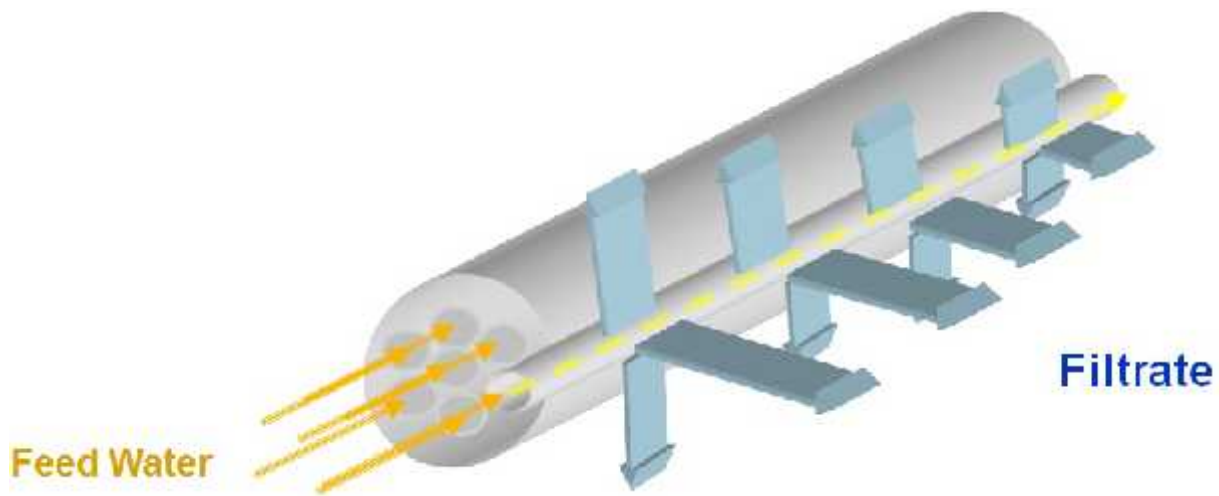


ULTRAFILTRATION



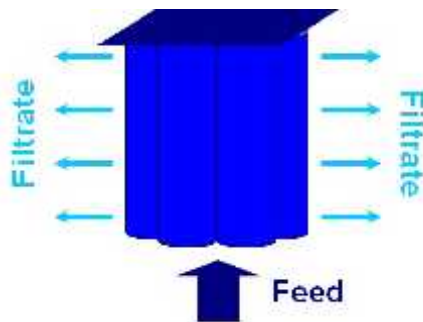
Ultrafiltration (UF) is a variety of membrane filtration in which hydrostatic pressure forces a liquid against a semipermeable membrane. Suspended solids and solutes of high molecular weight are retained, while water and low molecular weight solutes pass through the membrane. This separation process is used in industry and research for purifying and concentrating macromolecular solutions, especially protein solutions. *Ultrafiltration* is not fundamentally different from microfiltration, nanofiltration or gas separation, except in terms of the size of the molecules it retains. *Ultrafiltration* is applied in cross-flow or dead-end mode and separation in ultrafiltration undergoes concentration polarization.

UF Process

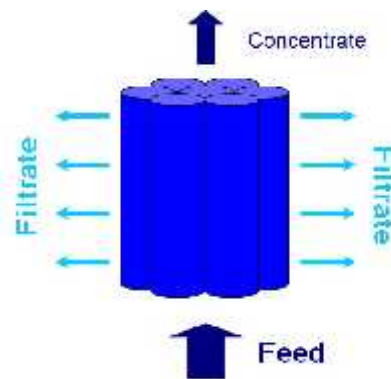
Membrane Configurations :

- 1- Flat Sheet
- 2- Spiral Wound
- 3- Tubular
- 4- Hollow Fiber

Filtration Modes :

