Capto™ S ImpAct resin

ION EXCHANGE CHROMATOGRAPHY

Capto™ S ImpAct chromatography resin is a strong cation exchanger (Fig 1). The resin is designed for polishing of monoclonal antibodies (mAbs) and a wide range of other biomolecules. Capto S ImpAct resin is part of a platform of resins based on the Capto product line. The polymeric ligand, in combination with the attributes of the base matrix, gives a cation exchanger with high binding capacity. By combining the rigidity of Capto resins with an optimized bead, Capto S ImpAct resin delivers both good pressure/flow properties and good resolution, even at high sample load. The high binding capacity and resolution, combined with the ability to run at high flow rates and bed heights, increase productivity and flexibility in process design.

Key benefits of Capto S ImpAct resin include:

- High binding capacity, typically > 100 mg mAb/mL resin
- Efficient aggregate removal at high load of mAbs
- High-resolution polishing
- Flexibility of design: large operational window of flow rates and bed heights for easy optimization and scaling
- High productivity, enabling cost-efficient manufacturing
- Security of supply and comprehensive regulatory support

Chromatography resin characteristics

Ionic groups and base matrix

Capto S ImpAct is a strong cation exchange (CIEX) resin. The resin has a polymer-grafted ligand composed of a mix of two different building blocks, a negatively charged sulfonate group and a neutral pyrrolidone (Fig 2). This composition combines a surface extender with functional groups, which results in a high binding capacity.



Fig 1. Capto S ImpAct resin extends the Capto platform to include a high-binding and high-resolution polishing chromatography resin.

Capto S ImpAct resin is based on a high-flow agarose base matrix with good pressure/flow properties and an average bead size of 50 µm, which combined with an optimized porosity gives high resolution. These properties, in combination with the polymer ligand, make Capto S ImpAct resin a good choice for reliable and robust polishing steps in an industrial purification process. Table 1 lists further characteristics of the resin.

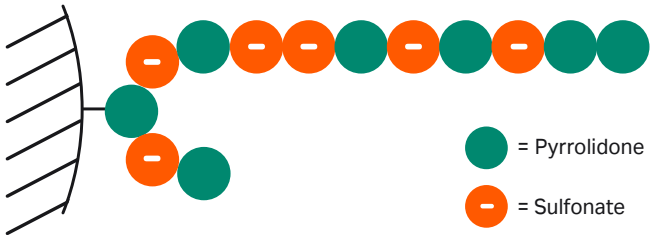


Fig 2. Schematic picture of the polymer-grafted Capto S ImpAct resin. The polymer surface extender is formed by random grafting between the two building blocks.

Table 1. Main characteristics of Capto S ImpAct resin

Matrix	High-flow agarose
Functional group	SO_3-
Total ionic capacity	37 to 63 µmol (H^+)/mL resin
Average particle size (d_{50v})[1]	50 µm
Flow velocity[2]	Maximum 220 cm/h in a 1 m diameter column with 20 cm bed height at 20°C; measured using process buffers with the same viscosity as water at < 3 bar (44 psi, 0.3 MPa)
Dynamic binding capacity[3]	> 100 mg IgG/mL resin
	> 90 mg lysozyme/mL resin
	> 85 mg BSA/mL resin
pH stability (operational)[4]	4 to 12
Cleaning-in-place stability (short term)[5]	3 to 14
Working temperature	4°C to 30°C
Chemical stability	All commonly used aqueous buffers, 1 M sodium hydroxide (NaOH)[6], 8 M urea, 6 M guanidine hydrochloride, 30% isopropanol, and 70% ethanol
Avoid	Oxidizing agents, cationic detergents
Storage	0.2 M sodium acetate in 20% ethanol at 4°C to 30°C

[1] d_{50v} is the median particle size of the cumulative volume distribution.
[2] Flow velocity stated in the table is dependent of the column used.
[3] Dynamic binding capacity at 10% breakthrough measured at a residence time of 5.4 min in a Tricorn™ 5/50 column with 5 cm bed height (corresponding to 220 cm/h in a 20 cm column). 50 mM sodium acetate, pH 5.5 (IgG), 25 mM sodium phosphate, pH 7.2 (lysozyme), and 50 mM sodium acetate, pH 5.0 (BSA).
[4] Working range: pH interval where the resin can be operated without significant change in function.
[5] Cleaning in place: pH stability where the resin can be subjected to cleaning in place without significant change in function.
[6] No significant change in ionic capacity and carbon content after storage for 1 week in 1 M NaOH at 40°C.

High binding capacity

There is a growing need for mAb downstream processes that can handle the challenges associated with increased product titers upstream in a cost-effective and efficient way. One way to improve productivity is to use chromatography resins with high dynamic binding capacities (DBC). Several studies using a selection of antibodies, listed in Table 2, have demonstrated the high binding capacities of Capto S ImpAct resin (Fig 3 and 4). The results show that Capto S ImpAct resin is a useful tool for these challenges faced in today's biopharmaceutical manufacturing.

