

Elutriation Method

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INTRODUCTION




2.

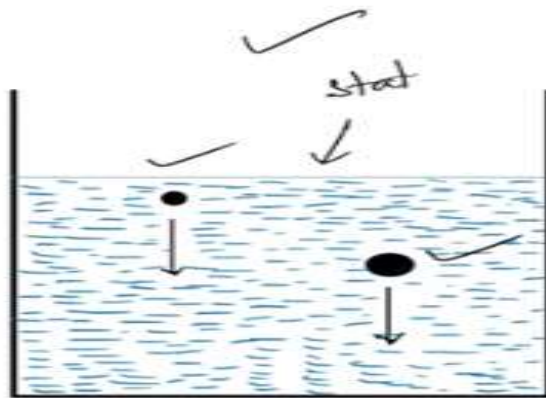
- These are "classification methods" of size separation
- Classification methods are based on the rate of settling of particles into different parts of narrow size ranges particles
- The separation of particles depends on the densities of particles – the coarser part containing heavy particles and finer part contains lighter components.

SEDIMENTATION VS ELUTRIATION

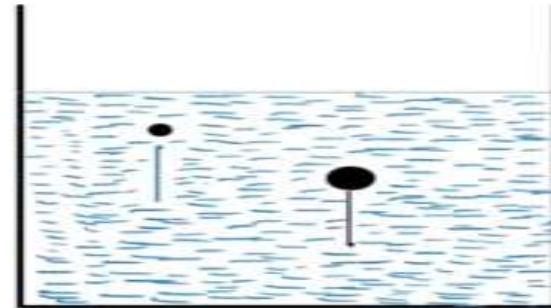


↓ ✓ Sedimentation	↓ Elutriation
The process of <u>settling</u> or <u>being deposited</u> as a <u>sediment</u> . <div style="text-align: center;">  </div>	The process for separating lighter particles from heavier ones using a vertically-directed stream of gas or liquid.
Liquid is kept stationary	Liquid flows in the opposite direction of the sedimentation movement of particles
Particles moves in the direction of gravitational force	Some particles moves against gravitational force
The heavier or denser particle settles first than lighter particles settles over	The particles having more settling velocity compared with liquid moving in opposite direction settles down

The <u>direction</u> of <u>movement</u> of <u>particles</u> is <u>same</u>	Direction of <u>movement</u> <u>varies</u>
The time required for <u>separation</u> decides <u>size</u> separation	The velocity of liquid and cross-sectional area of vessel decides size separation



1. Sedimentation



2. Elutriation

PRINCIPLE

- Fluid flows in the opposite direction of the settling movement of the particles.
- Sedimentation is still possible for the particles having velocity greater than liquid moving vertically upwards.
- But the particles settling slowly will be trapped and moved upwards along with liquid
- Very fine particles may be removed with liquid in overflow