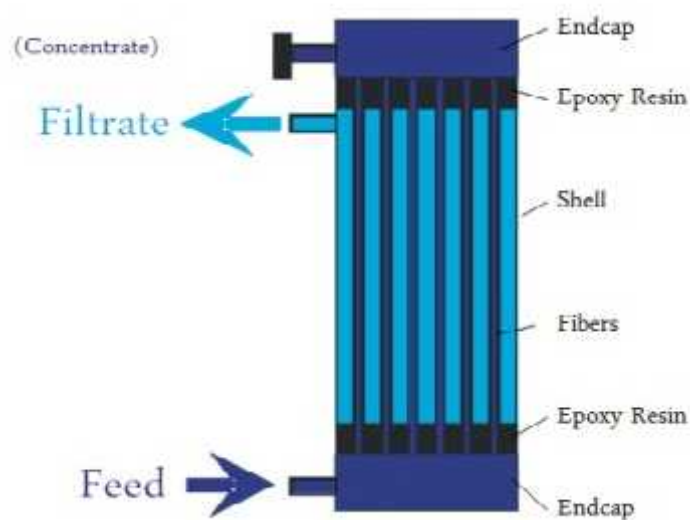


(1) Dead-End Mode



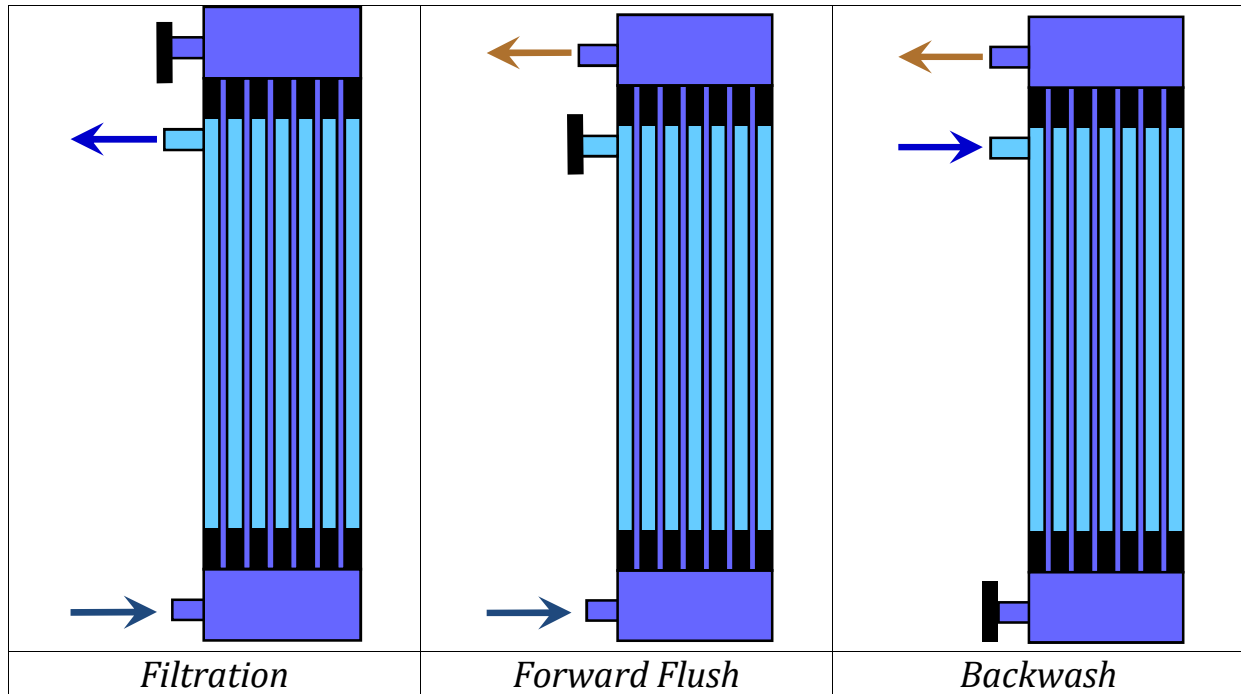
(2) Cross-Flow Mode

UF Module :