Table 2. Isoelectric point (pI) and aggregate content for mAbs used in the studies with Capto S ImpAct resin

mAb	pI	Aggregate content
mAb A	8.9	7%
mAb B	8.6	2%
mAb C	8.9 to 9.0	2%
mAb D	8.5	4%
mAb E	7.3 to 7.5	2%

The static binding capacity (SBC) of Capto S ImpAct resin for three mAbs and one polyclonal IgG (pIgG) was determined over a wide range of conductivities and pH values using prefilled PreDictor™ Capto S ImpAct 96-well filter plates (Fig 3). The red areas in the contour plots in Figure 3 correspond to the highest SBC (> 100 mg/mL) and the blue to the lowest. The binding optimum differs between the antibodies, but as indicated by the large red areas in all four contour plots, Capto S ImpAct resin showed high SBC under a wide range of conditions for all antibodies tested.

Please note that adding salt can, in some cases, improve binding performance. The optimal salt concentration is molecule-dependent and should be determined during process development.

Resin: PreDictor Capto S ImpAct, 2 µL/well
Sample: ~ 3 mg/mL (A) mAb A, (B) mAb B, (C) mAb D, purified on MabSelect™ SuRe chromatography resin, or (D) commercial pIgG, buffer exchanged to 5 mM sodium acetate, pH 5.4
Sample load: 200 µL
Start buffers: 50 mM sodium acetate, pH 4.5 to 6.0, and 0 to 350 mM NaCl
Incubation time: 90 min

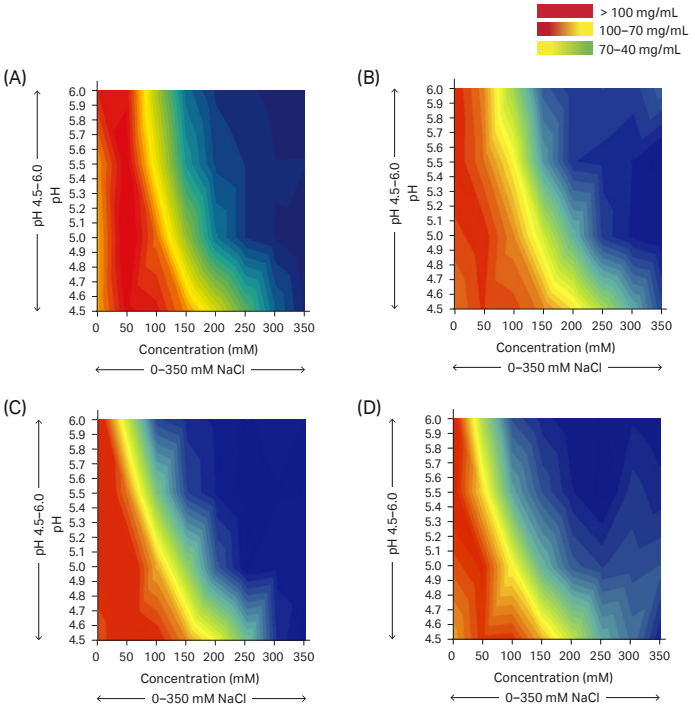


Fig 3. Contour plots showing SBC of (A) mAb A; (B) mAb B; (C) mAb D; (D) pIgG in PreDictor Capto S ImpAct 2 µL plates. Samples were run in triplicate.

Robust dynamic binding capacity

The high DBC of Capto S ImpAct resin was demonstrated in a study using a selection of mAbs and one pIgG (Fig 4). Residence time on the column was 5.4 min in all experiments. The DBC at 10% breakthrough was high (between 84 and 122 mg/mL) for the mAbs tested.

Furthermore, a study was performed to investigate if DBC was affected by high mAb concentrations (Fig 5). The results show that the DBC is unaffected by sample concentration between 5 and 25 mg mAb/mL for the tested mAb. The high and robust DBC indicates that Capto S ImpAct resin is useful for high-productivity processes.

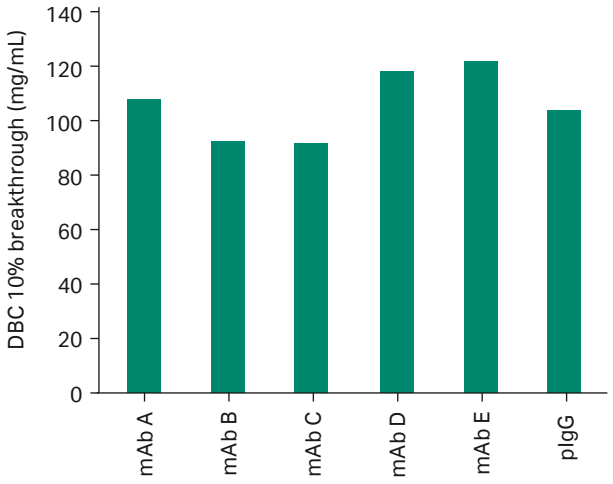


Fig 4. DBC of Capto S ImpAct resin for five mAbs and one pIgG. The samples, approximately 10 mg/mL resin of each five mAbs and pIgG were run in a Tricorn 5/50 column at a flow corresponding to a residence time of 5.4 min. The pH values of the start buffers were 5.5 for mAbs A, B, D, and pIgG, and 5.25 for mAbs C and E. The start buffer for mAb A also contained 50 mM NaCl.

