

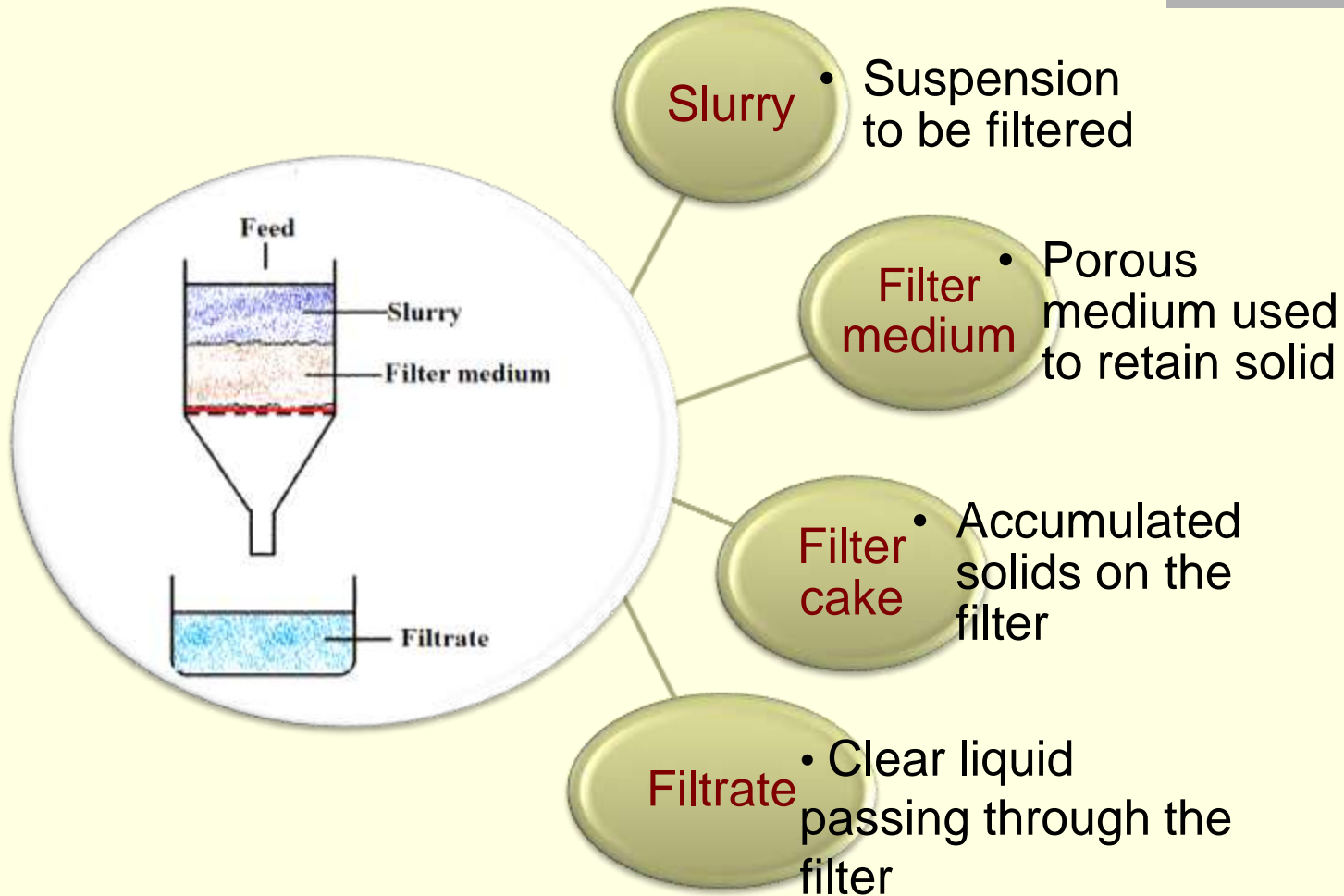

FILTRATION



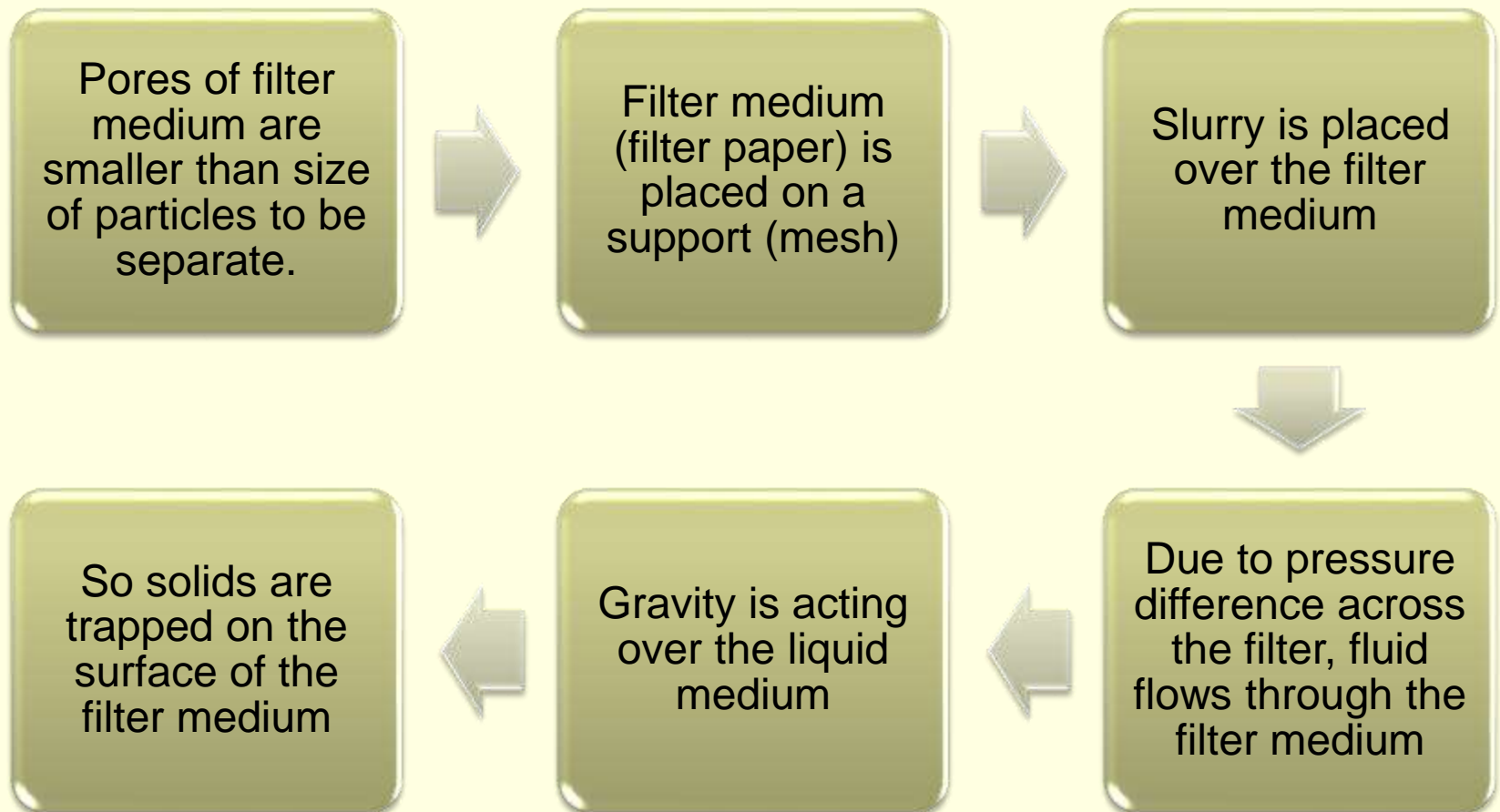
Definition

- Filtration: It may be define as a process of separation of solids from a fluid by passing the same through a porous medium that retains the solids but allows the fluid to pass through.
- Clarification: When solid are present in very low concentration, i.e., not exceeding 1.0% w/v, the process of its separation from liquid is called clarification.