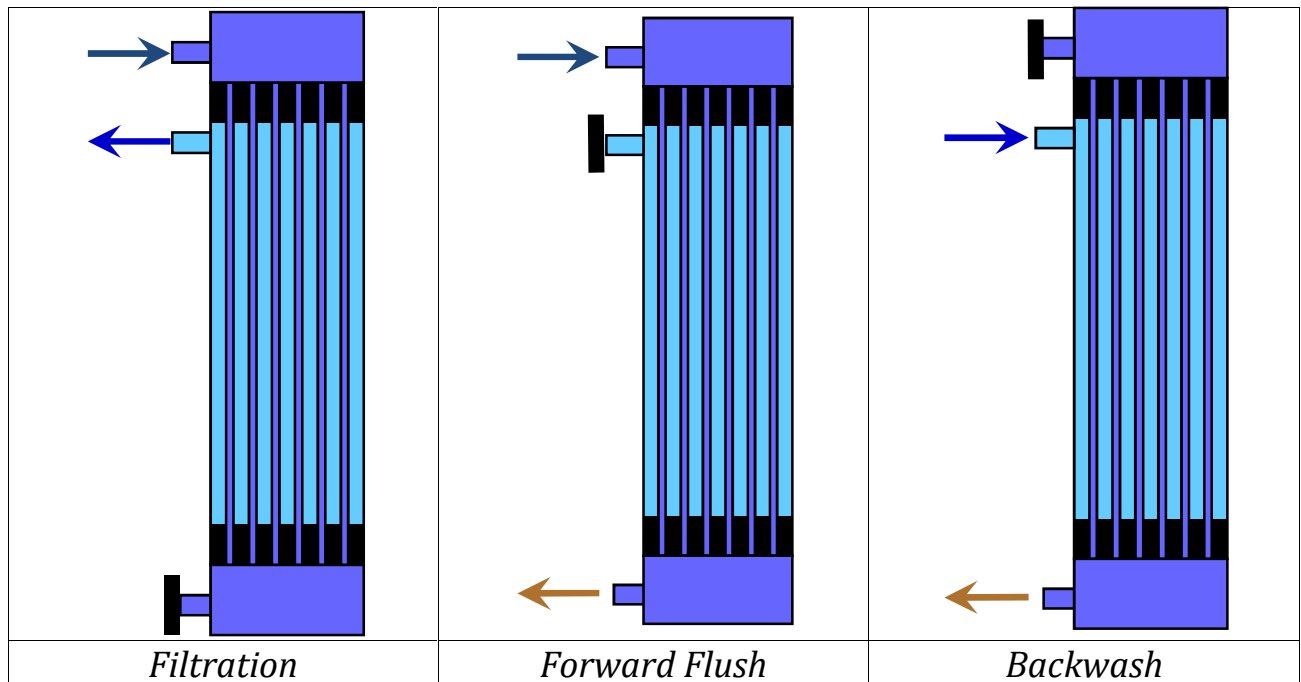


Module Operating Sequence

