges
 - Disadvantages:
 - ✓ Solid phase is retained on the sides of the basket.

Super centrifuge

- Principle:
 - ✓ This is sedimentation type centrifuge so separation takes place on the basis of difference in their densities between to immiscible liquids.
 - ✓ Centrifugation is done in the bowl of small centrifuge. During centrifugation the heavier liquid is thrown against the wall, while lighter liquid remains as inner layer.
 - ✓ The two layers are simultaneously separated using modified wiers.

Construction : The construction of a supercentrifuge is shown in Figure 10-6. It consists of a long hollow cylindrical bowl of small diameter. It is suspended from a flexible spindle at the top and guided at the bottom by loose-fit bushing. It can be rotated on its longitudinal axis. Provision is made at the bottom for the feed inlet using pressure system. Two liquid outlets are provided at different heights at the top of the bowl, for simultaneous recovery of the separated liquids using modified weirs.

Working : The centrifuge is allowed to rotate on its longitudinal axis at a high frequency usually about 2000 revolutions per minute with the help of drive-assembly. The feed is introduced from the bottom of the centrifuge using a pressure system. During centrifugation, two liquid phases separate based on the difference in their densities. The heavier liquid is thrown against the wall, while the lighter liquid forms an inner layer. Both liquids rise to the top of the vertical bowl.

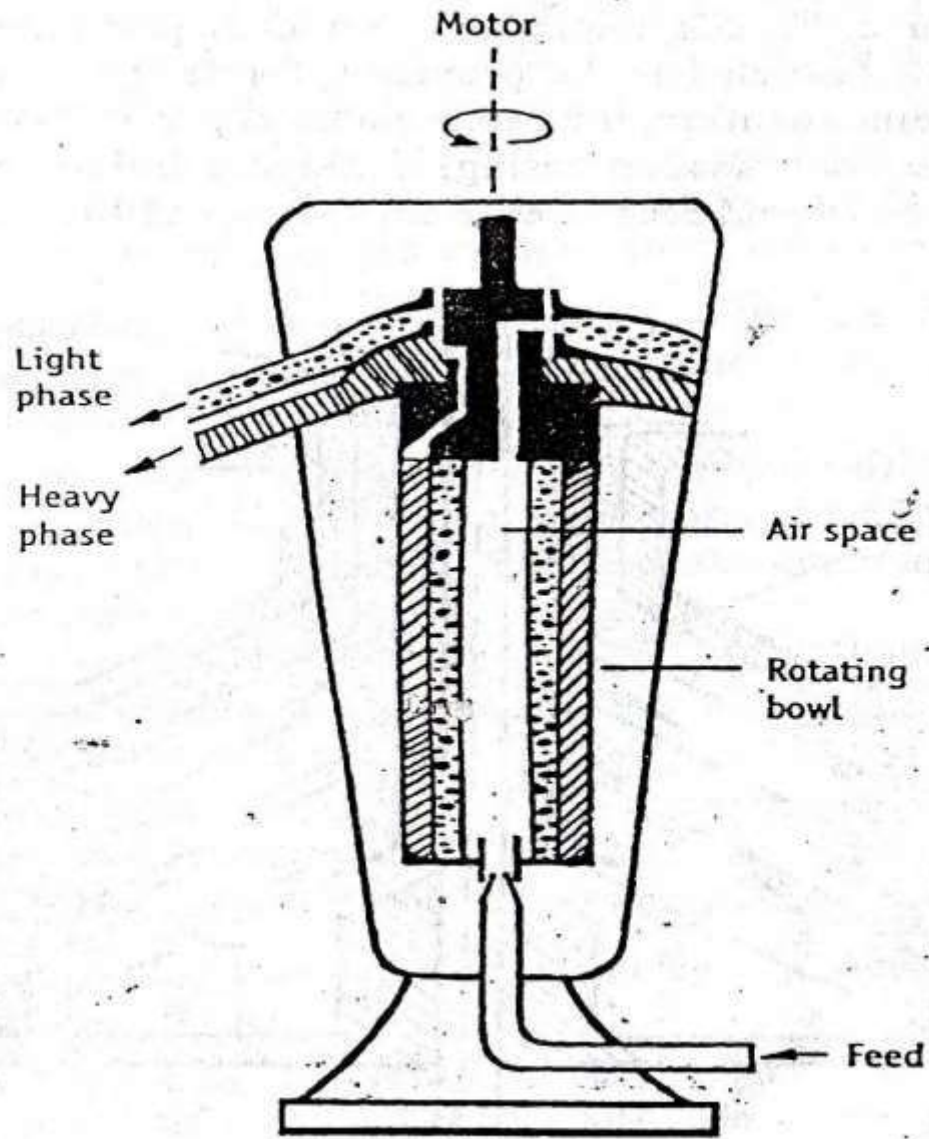


Figure 10-6. Construction of supercentrifuge.

The liquid-liquid interface (the so-called neutral zone) is maintained by an hydraulic balance. These two layers are simultaneously separately removed from different heights through modified weirs (as shown in Figure 10-6). Thus the supercentrifuge can work for continuous separation of immiscible liquid phases.

- Uses:
 - ✓ Used for separating liquid phase of emulsion in foods and pharmaceuticals.
- Advantage:
 - ✓ Continuous operation.
 - ✓ Can handle much higher concentration.
 - ✓ Produces dry solids.
- Disadvantage:
 - ✓ Sediment does not have uniform structure.

THANK YOU