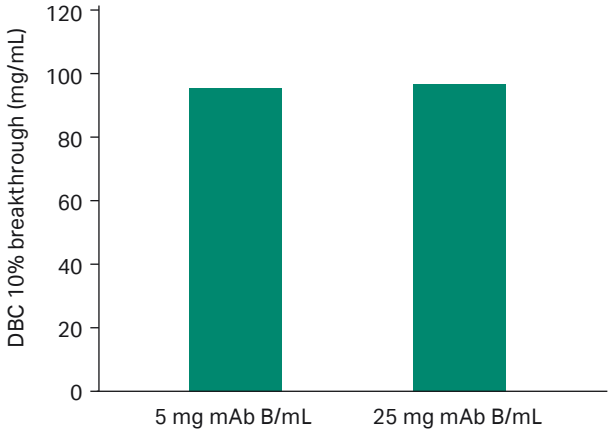


Fig 5. DBC of Capto S ImpAct resin at different sample concentrations. The samples (5 mg and 25 mg mAb B/mL in 50 mM sodium acetate, 10 mM NaCl, pH 5.5) were run in a Tricorn 5/50 column at a flow corresponding to a residence time of 5.4 min.

High resolution

A main mAb polishing purification challenge is often to selectively remove impurities similar to the target product. Examples of impurities are protein fragments, aggregated forms, and structural or charge variants, as well as protein A (from the initial capture step) and host cell proteins (HCP). Also, high antibody titers often increase the amount of these impurities in the cell culture feedstock. Chromatography resins designed for polishing therefore need to offer high resolution for effective removal of such impurities, while retaining high recovery. The attributes of Capto S ImpAct resin offer an excellent solution for this challenge even at high sample load.

To evaluate Capto S ImpAct resin for removal of aggregates, four different mAbs purified on MabSelect SuRe resin were run using linear gradient elution in Tricorn columns. Fractions from the elution peaks were collected and analyzed by analytical gel filtration (size-exclusion chromatography) for aggregate content.

HCP and protein A content was analyzed using a Gyrolab™ workstation and a commercial ELISA assay, respectively. As can be seen in Table 3, Capto S ImpAct resin demonstrates effective aggregate and HCP removal at a high monomer recovery. For example, mAb A, which had the higher initial aggregate content (7%) was nonetheless effectively purified from aggregates and other contaminants.

Figure 6 shows the chromatogram for mAb E, illustrating that aggregates (green) elute at the tail of the elution peak. For this mAb, the aggregate level was reduced to 0.6% at 90% monomer recovery. The initial aggregate content was 2%.

Table 3. Results from the purification of four mAbs using Capto S ImpAct resin

	mAb A	mAb C	mAb D	mAb E
DBC (mg/mL resin)	108	92	118	122
Load (mg/mL resin)	80	64	80	85
Start aggregate content (%)	7	2	4	2
Aggregates at 90% monomer recovery (%)	0.9	0.6	1.2	0.6
Start HCP content (ppm)	34	1800	300	454
HCP at 90% monomer recovery (ppm)	8	42	25	43
Start protein A content (ppm)	4	1	1	< 1
Protein A at 90% monomer recovery (ppm)	< 1	< 1	< 1	< 1
Elution pool volume (CV)	5.1	5.4	4.0	6.3
Elution pool concentration at 90% monomer recovery (mg/mL)	13.6	10.6	17.8	12.3

Resin: Capto S ImpAct
Column: Tricorn 5/100, bed height 10 cm
Sample: mAb E, purified on MabSelect SuRe resin
Sample load: 85 mg/mL resin
Start buffer: 50 mM sodium acetate, pH 5.3
Elution buffer: 50 mM sodium acetate + 500 mM NaCl, pH 5.3
Flow rate: 0.35 mL/min, residence time 5.4 min
Gradient: Linear, 0 to 350 mM NaCl in 20 CV

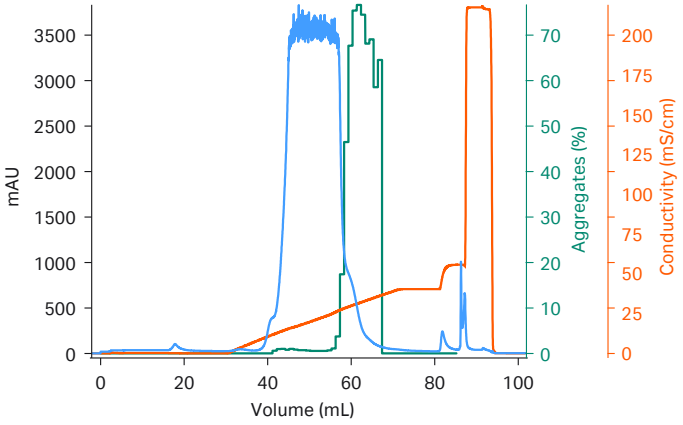


Fig 6. Chromatogram from purification of mAb E using Capto S ImpAct resin in a Tricorn 5/100 column. Histogram in green represents aggregates in fractions. Size exclusion chromatography was used for aggregate content analysis, using a prepacked Superdex™ 200 Increase 10/300 GL column.

