TANGENTIAL FLOW MEMBRANE FILTRATION (TFMF) APPLICATIONS IN WASTEWATER REUSE AND BRACKISH GROUNDWATER PLUS HIGH CHLORIDE SURFACE WATER TREATMENT

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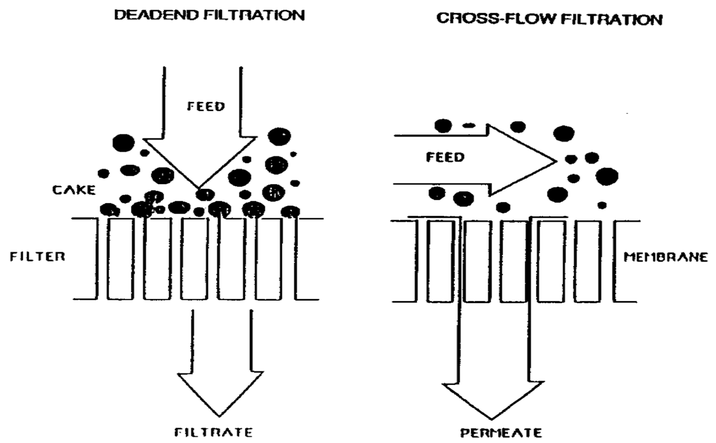
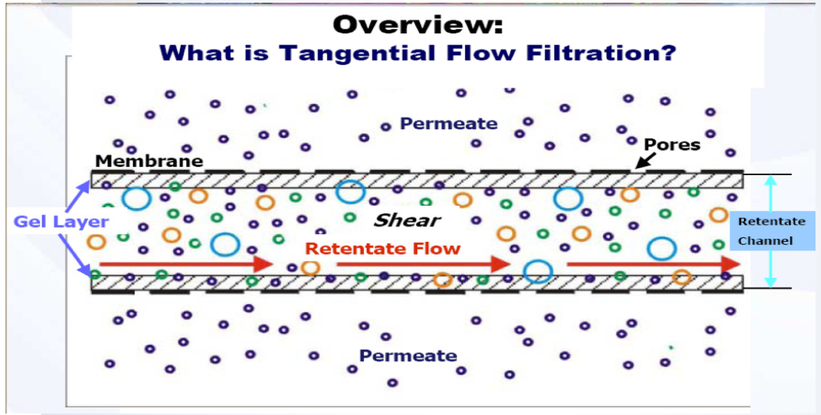
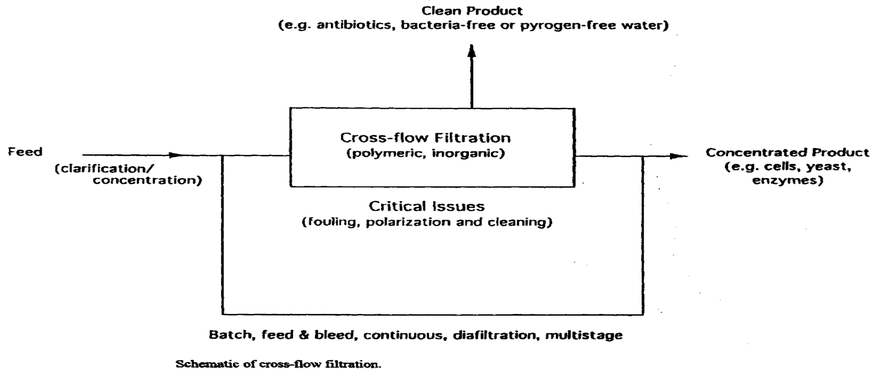




Cross-flow also allows the concentration of the retentate and provides a clean permeate (product). Therefore TFF can be used to collect either the permeate or the retentate



Schematic of cross-flow filtration.

	Microfiltration	Virus Filtration	High-Performance Filtration	Ultrafiltration TFF	Nanofiltration/ Reverse Osmosis
Components retained by membrane	Intact cells Cell debris	Viruses	Proteins	Proteins	Antibiotics Sugars Salts
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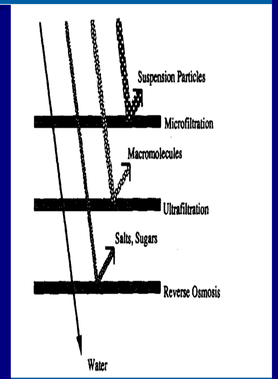
Components passed through membrane	Colloidal material Viruses Proteins Salts	Proteins Salts	Proteins Salts	Small Peptides Salts	(Salts) Water
Approximate membrane cutoff range	0.05 µm – 1 µm	100 kD – 0.05 µm	10 kD – 300 kD	1 kD – 1000 kD	<1 kD

MF, UF and RF

- **Microfiltration** generally refers to the filtration of suspension particle such as cells and cellular fragments
- **Ultrafiltration** is the filtration of macromolecules
- **Reverse Osmosis** is the filtration of molecules such as salts and sugars



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TFF Applications

Microfiltration and ultrafiltration processes incorporating tangential flow or cross flow filtration is utilized in a wide range of biopharmaceutical applications. Examples of a few typical applications are listed below:

1. Water Desalination and Brackish + High Cl^- Water Treatment
2. Concentration and desalting of protein, peptide, and oligonucleotide solutions
3. Purification and recovery of antibodies or recombinant proteins
4. Vaccine and conjugate concentration and diafiltration.
5. Fractionation of protein mixtures
6. Blood plasma fractionation and purification
7. Cell broth clarification, concentration
8. Cell culture perfusion such as in monoclonal antibody (Mab) production
9. Clarification of Fermentation broths
10. Concentration and washing of bacterial cells
11. Water and buffer purification (endotoxin removal)

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