Intensification of mAb Processes Leveraging Sartobind® Rapid A and Full Connected Membrane-Based DSP

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Introduction

In the field of mAb purification, high performances chromatography membranes that are ready-to-use, for "one-batch-one-device" manufacturing strategy, take off. The newly Protein A Capture technology "Sartobind® Rapid A", used in rapid cycling platforms, brings a 30-fold higher productivity (203 g/L vs 14 g/L with traditional resins), has similar performances for DBC, yield and HCP to DNA removal. This allows next-generation full membrane-based purification platforms.

Sartobind® Rapid A vs Purely Convective | Diffusive Materials

The first milestone to fully membrane-based process is achieved by implementing a competitive double-flow-through polishing process with connected Sartobind® Q and Sartobind® F. Comparable purity and yield are obtained (>98% for each flow-through step) with a strong footprint reduction of the purification process. The second step to a full membrane process is combining the Resolute® MCC multicolumn technology with protein A, AEX, and CEX membranes in parallel batch mode. This results in increasing even more the productivity (>400 g/L/h) compared to a resin-based multi-column chromatography process (>200 g/L/h).

This innovative Sartobind® Rapid A combined with process intensification solutions demonstrates that alternative mAb polishing platforms are safer and highly competitive against classic resin-based approaches.

CPP and COA of IgG Purified With Sartobind® Rapid A and Standard Resin

In this comparison, we show how Sartobind® Rapid A compares to standard protein A resin. Both materials were tested with the same fixed material. The analyzed data shows a very good comparability of Sartobind® Rapid A with the protein A resin. The membrane showed superior performance in DNA reduction and protein A leaching, tested with the same feed material. The analyzed data show a very good comparability of Sartobind® Rapid A with the Convecdiff Sartobind® Rapid A.

Levels of Intensification for Downstream Processing

- Standard batch: standalone UO
- Intensified, standalone UO increases the individual step productivity by higher cycling (BC or MCC, improved buffer management) and high HPCDR resin pooling tanks
- Connected process: at least 2 UO subsequent steps started before first UO could be finished, if needed, software orchestration of batch to reduce load time (e.g., 30 min less load time, closed processing)
- Connected process: continuous processing using intermediate batches, stepwise states are replaced with flow-through modes. Molecules do not stop... (e.g., intermediate buffer tanks)

Double Flow-Through With Membrane Adsorbers

- Step 1: DOE to Define Buffer Conditions
- Step 2: Breakthrough Curves
- Step 3: Connected Processing

Downstream Intensification Reduces Processing Times

- Each step starts before the previous one ends
- This enables processing the sub-batches from protein A elution
- Reduction of intermediate tanks and chromatography columns’ size
- Lower footprint
- Lower OPEX

The Power of the Connected Membrane Processes

- Connecting the process and using MCC or parallel batch multiplexing productivity or drops costs
- Comparable purity and yield
- Lower footprint

Conclusion

Due to inherent structural characteristics, Sartobind® Rapid A offers unique possibilities in the area of full membrane-based ultra-fast mAb purification process.

- Ready-to-use and One batch — One device manufacturing strategy enabled thanks to Sartobind® Rapid A
- DBC highly competitive
- Short cycle time (<30 min)
- High number of cycles per batch (up to 150)
- Double Flow-Through polishing with Sartobind® Q, F
- Full membrane process with ultra-high productivity

The second connected process is finished with a strong footprint reduction of the purification process. The second step to a full membrane process is combining the Resolute® MCC multicolumn technology with protein A, AEX, and CEX membranes in parallel batch mode. This results in increasing even more the productivity (>400 g/L/h) compared to a resin-based multi-column chromatography process (>200 g/L/h).

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