High resolution for late-stage purification and polishing

Cytiva offer several strong cation exchange resins. Even though the charged groups of the sulfonate and sulfopropyl ligands are similar for these resins, differences in base matrix, ligand density, and surface extenders give differences in selectivity and resolution. Figure 7 presents chromatograms from four ion exchange runs in prepacked HiScreen™ columns. As can be seen by the sharper peaks, Capto S ImpAct, Capto SP ImpRes, and SP Sepharose™ High Performance resins deliver improved resolution compared with Capto S resin. The result is due to that the three former have smaller average bead sizes, 50 µm, 40 µm, and 34 µm, respectively, compared with Capto S resin (90 µm).

Column:	(A) HiScreen Capto S ImpAct; (B) HiScreen Capto SP ImpRes; (C) HiScreen SP HP; (D) HiScreen Capto S
Sample:	Protein mix of α-chymotrypsinogen A 4.5 mg/mL resin and lysozyme 3 mg/mL resin in 20 mM sodium phosphate, pH 6.8
Sample load:	3 mL
Start buffer:	20 mM sodium phosphate, pH 6.8
Elution buffer:	Start buffer + 500 mM NaCl
Flow rate:	0.9 mL/min (5.4 min residence time)
Gradient:	Linear, 0% to 100% elution buffer in 20 CV
System:	ÄKTA™ avant 25

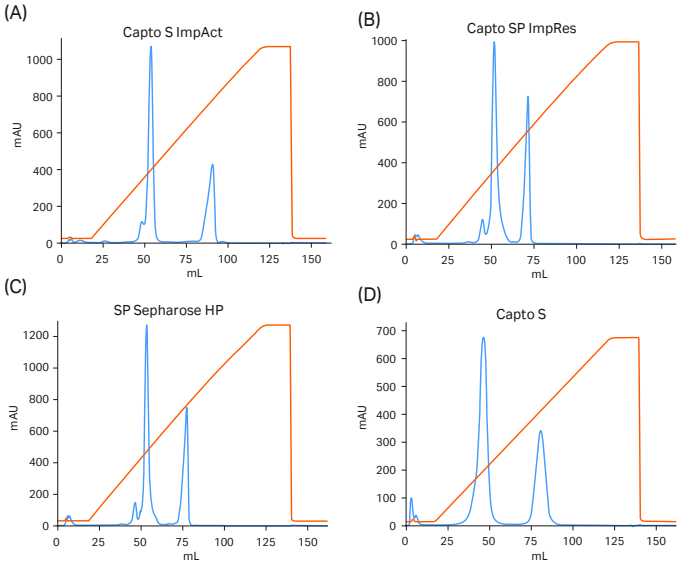


Fig 7. Chromatograms showing different resolution, comparing four cation ion exchange resins. Peaks (left to right) are α-chymotrypsinogen A and lysozyme. The chromatograms correspond to (A) Capto S ImpAct (50 µm); (B) Capto SP ImpRes (40 µm); (C) SP Sepharose High Performance (34 µm); (D) Capto S (90 µm).

Comparison to other resins on the market

SBC and DBC studies as well as selectivity studies, show that Capto S ImpAct resin has an improved performance compared with five other commercially available cation exchange resins*, (Fig 8, 9, 10, and Table 4). The resins tested were Capto S ImpAct, Capto SP ImpRes (Cytiva), Eshmuno™ CPX, Fractogel™ EMD SO_3^- (M) (Merck Millipore), Nuvia™ HR-S (Bio-Rad Laboratories), and Poros™ XS (Thermo Fisher Scientific Inc.) resins.

To find optimal running conditions for each resin, SBC for mAb A was measured over a wide range of pH and salt concentrations in a 96-well plate format. Samples were run in triplicate and the same conditions were used for all resins. Under the studied conditions, Capto S ImpAct resin has a SBC that is higher or equivalent to the other resins in the study (Fig 8).

Resins:	(A) Capto S ImpAct; (B) Capto SP ImpRes; (C) Eshmuno CPX; (D) Fractogel SO_3^- (M); (E) Nuvia HR-S; (F) Poros XS in 96-well plates, 2 µL resin/well
Sample:	~ 3 mg/mL mAb A, purified on MabSelect SuRe resin
Sample load:	200 µL
Start buffers:	50 mM sodium acetate, pH 4.5 to 6.0, and 0 to 350 mM NaCl
Incubation time:	90 min

