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Materials for membrane construction

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Outline

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 5. Membrane structures



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Introduction

The selection of membranes offered by the various suppliers in the business may appear to be confusing since many materials may be used to make membranes, and they are provided under an array of trade names. In reality, relatively few materials are actually used in quantity, and only a few basic membrane types form the bulk of the membranes being sold and used.



Different materials for membrane construction

Following materials for membrane construction

1. Cellulose acetate:

Contains 38 – 40 % by weight of acetyl group.

- Membranes are strong and flexible.
- Used for RO, NF and UF applications.
- Advantages
 - o Low price
 - o Less prone to fouling due to its hydrophilic nature.
- Limitations
 - o Low resistance to pH change.
 - o Maximum operating temperature is 35°C.
 - o Low resistance to chemicals normally used for cleaning and sanitization (e.g. chlorine)



2. Synthetic Polymers

a. **Polysulphones:**

- Used for UF and MF membrane since 1975.
- Advantages:
 - o Exceptional temperature and pH resistance
- These membranes do not tolerate oil, grease, fat and polar solvents.
- Aromatic polysulphones are used as they are resistant to oxidation, dimensionally stable and resistant to acids, alkali, salt solutions and detergents even at elevated temperatures or moderate pressure.

b. **Polyvinylidene fluoride:**

- These are resistant to hydrocarbons and oxidizing environments.
- These have excellent abrasion resistance and good resistance against temperature and chemicals.



3. **Composite membranes:**

- Made to replace cellulose acetate RO membranes.
- The main advantage is the combination of relatively high flux and very high salt rejection.
- They also have good temperature and pH resistance.

4. Others

ABS, Delrin, PE, PP, PVC, C-PVC, PVDF, FRP, EPOXY

Membrane Structure

Membranes have a tight top layer facing the product to be treated. This layer is also called

the skin layer. It is thin, typically <0.1 micron. The membrane itself is 150 - 250 micron, the

bulk of the membrane simply providing structural support for the skin layer.

Pore size differs for different types of processes:

MF – 5 – 0.1 micron

UF – 0.1 – 0.01 micron

NF, RO – 0.001 micron (theoretical)



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Thank you