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Recombinant Protein – Lab Scale Concentration – 2.27 mg/mL

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Abstract

This application note is focusing on the concentration and diafiltration of a 150 kD recombinant protein. With a target concentration of 2.27 mg/mL.

The goal was to determine the optimum operating conditions to maximize the retention of the protein at a favorable permeate flux rate.

The Reuse line Explorer in 24-inch lengths and 30 kD MWCO with a 1.0 mm fiber ID was used for this trial. It was shown that no passage of the recombinant protein into the permeate happened, therefore nearly 100% of the product were retained. The average permeate flux rate was 60 LMH during the process. At the membrane loading of 75 Kg/m², the overall product recover was nearly 100%.

Introduction

In the following you will see a concentration of a 150 kD recombinant protein. The goal of this operation to determine optimum operating conditions to maximize the retention of the protein at a favorable permeate flux rate.

Materials

For this concentration and diafiltration of a 150 kD recombinant protein a Reuse line Explorer was used. The length of 24-inch and a MWCO of 30 kD and 1.0 mm fiber ID were chosen. Like all our Hollow Fiber modules the membrane consisted of modified Polyethersulfone (m-PES). The Explorer module has a diameter of 1.3 cm and a corresponding filter area of 0.0321 m²

Details of used Hollow Fiber Module

| | |
|-------------------------------------|-------------------------|
| Family | Reuse |
| Product Size | Investigator |
| MWCO Pore Size | 30 kD |
| Fiber ID | 1.0 mm |
| Length | 24 inch |
| Filter Area | 0.0321 m ² |
| No. of Fibers | 18 |
| Recommended batch volume per module | 250 - 1,500 mL |
| Diameter Module (cm) | 1.3 cm |
| Feed Retentate connectors | ½-inch TC |
| Permeate connector | ¾-inch Hose Barb |
| Material | WA03010EXP24S0 (1-pack) |

Methods

Feed:

- Recombinant Protein: 150 kD
- Concentration: 2.27 mg/mL

Details of Trial

| | |
|---------------------|---|
| Membrane & Module | Reuse line Explorer 24-inch 30 kD, m-PES, 321 cm ² , 1 mm fiber ID |
| Initial Feed Volume | 2,400 g |
| Membrane Loading | 2,400 g/321 cm ² = ~75 kg/m ² |
| Process Objective | 24× concentration + 6 diavolumes (DV) |
| Process Flux | TMP control, 18 psig, 4000 sec ⁻¹ |

Results

During optimization, the flux vs. TMP (Figure 1) is a smooth curve with no sudden increases or decreases in flux or TMP which shows the process conditions were optimum for this recombinant protein. Figure 2 for filtrate flux vs. concentration factor shows the filter could retain the recombinant protein at these process conditions.