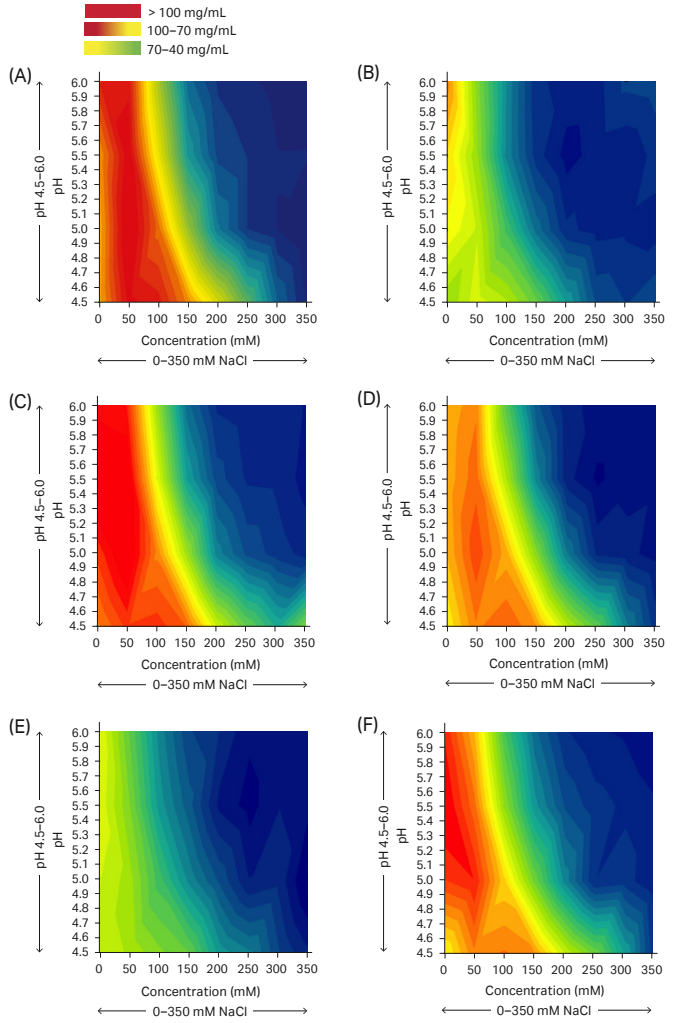


Fig 8. Contour plots for determination of SBC of (A) Capto S ImpAct; (B) Capto SP ImpRes; (C) Eshmuno CPX; (D) Fractogel SO_3^-(M); (E) Nuvia HR-S; (F) Poros XS for mAb A. Experiments were run in triplicate.

Based on SBC data, determination of DBC was performed in triplicate runs at optimal conditions for each resin. Figure 9 shows the DBC results for mAb A and mAb B, demonstrating that Capto S ImpAct resin has higher DBC for the antibodies tested compared with the other cation exchangers included in the study.

* The comparison was performed in January and February, 2014, in Uppsala, Sweden. The data is available upon request to Cytiva.

Furthermore, Capto S ImpAct resin has a higher DBC, even at short residence times, compared with the other CIEX resins tested (Fig 10).

Resins: Capto S ImpAct, Capto SP ImpRes, Eshmuno CPX, Fractogel EMD SO_3- (M), Nuvia HR-S, or Poros XS
Column: Tricorn 5/50, 1 mL
Sample: mAb A and mAb B, purified on MabSelect SuRe resin
Sample load: Until 10% breakthrough
Start buffer: mAb A, pH 5.0: 50 mM sodium acetate, pH 5.0 + 50 mM NaCl (optimum for Capto S ImpAct, Eshmuno CPX, Fractogel EMD SO_3- (M), and Poros XS)
mAb A, pH 6.0: 50 mM sodium acetate, pH 6.0 (optimum for Capto SP ImpRes and Nuvia HR-S)
mAb B: 50 mM sodium acetate, pH 5.5
Elution buffer: Start buffer + 500 mM NaCl
Flow rate: 0.19 mL/min, 5.4 min residence time

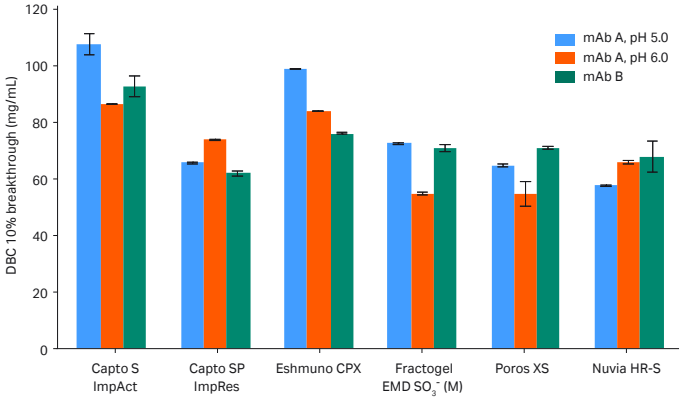


Fig 9. DBC comparison of different CIEX resins. Capto S ImpAct resin exhibits equal or higher DBC compared with Eshmuno CPX. Capto SP ImpRes, Fractogel EMD SO_3- (M), Nuvia HR-S, and Poros XS exhibit lower DBCs under the observed conditions. Experiments were run in triplicate.