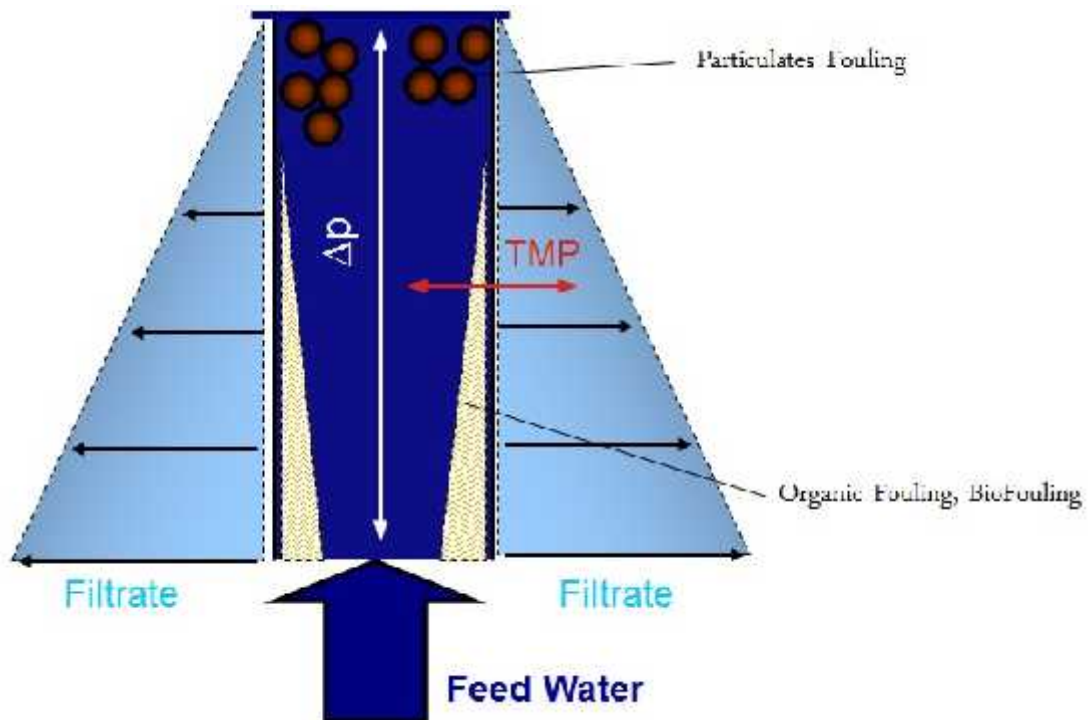
1- BOTTOM :



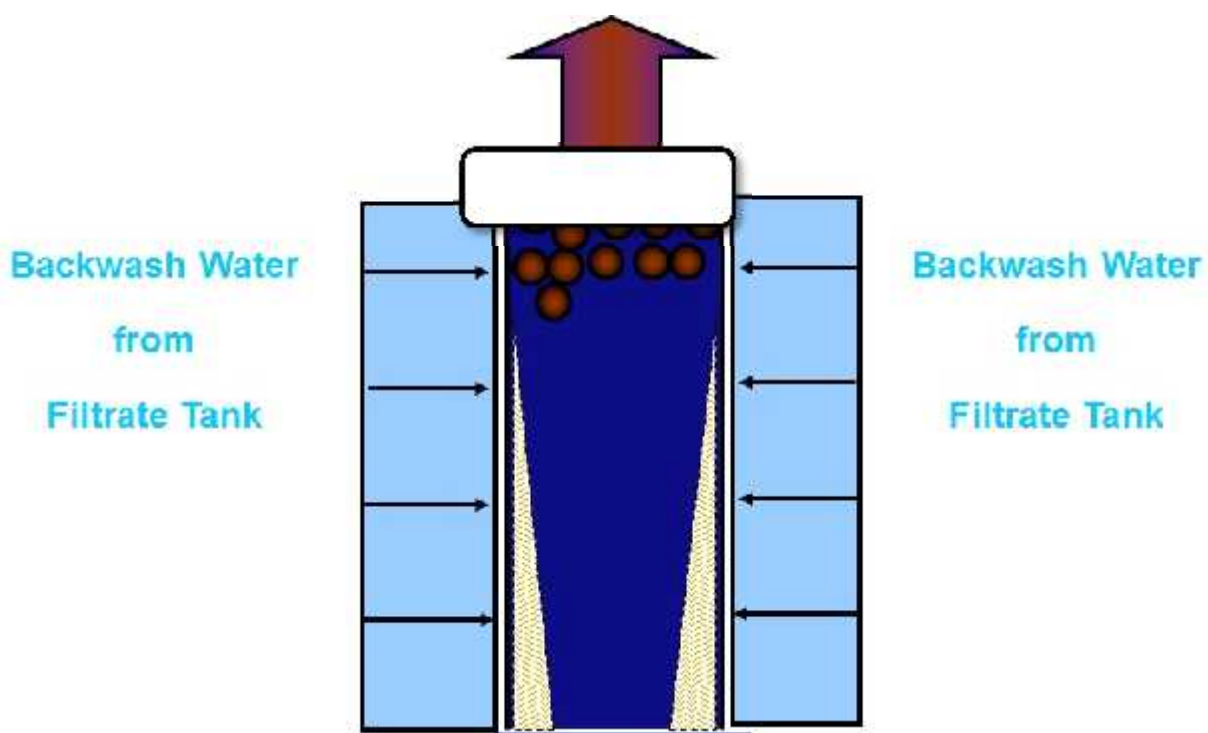
2- TOP :



