Mag Sepharose™ PrismA magnetic bead resin

DOWNSTREAM BIOPROCESSING

Mag Sepharose™ PrismA magnetic bead resin (Fig 1) is designed to simplify enrichment of antibodies by immunoprecipitation. The technology uses a genetically engineered protein A-derived ligand immobilized to Mag Sepharose™ beads for capture of target proteins followed by collection of the beads using a magnetic device. Mag Sepharose™ PrismA resin can be used for high-throughput screening of antibody drug candidates in microwell plates and for purification of antibodies in a magnetic separator.

Key features of Mag Sepharose™ PrismA:

- Magnetic properties that reduce materials and workload for antibody screening in microwell plates.
- Capture of mAbs in up to 80 L of unfiltered feed eliminates clarification steps in antibody processes.
- Excellent alkaline stability enables efficient cleaning and sanitization using 0.5–1.0 M NaOH for improved process economy and robustness.

Fig 1. Mag Sepharose™ PrismA magnetic bead resin. A protein A-derived ligand immobilized to Mag Sepharose™ beads is used for capture of target proteins. These beads are then collected by a magnetic device.

Principles of magnetic separation

The paramagnetic properties of the resin allow it to adhere to magnets for easy extraction of the beads from a solution or suspension. When combined with the protein A-derived PrismA ligand, the resin can capture high amounts of mAbs, which can then be washed and eluted by magnetic separation. Mag Sepharose™ PrismA resin can be applied directly to an unfiltered cell suspension for capture and elution of mAbs. It can also be used for automated screening of antibody drug candidates, in which the resin is moved across wells in a microwell plate, and the beads are extracted magnetically. This saves both time and material.

High-throughput antibody drug candidate screening capabilities

We compared MabSelect PrismA™ chromatography resins in PreDictor™ plates and Mag Sepharose™ PrismA resin for lab-scale mAb screening. Time for analysis with Mag Sepharose™ PrismA resin was 10 min, compared to 65 min for MabSelect PrismA™ resin (Table 1). Mag Sepharose™ PrismA resin required 12 fewer sample collection plates and 156 fewer pipette tips (Table 2).

To perform screening using Mag Sepharose™ PrismA, load ~ 20–50 µL resin per well in a deep-well plate. Use a robotic liquid handling system to prepare buffers and add them to the plates. Perform capture of the target molecule using a robotic magnetic separator to transfer beads between the wells of the plate.

Table 1. Time use for MabSelect PrismA™ resin (traditional) and Mag Sepharose™ PrismA resin (magnetic bead) for lab-scale mAb screening

Step	Traditional plate	Magnetic bead
Shake plate and remove storage liquid	5 min	N/A
Prepare deep-well plate	N/A	10 min
Equilibrate resin 3 × 200 µL PBS	15 min	N/A
Sample application	10 min	N/A
Wash 3 × 200 µL	15 min	N/A
Elution 3 × 200 µL centrifugation 5 min inc. shake incubator	20 min	N/A
Total	**65 min**	**10 min**

Table 2. Material use comparison for MabSelect PrismA™ resin (traditional) and Mag Sepharose™ PrismA resin (magnetic beads) for lab-scale mAb screening

Material	Number used per analysis, traditional	Number used per analysis, magnetic bead
Deep-well plates	2	2
Sample collection plates	12	0
Pipette tips	192	36

High-productivity mAb capture directly from feed

A cell feed can be applied directly to the Mag Sepharose™ PrismA resin for bioprocess purification of antibodies, eliminating the need for several clarification steps compared to a traditional mAb process. This also allows for dense cell cultures and high mAb titers upstream, as clarification before capture is not needed.

Conventional buffers (e.g., PBS, Tris, acetate) can be used for capture, washing, and elution. The resin is also alkaline stable, and 0.5 to 1 M NaOH can be used for cleaning-in-place (CIP), as shown in Figure 2. When we measured the binding capacity of Mag Sepharose™ PrismA in batch mode after incubation in 1 M NaOH, we observed only a 7% reduction after 27 h incubation, equivalent to 162 CIP cycles of 10 min each.

Magnetic bead technology is gentle towards the target molecule and does not induce any shear forces.

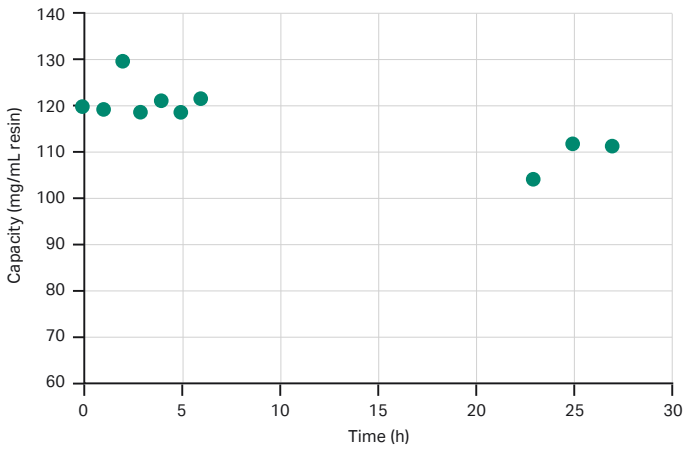

Fig 2. Maximum total binding capacity of Mag Sepharose™ PrismA resin at 1 M NaOH.