Resins: Capto S ImpAct, Capto SP ImpRes, Eshmuno CPX, Fractogel SO_3- (M), Nuvia HR-S, or Poros XS
Column: Tricorn 5/50, 1 mL
Sample: 9.4 mg/mL mAb B, purified on MabSelect SuRe resin
Sample load: Until 10% breakthrough
Start buffer: 50 mM sodium acetate, pH 5.5
Elution buffer: Start buffer + 350 mM NaCl
Flow rates: 0.12 to 0.24 mL/min, 4, 6, and 8 min residence time

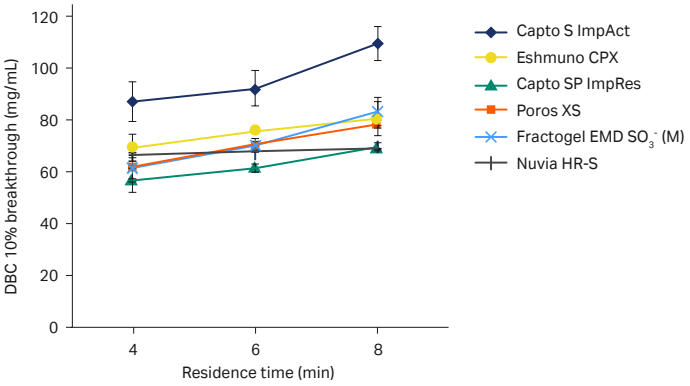


Fig 10. Comparison of DBC at different residence times for Capto S ImpAct, Capto SP ImpRes, Eshmuno CPX, Fractogel EMD SO3- (M), Nuvia HR-S, and Poros XS resins. Experiments were run in triplicate.

In addition to the high SBC and DBC of Capto S ImpAct resin, the selectivity has also been shown to be good compared with the other CIEX resins studied, even at high sample load. Table 4 presents data for aggregate removal from mAb A for the different resins. Samples were run in triplicate. The data shows that Capto S ImpAct resin has better selectivity for mAb A than the majority of the tested resins under the conditions studied.

In summary, the comparison studies show that Capto S ImpAct resin is a competitive choice for high productivity processes.

Table 4. Aggregate removal data for Capto S ImpAct resin and four other commercially available CIEX resins using mAb A

	DBC (mg/mL resin)	Load 70% of DBC (mg/mL resin)	Recovery (%) at 1% aggregate content	STDEV*	Load (mg/mL resin)	Recovery (%) at 1% aggregate content	STDEV*
Capto S ImpAct	108	75	93	0.59	75	93	0.59
Eshmuno CPX	99	69	94	0.63	75	93	0.45
Fractogel EMD SO_3- (M)	73	51	85	1.85	75	Breakthrough	
Nuvia HR-S	58	40	97	1.06	75	Breakthrough	
Poros XS	65	45	91	1.29	75	Breakthrough	

* STDEV = standard deviation

Reduced process costs

Higher titers in the upstream process often result in increased challenges downstream, both in terms of higher mass and more complex separation requirements. With a high DBC and high resolution, enabling the use of smaller chromatography resin volumes, column sizes, buffer volumes, and possibly equipment footprint, Capto S ImpAct resin can be an efficient tool to meet these challenges. The positive effects also stretch beyond meeting the challenges in the downstream process. Reducing the amount of chromatography resin required greatly improves process economy in general.

When comparing Capto S ImpAct resin with Capto SP ImpRes resin using BioSolve Process (BioPharm Services), the results show that there is a significant improvement in process economy for the CIEX step when using Capto S ImpAct resin compared with Capto SP ImpRes resin. For this step in a standard mAb process, using Capto S ImpAct resin could result in a 7% to 25% reduction in total cost of goods/g mAb. In the simulation, the cost for labor was set to identical for the two resins and the cost for buffers and water was seen as negligible. The CIEX step studied was simulated in bind-and-elute mode.

Cleaning and sanitization

Cleaning in place (CIP) is a cleaning procedure to remove impurities such as lipids, precipitates, or denatured proteins that can remain in the packed column after regeneration. Regular CIP also prevents the build-up of these impurities in the chromatography bed and helps maintain the capacity, flow properties, and general performance of the resin. The frequency of CIP depends on the nature and the condition of the starting material, but one CIP cycle is generally recommended every one to five separation cycles. Furthermore, a specific CIP protocol should be designed for each process based on the type of impurities present.

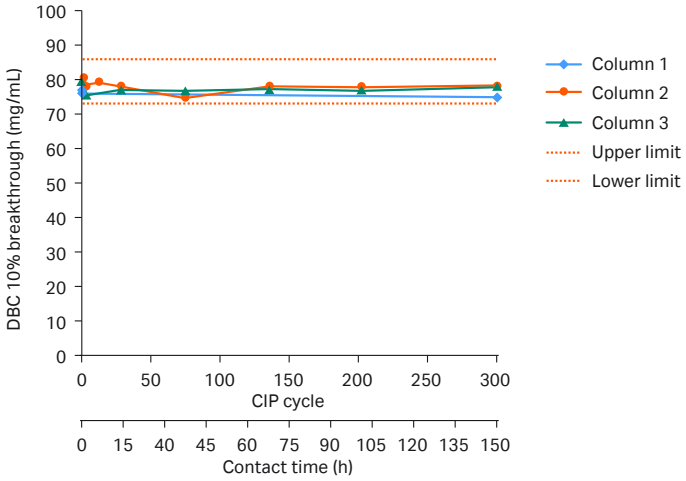


Fig 11. Capto S ImpAct DBC is stable over 300 CIP cycles with 1 M NaOH. Frontal analysis was performed at 4 min residence time on Tricorn 5/50 columns packed with Capto S ImpAct resin. Sample concentration was 2.5 mg IgG/mL in 50 mM sodium acetate + 50 mM NaCl, pH 4.75. Each cycle comprised CIP with 1 M NaOH for 30 min. Column 1 was only tested at start and end of the study, whereas column 2 and 3 were tested at tighter intervals. Upper and lower limits are the 95% confidence limits for the study.

