## 2. Solid-Liquid separation method- Filtration

**Aim** : Is to determine the flow rate of the tissue homogenate solution through filter media.

**Principle:**

- Filtration is ubiquitous in solid liquid separation of suspension mixer.
- Liquid to be clarified is passed through a porous barrier.
- Large particles are retained at the filter surface or within the depth of filter medium; solvent and some small particles pass through the filter.
- Process is pressure driven and unlike sedimentation works well even when there is no density difference between the particulated and the suspending medium.
- When membranes tested using pure water most membranes give very high fluxes.
- But during actual filtration the flux is likely to be, very much lower.
- At the start of operation the flux is high and in some cases may approach the pure water flux.
- However, a rapid decline occurs over the first 20-30 min of operation followed by a gradient, but persistent , fall.
- This reduction in flux is caused by a combination of concentration polarization and fouling.

## Equipments and reagents:

1. Sheet of membrane to test
2. Ground cell Suspension which can be loaded with flat sheet of membrane.
3. Ancillary Equipment for operation of membrane module.
4. Timer.



**Determination of flow rate of homogenate solution through filter media:**

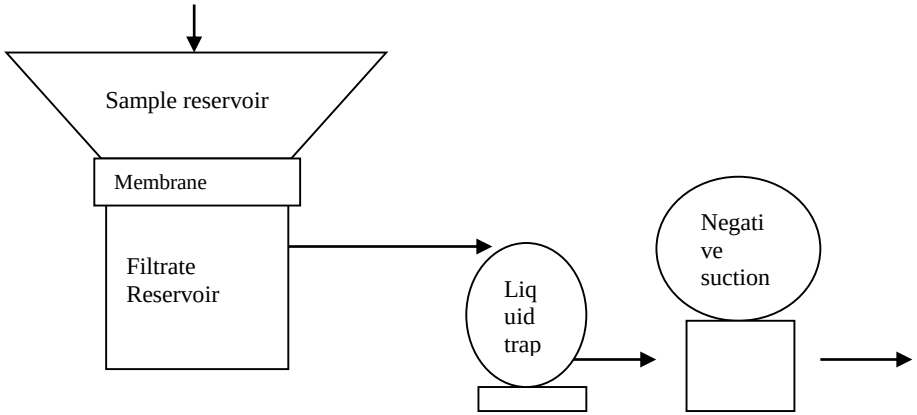
1) Close all the inlet and outlets of permeate reservoir and Sample reservoirs of the Ancillary Filtration Unit
2) Fill tissue homogenate solution to the Sample reservoir.
3) Cut out a disc of membrane to fit into a dead-end filtration unit.
4) Wash thoroughly to remove preservatives and wetting agents and fix the disc to the Filter Membrane holder.
5) Load the tissue homogenate solution through the membrane by opening the inlet and outlet valves of the sample reservoir and switching on the pump.
6) Apply Fixed Pressure and measure the permeate flow rate by measuring volume filtered over period of 5, 10, 15,20, 25 and 30 sec.
7) Plot a graph by plotting flow rate against time.

**Results:**

1. Flow rate of the distilled water after 2000 sec: 0.2 cc/sec
2. Flow rate of the tissue homogenate after 2000 sec 0.07cc/sec
3. Difference in the flow rate: 0.13 cc/sec

# Observation

## A. Construction details of Filtration Unit:




# Observation

| Membrane fouling | | | Cake formation | | |
|---|---|---|---|---|---|
| Time in second | Volume collected in cc/sec in untreated membrane | Volume collected in cc/sec in treated membrane | Time in second | Volume collected in cc/sec | Rate |
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## OBSERVATIONS:

| Time (s) | Volume of sample collected [cc] | Flow rate [cc/s] |
|---|---|---|
| 300 | 40 | 0.133 |
| 600 | 70 | 0.116 |
| 900 | 95 | 0.105 |
| 1200 | 110 | 0.092 |
| 1500 | 120 | 0.08 |
| 1800 | 130 | 0.072 |

Note:  plot a graph of flow rate v/s time in sec both for membrane fowling and cake formation