1) Fouling Mechanism during Filtration :

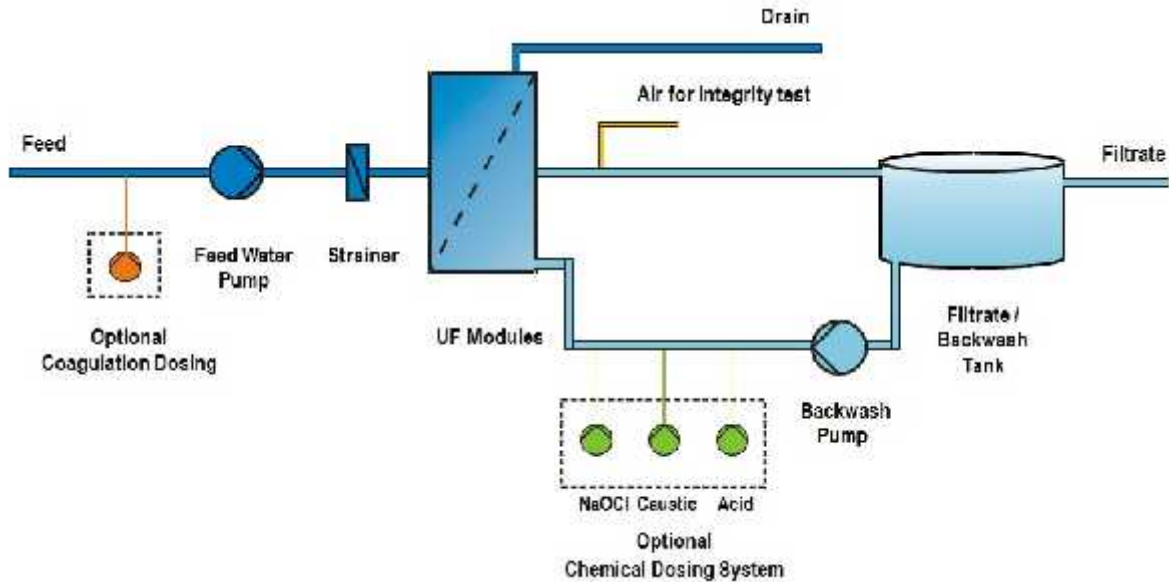


2) Removal of Fouling Layer by Backwash :