The possibility of using NaOH in the CIP procedure is key in a cost-effective production of pure mAb products at industrial scale. In a life time study, Capto S ImpAct resin has shown great alkaline stability. The results show that Capto S ImpAct resin is stable over 300 purification cycles (Fig 11). Each cycle comprised CIP with 1 M NaOH for 30 min.

Regular sanitization will prevent microbial growth and maintain a high level of hygiene in the packed column. A specific sanitization protocol should be developed based on the nature and condition of the starting material.

Pressure/flow properties

Properties of Capto resins, such as matrix rigidity, allow a wide working range of flow velocities, bed heights, and sample viscosities. High flow velocities increase volume throughput and decrease process time. Higher bed heights mean smaller diameters and a reduced column footprint.

Figure 12 shows the relationship between column bed height and operating flow velocity for Capto S ImpAct resin. The size of the area below the pressure-limit curve represents the window of operation, that is, the available operating range for the resin.

The pressure limits for Capto S ImpAct resin shown in Figure 12 are based on a production-scale column and are calculated for 20 cm bed height and maximum operating flow velocities of 220 cm/h. At this flow velocity, the pressure is equal to or less than 3 bar measured using process buffers with the same viscosity as water, 20°C, which is the highest recommended operating pressure for this resin at this scale. Capto S ImpAct chromatography resin can normally be run at maximum pressure ratings of low-pressure columns (3 bar).

Note that the maximum operating velocity of Capto S ImpAct resin is dependent of the column used as well as the viscosity of the liquid. For recommended columns, see Table 5.

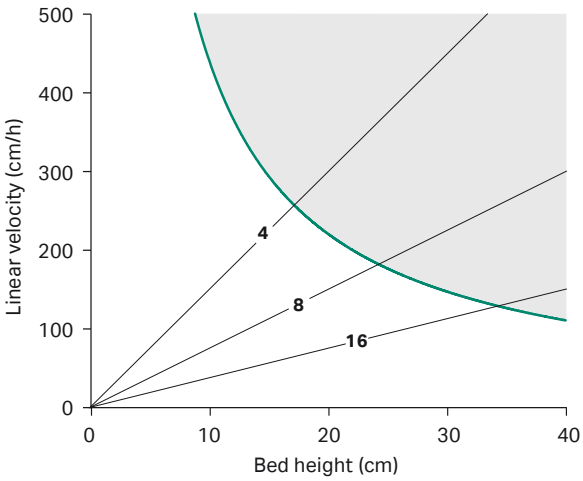


Fig 12. The Capto S ImpAct pressure/flow window of operation (area under the blue curve). The window of operation describes schematically the limits for the operating variables, here, the possible combinations of column bed height and operating velocity. Data corresponds to a production-scale column at 20°C and viscosity equivalent to water. Green lines show the residence time in the column (4, 8, and 16 min).

Equipment

Capto S ImpAct resin can be used with most modern chromatography equipment from laboratory to production scale. For details of packing laboratory-scale columns, see the appropriate *Instructions for use*. Table 5 lists suitable empty columns from Cytiva.

Table 5. Cytiva column families suitable for packing Capto S ImpAct resin

Column family	Inner diameter (mm)
Laboratory scale:	
Tricorn	5, 10
HiScale™	10, 16, 26, 50
Pilot and production scales:	
AxiChrom™	50 to 1000
BPG†	100 to 300
Chromaflow	400 to 600

† Note that the pressure rating of the BPG 450 column is too low for Capto S ImpAct resin.

Small-scale formats for fast screening and method development

Using small-scale formats to screen for the most suitable chromatography process conditions in the early stages of process development saves both time and sample. Capto S ImpAct resin is available in multiple formats that are suitable for process development.

Prepacked formats for high-throughput process development (HTPD):

- PreDictor 96-well filter plates
  (96 purifications in parallel under static conditions)
- PreDictor RoboColumn™ units
  (8 purifications in parallel under dynamic conditions)

Prepacked formats for method optimization and parameter screening:

- HiTrap™ columns (1 or 5 mL)
- HiScreen columns (4.7 mL)

Basic characteristics of HiTrap and HiScreen prepacked columns are summarized in Tables 6 and 7, respectively.

