Problem 7

You have the task to desalt 5 m³ protein solution by diafiltration. You have selected a membrane with a rejection of 0.12 for your salt.

1. Calculate the amount of water which you need to remove 99% of the salt?
2. Calculate the membrane area when the process must be completed within 10 hours. Use an average polymer membrane for this process.
3. Estimate the size of the pump and select a pump.
4. Justify all assumptions and report all sources, which you have used

Problem 8

You have to scale up a ultrafiltration process of a protein.
The initial flux at time 0 is 150 l/m²h. After 60 min the flux has declined to 20 l/m²h.

1. Calculate the filter area for filtration of 7 m³ protein solution in 8 hours assuming a exponential flux decay and cleaning of the filter after 20 min.
2. Calculate the average flux.
3. Discuss how you could improve the filtration.

Problem 9

For protein formulation you must calculate the osmotic pressure of a protein solution with 40 g/l. The protein has similar properties as fibrinogen.

1. Calculate the osmotic pressure and compare it to ideal osmotic pressure calculated by the van't Hoff equation.
2. How much salt do you have to add to the protein solution to reach the osmotic pressure of a physiological salt solution.