Mag Sepharose™ PrismA resin fills midstream and capture steps of a mAb manufacturing process, as illustrated in Figure 3. This saves time and material compared to a traditional process.

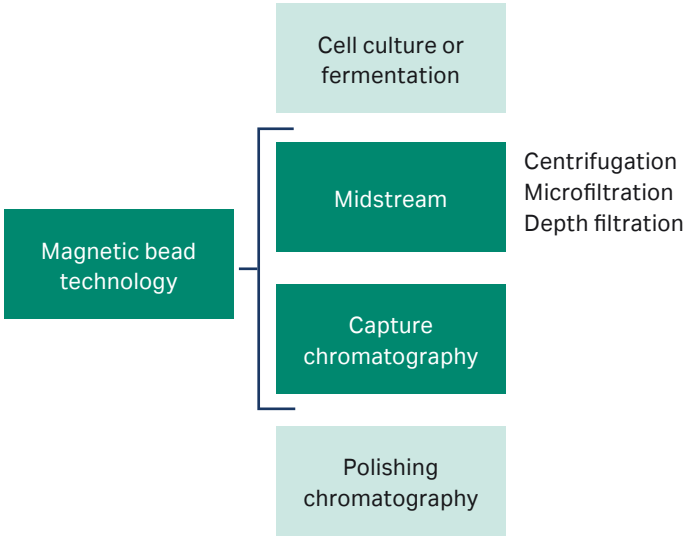

Fig 3. Mag Sepharose™ PrismA resin combines the midstream and capture steps of a conventional resin-based process.

Because Mag Sepharose™ PrismA resin has a higher total binding capacity in batch mode, compared to MabSelect PrismA™, the resin volume needed for capture is lower than with MabSelect PrismA™ resin, and productivity is higher (Table 3). The elimination of the depth filtration step further reduces process time, material use, and water-for-injection (WFI) consumption. However, because MabSelect PrismA™ resin has a lower elution volume in the capture step, it also has a shorter loading time for the subsequent polishing step.

Table 3. Productivity comparison of Mag Sepharose™ PrismA resin and MabSelect PrismA™ resin based on standard operating conditions

	Mag Sepharose™ PrismA resin	MabSelect PrismA™ resin
Feed volume (L)	20	20
Depth filter area	N/A	0.6 m^2
Resin volume capture (L)	0.75	1.2
Capacity (g mAb/L resin)	80 (1 h incubation time)	52 (80% of Q_{B10} at 4 min residence time)
Process time capture (h)	1.8	2.3 (+2.5 h for depth filtration)
Eluate volume (L)	3.0	1.5
Total WFI consumption (L)	21	108
Productivity (g mAb/L resin/h) (capture step)	43.6	10.7 (incl. time for depth filtration)

Figure 4 shows the binding isotherm of Mag Sepharose™ PrismA resin during 1 h incubation in an IgG solution. The capacity of the resin increases with higher concentrations of mAb in the feed. When the resin is fully saturated with IgG, it can capture > 100 mg IgG per mL resin.

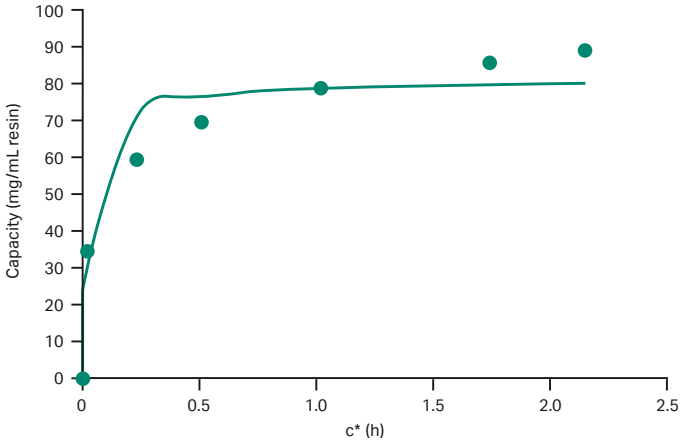

Fig 4. Binding capacity of Mag Sepharose™ PrismA resin as a function of IgG concentration in the sample (c*), with 1 h incubation time. Graph shows Langmuir isotherm fit to data; resin particle size is 37–100 µm.

Table 4. Main characteristics of Mag Sepharose™ PrismA resin

Matrix	Paramagnetic, spherical, highly cross-linked agarose particles
Ligand	Alkaline stabilized protein A-derived *(E. coli)*
Ligand concentration	> 15 mg/mL
Particle size, d_{50V} [1]	37–100 µm
Maximum total binding capacity	Typically, > 100 mg IgG/mL resin
pH stability, operational[2]	3 to 12
pH stability, CIP[3]	2 to 14
Chemical stability	Stable in commonly used aqueous buffers used in purification of mAbs
Delivery conditions	20% ethanol
Storage	20% ethanol, 4°C to 8°C

[1] Median particle size of the cumulative volume distribution.
[2] pH range where resin can be operated without significant change in function.
[3] pH range where resin can be subjected to cleaning- or sanitization-in-place without significant change in function.

Ordering information

Product	Size	Product code
Mag Sepharose™ PrismA	25 mL	17550001
Mag Sepharose™ PrismA	1 L	17550003

cytiva.com/chromatography

For local office contact information, visit cytiva.com/contact

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