Precharacterized column for mechanistic modeling:

- f(x) columns

Scale-down columns for process validation and process development:

- Validation columns (Tricorn format)

Kits for resin variability studies:

- Process characterization kits
  (3 bottles of 25 mL, with 3 different ligand densities)

Prepacked formats for scale-up and GMP manufacturing

Capto S ImpAct resin is also available in ReadyToProcess™ column formats, which are validated high-performance prepacked columns for scale-up and GMP biomanufacturing.

Table 6. Main characteristics of HiTrap columns prepacked with Capto S ImpAct resin

Column volume	1 mL and 5 mL
Column dimensions	0.7 × 2.5 cm (HiTrap 1 mL), 1.6 × 2.5 cm (HiTrap 5 mL)
Maximum flow rates	4 mL/min (HiTrap 1 mL), 20 mL/min (HiTrap 5 mL)
Recommended flow rates	1 mL/min (HiTrap 1 mL), 5 mL/min (HiTrap 5 mL)
Maximum back pressure over the packed bed	3 bar (44 psi, 0.3 MPa)
Maximum pressure over the hardware	5 bar (73 psi, 0.5 MPa)

Table 7. Main characteristics of HiScreen columns prepacked with Capto S ImpAct resin

Column volume	4.7 mL
Column dimensions	0.77 × 10 cm
Maximum flow rates	300 cm/h (2.3 mL/min)
Recommended flow rates	100 to 300 cm/h
Maximum back pressure over the packed bed	4 bar (58 psi, 0.4 MPa)
Maximum pressure over the hardware	8 bar (116 psi, 0.8 MPa)

Scalability

Scale-up is typically performed by keeping bed height and flow velocity constant, while increasing column bed diameter and flow rate. However, as conditions are often optimized using small column volumes, parameters such as DBC can be optimized on shorter bed heights than those used in the final scale. Nevertheless, as long as the residence time is constant, the binding capacity for the target molecule remains the same. Further development and optimization from, for example, HiTrap and HiScreen prepacked columns are easily done using HiScale columns.

Storage

Store unused Capto S ImpAct resin in 20% ethanol containing 0.2 M sodium acetate at 4°C to 30°C. Do not freeze the resin.

Store prepacked HiTrap Capto S ImpAct and HiScreen Capto S ImpAct columns in 20% ethanol with 0.2 M sodium acetate at 4°C to 30°C. Do not freeze the columns.

After storage, equilibrate with suitable start buffer. An alternative storage solution is 2% benzyl alcohol containing 0.2 M sodium acetate.

BioProcess™ chromatography resins

Capto S ImpAct resin is part of the BioProcess resin family comprising chromatography resins widely used by biopharmaceutical manufacturers. Support for these products includes validated manufacturing methods, secure long-term resin supply, safe and easy handling, and regulatory support files (RSF) to assist process validation and submissions to regulatory authorities. In addition, the Fast Trak™ Training & Education team provides high-level hands-on training for all key aspects of bioprocess development and manufacturing.

Ordering information

Multiple resins (screening kits)

Format	Quantity	Product code
PreDictor Capto CIEX polishing screening	2 µL/6 µL, 4 × 96-well plates *Kit contains the following resin volumes per well:* Capto S ImpAct 2 µL, Capto SP ImpRes 6 µL, and Capto MMC ImpRes 6 µL.	29095568
	20 µL, 4 × 96-well plates *Kit includes the following resin volumes per well:* Capto S ImpAct 20 µL, Capto SP ImpRes 20 µL, and Capto MMC ImpRes 20 µL.	29095567

Capto S ImpAct resin

Format	Quantity	Product code
Bulk	25 mL	17371701
	100 mL	17371702
	1 L	17371703
	5 L	17371704
	10 L	17371705
	60 L	17371760
HiTrap column	1 × 1 mL	29400459
	5 × 1 mL	17371751
	5 × 5 mL	17371755
HiScreen column	1 × 4.7 mL	17371747
Validation column	1 × 15.7 mL	29321910
f(x) column	1 × Tricorn 10/100 *f*(x) and results of analysis	29716581
	1 × Tricorn 10/200 *f*(x) and results of analysis	29716743
PreDictor plate	2 µL, 4 × 96-well plates	17371716
	20 µL, 4 × 96-well plates	17371717

Format	Quantity	Product code
PreDictor RoboColumn unit	200 µL, 8 columns	17371771
	600 µL, 8 columns	17371772
Process characterization kit	3 × 25 mL (3 different ligand densities)	17371770
ReadyToProcess column	0.8 L (80/150)	29287577
	1 L (80/200)	17371761
	2.5 L (126/200)	17371762
	5 L (178/200)	29146146
	10 L (251/200)	17371763
	20 L (359/200)	17371764
	32 L (450/200)	29212475
	57 L (600/200)	29376130

Related literature

Selection guide – ion exchange chromatography columns and resins	CY12727
Data file: HiScreen prepacked columns	CY13473
Data file: PreDictor 96-well filter plates and Assist software	CY13663
Data file: PreDictor RoboColumn	CY13689
Data file: ReadyToProcess columns	CY11724
Handbook – ion exchange chromatography	CY13983

Additional reading

How to pack Capto S ImpAct resin

Controlling mAb aggregates in chromatography process development

A guide to polishing chromatography in process development

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