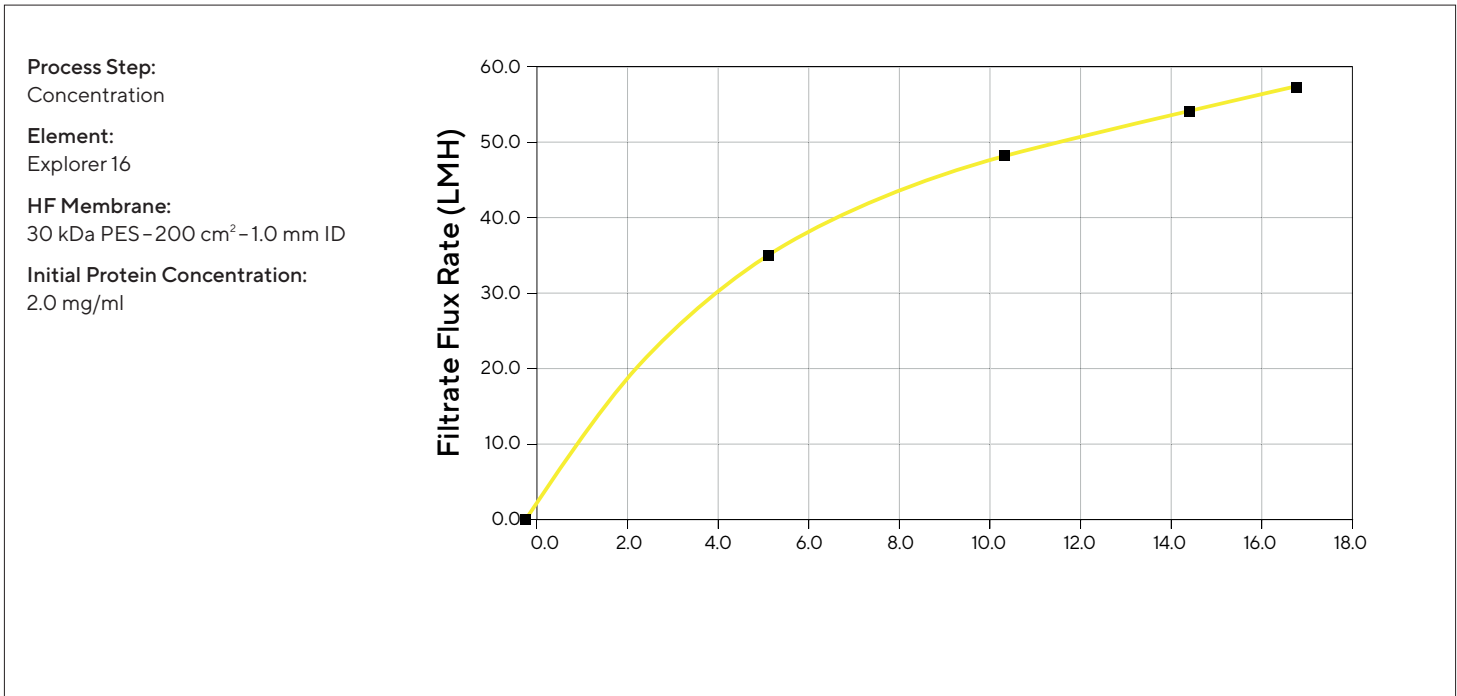


Figure 1: Filtrate Flux rate vs. TMP for fusion protein

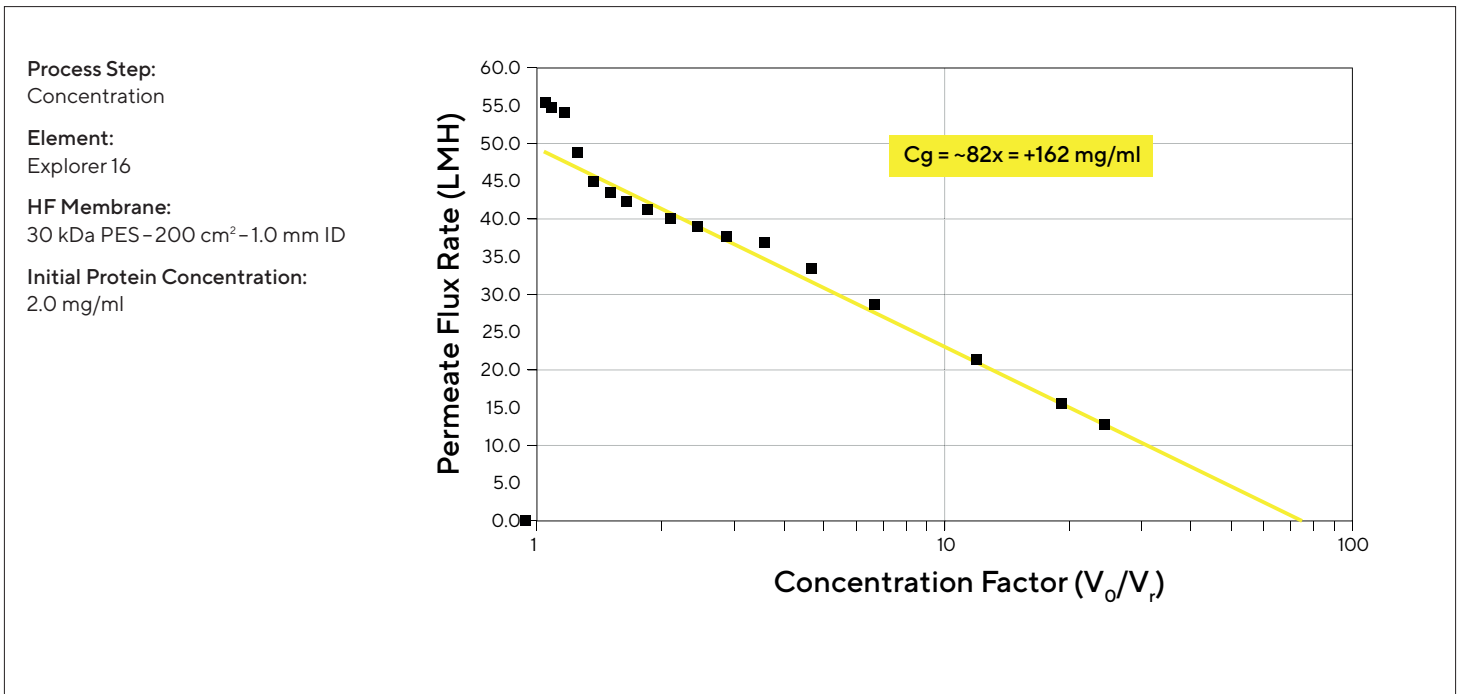


Figure 2: Filtrate flux profile for concentration of recombinant protein up to 162 mg/mL

Conclusion

The average permeate flux rate was 60 LMH during the process. At the membrane loading of 75 Kg/m², the overall product recover was nearly 100%.

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