

Membrane Technology

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Chapter 6

Membrane Characterization



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Chapter Description

- Aims
 - Understand membrane's characterization including flux, permeability, rejection and calculation of membrane module
- Expected Outcomes
 - Understand membrane's characterization in general.
- Other related Information



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Subtopics

6.1 Flux and membrane permeability

6.2 Calculation of number of module



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6.1 Flux and Membrane Permeability

- Example 1:
Data obtained from one experiment using pure water is shown in Table 1. Calculate the flux ($\text{L}/\text{m}^2\cdot\text{h}$) and permeability ($\text{L}/\text{m}^2\cdot\text{h}\cdot\text{bar}$) from the data. What type of membrane for this case? Please justify.



6.1 Flux and Membrane Permeability

Sample collect at constant
volume, $V=$ 25 mL
Effective membrane
diameter, $d=$ 4 cm

Table 1

Pin(bar)	Pout(bar)	time
0	0	0
2	2.1	51min 29s
3	3.1	32min 6s
4	4.1	26min 17s
5	5.1	19min 46s
7	7.1	14min 9s
9	9.2	10min 48s



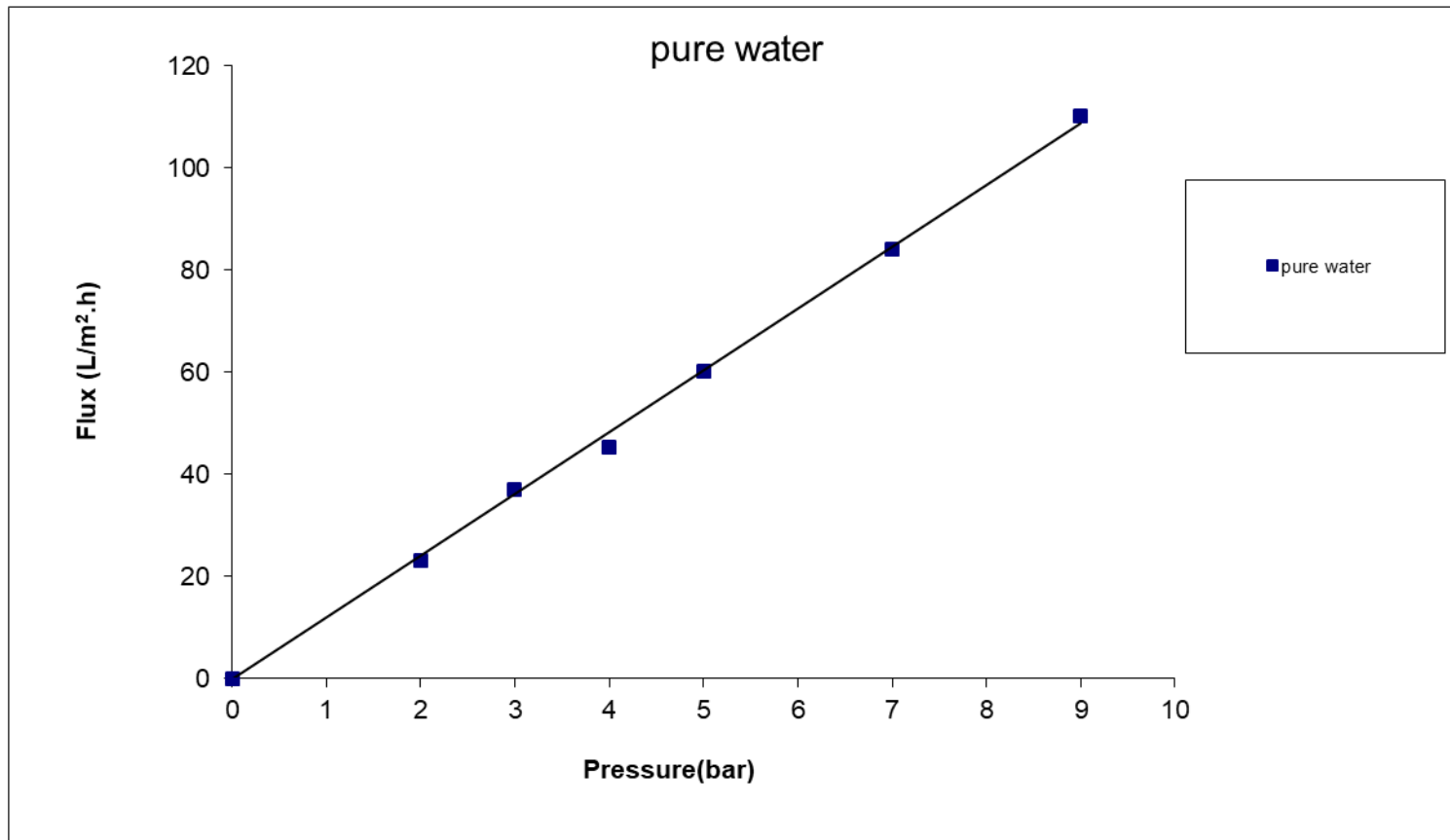
6.1 Flux and Membrane Permeability

Pin(bar)	Pout(bar)	t(h)	Flux(L/m ² .h)
0	0	0	0
2	2.1	0.8581	23.12232821
3	3.1	0.535	37.08648568
4	4.1	0.4381	45.2893628
5	5.1	0.3294	60.23457754
7	7.1	0.2358	84.14448618
9	9.2	0.18	110.2292769



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6.1 Flux and Membrane Permeability



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6.2 Calculation Number of Module

- An UF flat sheet membrane has a water permeability of $L_p = 50 \text{ L/m}^2 \cdot \text{h} \cdot \text{bar}$. The effective size of the flat sheet membrane is $0.5 \text{ m} \times 0.2 \text{ m}$ in rectangle module. If the system is run at 5 bar and $25 \text{ }^\circ\text{C}$ and protein as a feed, how many number of modules are required in order to achieve permeate flow rate of $3 \text{ m}^3/\text{day}$.



References

- Mulder, M. (2000) *Basic Principles of Membrane Technology*, second ed., Kluwer Academic Publishers, Dordrecht, The Netherlands.
- Baker, R.W. (2000) *Membrane Technology and Applications*. New York, Mc Graw-Hill.



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