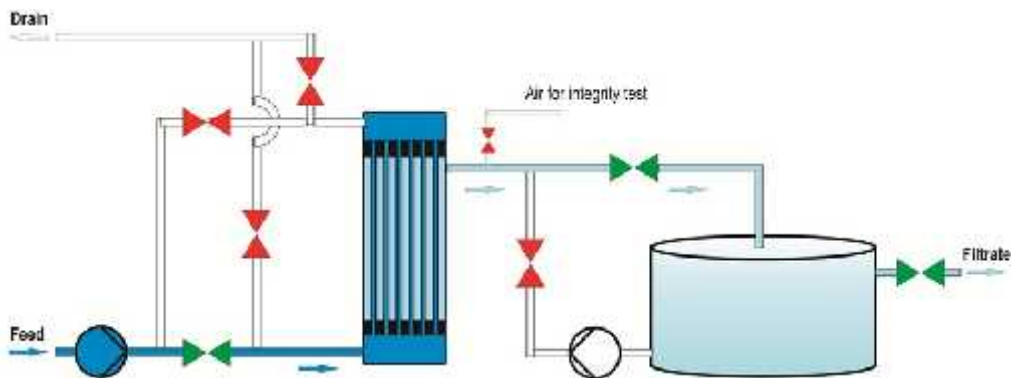


UF System

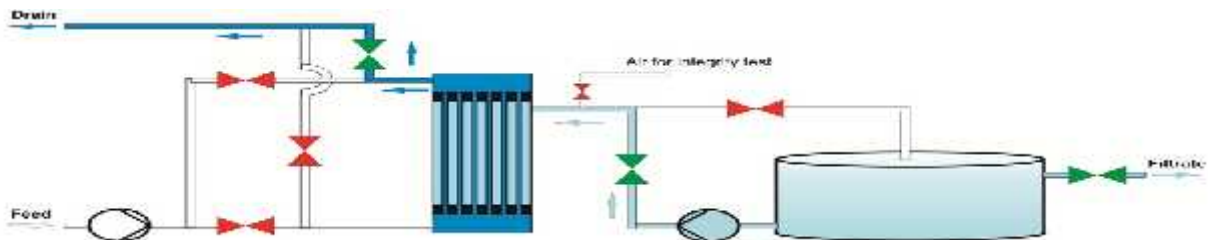
Typical Flow Diagram :