Terms used in filtration



Process of filtration



Applications of filtration

- Production of sterile products:
 - ✓ HEPA filters or laminar air bench
 - ✓ Membrane filters.
- Production of bulk drugs
- Production of liquid dosage
- Effluents and waste water treatment

Mechanism of filtration

- The mechanism whereby particles are retained by a filter is significant only in initial stages of filtration.

Straining

- Similar to sieving, i.e., particles of larger size can't pass through smaller pore size of filter medium.

Impingement

- Solids having the momentum move along the path of streaming flow and strike (impinge) the filter medium. Thus the solids are retained on the filter medium.

Entanglement

- Particles become entwined (entangled) in the masses of fibres (of cloths with fine hairy surface or porous felt) due to smaller size of particles than the pore size. Thus solids are retained within filter medium.

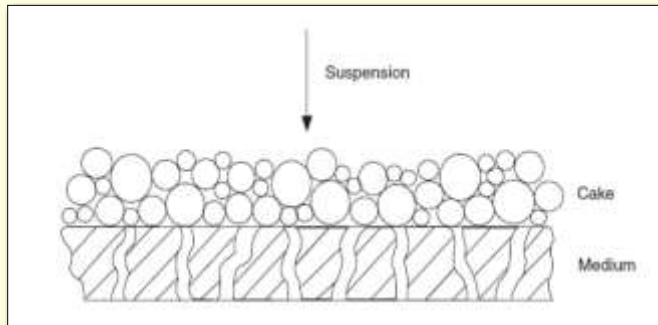
Attractive forces

- Solids are retained on the filter medium as a result of attractive force between particles and filter medium, as in case of electrostatic filtration.

Types of filtration

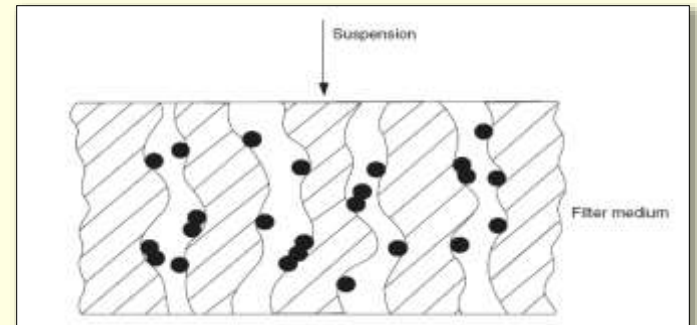
■ Surface/ screen filtration

- It is a screening action by which pores or holes of medium prevent the passage of solids.
- Mechanism involved : straining and impingement
- For this, plates with holes or woven sieves are used.
- Efficacy is defined in terms of mean or maximum pore size.



■ Depth filtration

- In this slurry penetrates to a point where the diameter of solid particles is greater than that of the tortuous void or channel.
- Mechanism : Entanglement
- The solids are retained with a gradient density structure by physical restriction or by adsorption properties of medium.



Difference between surface and depth filtration

Surface filtration

- The size of particles retained is slightly higher than the mean pore size of medium.
- Mechanical strength of filter medium is less, unless it is made of stainless steel.
- It has low capacity.
- The size of particles retained is more predictable.
- Equipment is expensive because ancillary equipment such as edge clamps is required.
- Ex. Cellulose membrane filter.

Depth filtration

- The size of particles retained is much smaller than the mean pore size of medium.
- Mechanical strength of filter medium is high.
- It has high capacity.
- The size of particles retained is less predictable.
- Equipment is cheaper because ancillary equipment is not required.
- Ex. Ceramic filters and sintered filters.