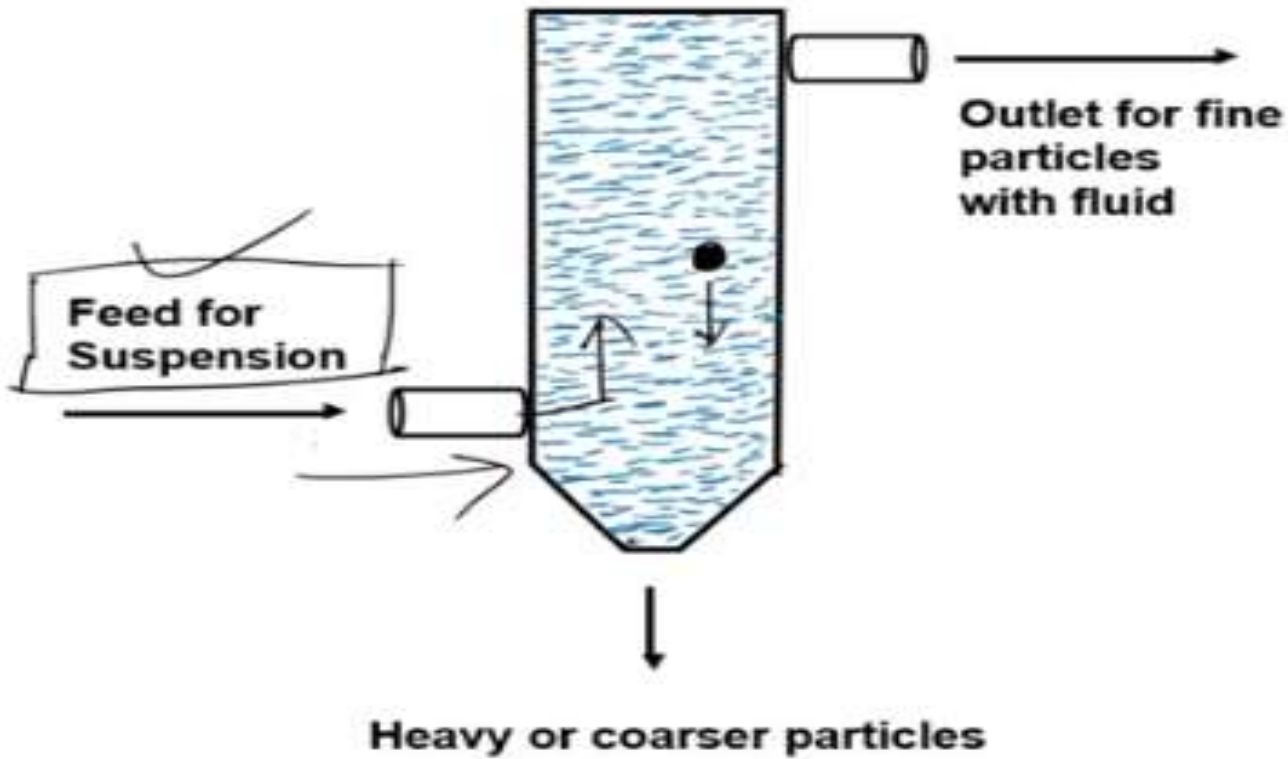


WORKING

1) Single Elutriation Tank

- The feed is introduced from the bottom
- Liquid is allowed to move in vertical direction, where as particles tends to settle down due to gravitational force
- As discussed in the principle section, the particles with greater velocity (heavier or coarser) settles down to the bottom and due to gravitational force and collected from bottom
- Thus, by adjusting the velocity of particles fractions of different densities can be collected from bottom. A single column is generally used to separate particles in two fractions.
- Lighter portion of particles may also be separated through overflow





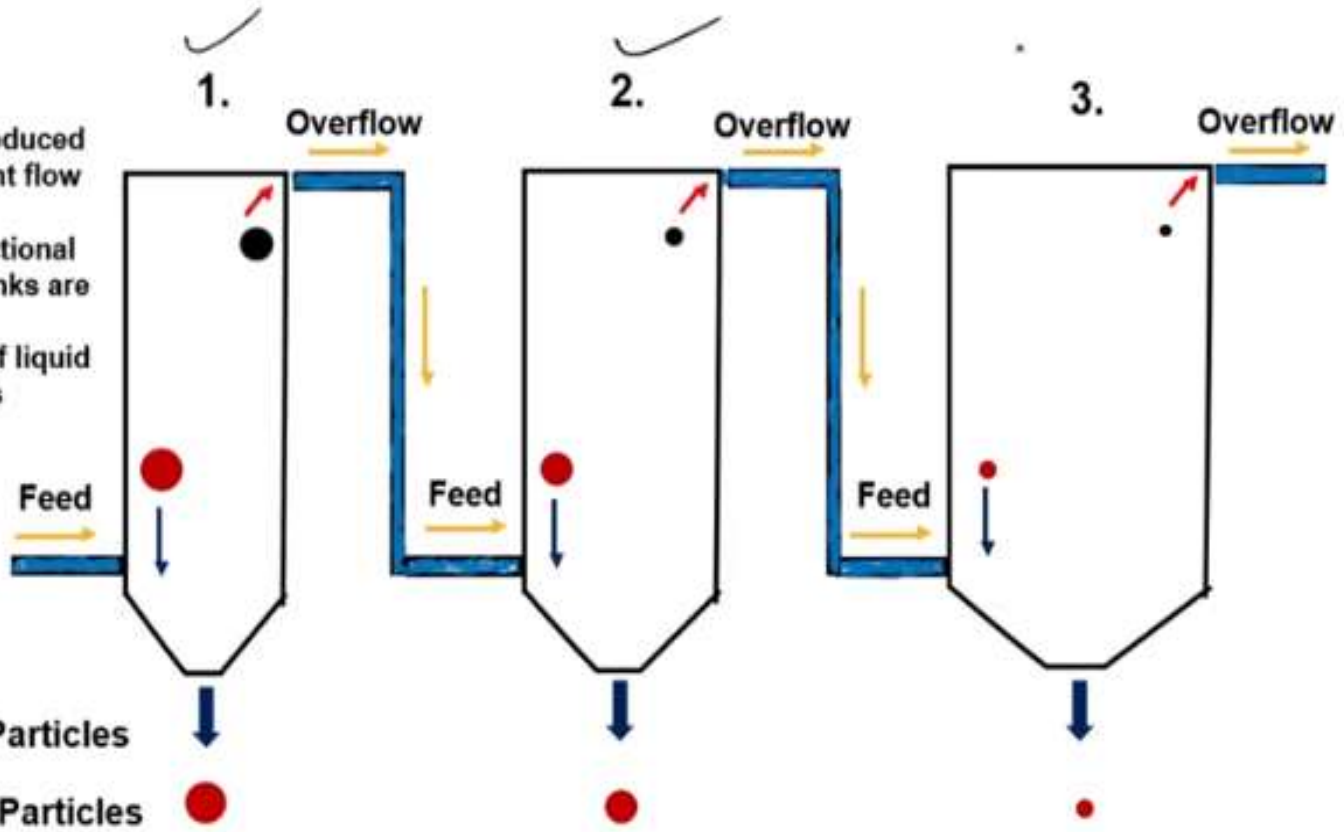


Multiple Elutriation Tanks

- Tanks of different cross section are arranged in series
- The feed is introduced from the bottom of first tank
- The overflow of tank is connected with feed of another tank having more cross-sectional area and similarly third tank is filled by overflow of second tank
- The flow rate is kept constant in all tanks, but the velocity decreases when liquid moves from one tank to another because of increase in cross sectional area)
- Thus, more coarser particles retained in first tanks whereas finer portions will be retained by next two tanks depend on their respective cross sectional area



1. Feed introduced at constant flow rate
2. Cross sectional area of tanks are different
3. Velocity of liquid decreases



Advantages of Elutriation Method

- The process is continuous.
- Depending on the number of fractions required, the same number of tubes of different area of cross section can be connected.
- The separation is quick as compare to other methods of separation.
- The apparatus is more compact than as that used in sedimentation methods.
- The main disadvantage of this method is that the suspension o solid particles has to be diluted which may not be desired in certain cases.



THANK YOU