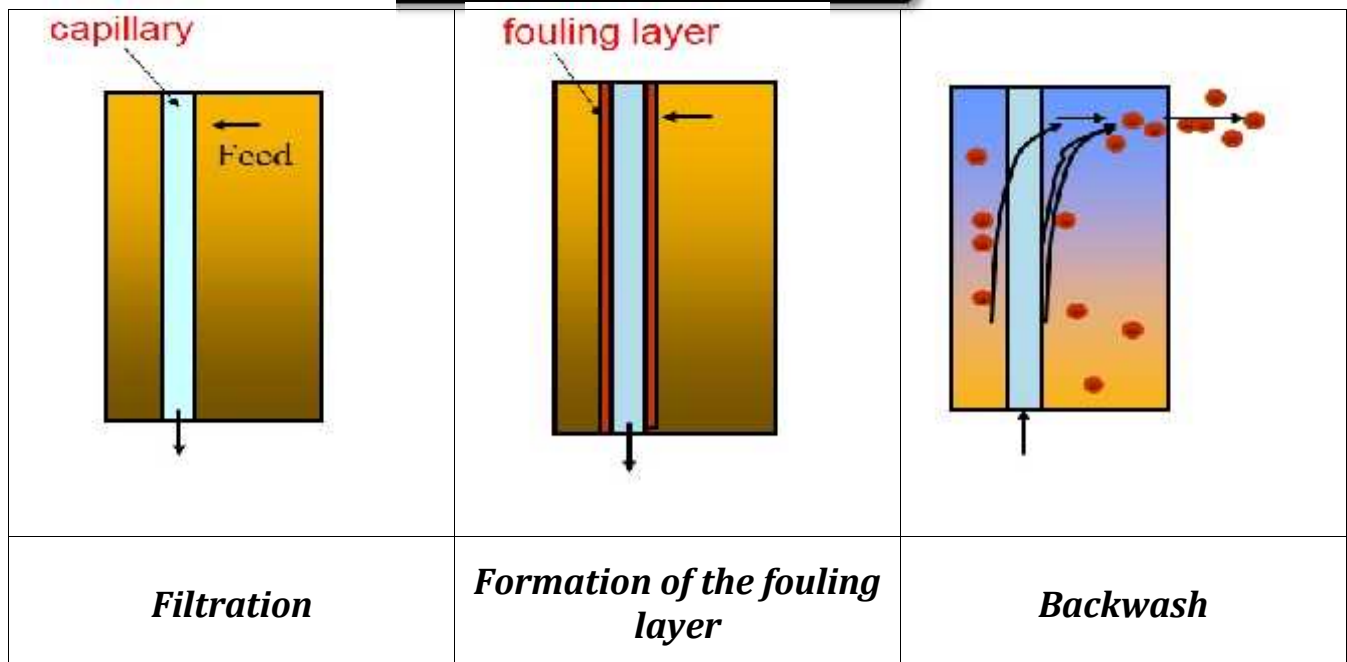
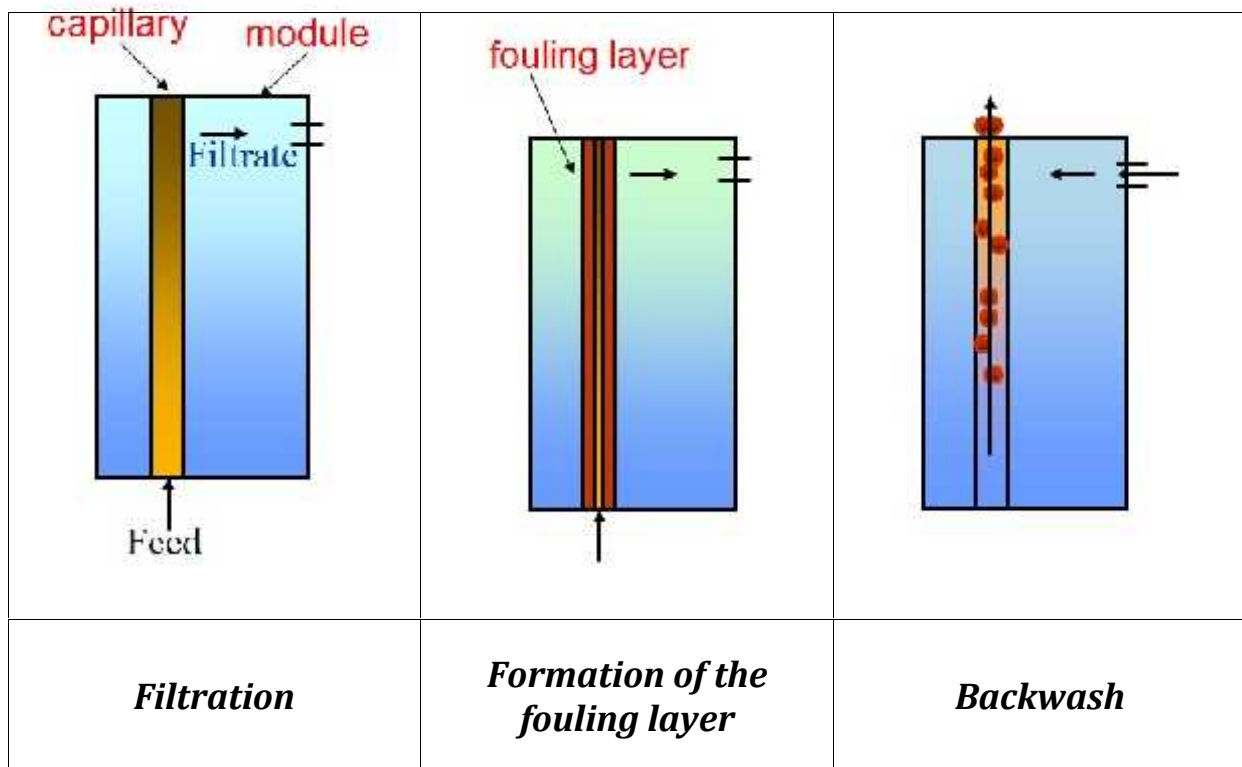
Filtration Mode :



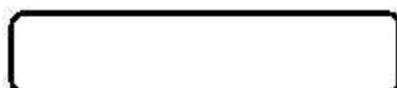
Backwash Mode :



IN-to-OUT FILTRATION



OUT-to-IN FILTRATION



UF Characteristics

1. Surface filtration

→ *No breakthrough possible*

2. Defined pore sizes

→ Complete rejection of larger particles

3. Very fine structure

→ *High rejection of bacteria and viruses*

4. Automated control

→ *Flexible operation*

UF Applications

1. Wastewater

2. Secondary and Tertiary treatment

→ *Surface Water*

→ *Well Water*

3. Pre-treatment to RO

→ *Longer life time*

→ *Smaller RO system*

→ *Less cleaning chemicals*