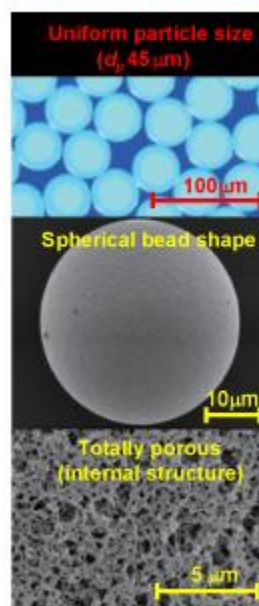
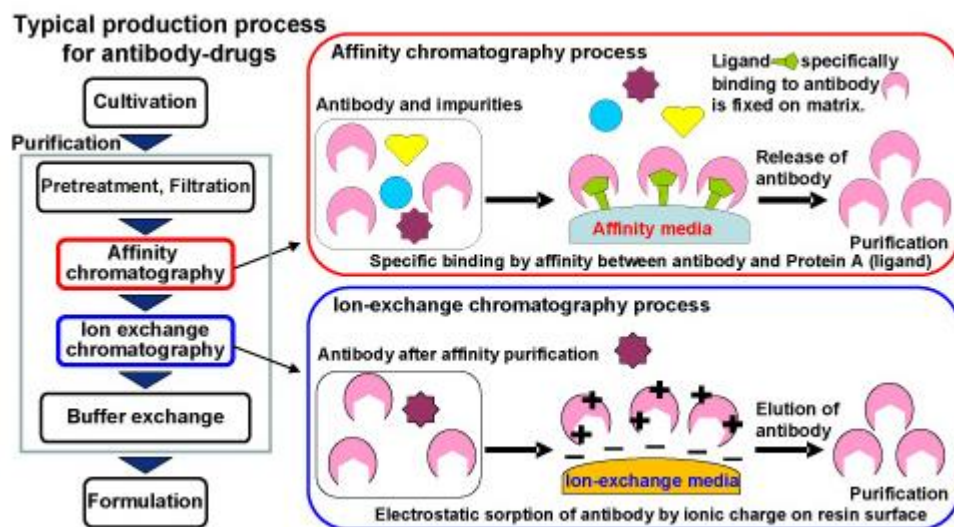


Chromatographic resins

MabSpeed & ChromSpeed Series

MabSpeed™ and ChromSpeed™ chromatographic resins are specially designed material for the purification of biopharmaceuticals (antibody-drugs, protein-drugs, etc.). They are based on hydrophilic polymethacrylate matrix with spherical, totally porous structure. The rigid, uniform-particle sized matrix enables high speed chromatographic operation with high production efficiency. Various product line can meet variety of demands for separation and purification.



MabSpeed RP Series

Spherical and monodisperse particles:

- Easy to pack
- High packing reproducibility
- Low pressure drop

Extremely high bed height available: > 50 cm

- Compatible with simple structured columns
- Enables equipment cost reduction

High flow rate available: > 600 cm/h

- Improves throughput
- Shortens process time suitable for higher efficacy of purified therapeutic mAb

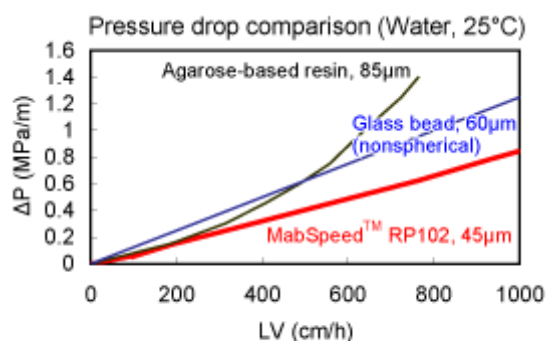
Rigid and durable matrix:

- Non compressive bed

Variation in particle size:

- Standard particle size: 45µm

Hydraulic properties of MabSpeed™



MCC 45µm data was calculated from the data measured for 60µm.

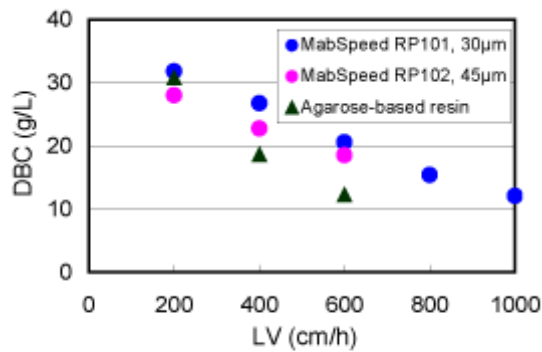
Cleaning in place – Low effect on Ligand leakage and Dynamic binding capacity

Ligand leakage	
cycles	ng PrA / mg IgG
1	0.53
20	0.23
40	0.24
60	0.25
80	0.26
100	0.25

Characteristics of MabSpeed™

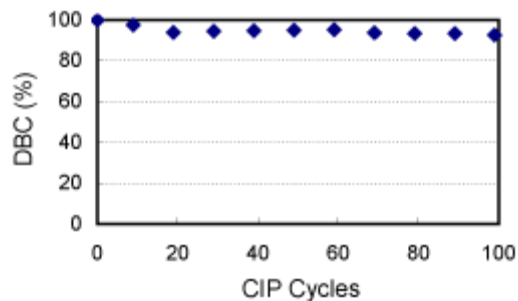
Product	MabSpeed™ RP102
Matrix	Crosslinked polymethacrylate
Ligand	recombinant Protein A
IgG-SBC	> 30 g/L
Particle size	45µm

Dynamic binding capacity comparison



Conditions:

Column, 127 x 5 mm I.D.;
 Sample, 1.0 mg/mL human γ -globulin;
 Buffer, PBS (pH 7.4); Temp., 20°C.
 The DBC was determined at 10% breakthrough.



Conditions:

Column, 50 x 5 mm I.D.;
 DBC of human γ -globulin was determined at 10% breakthrough.
 Binding, Phosphate buffered saline (pH 7.4);
 Elution, 0.1M Sodium citrate (pH 3.0);
 CIP, 0.1M NaOH; Contact time, 15 min.

ChromSpeed S Series

Superior IgG binding capacity: > 100 g/L

- Suitable for therapeutic mAb production
- Reduces packing material cost

Extremely high bed height available: > 50 cm

- Compatible with simple structured columns
- Enables equipment cost reduction

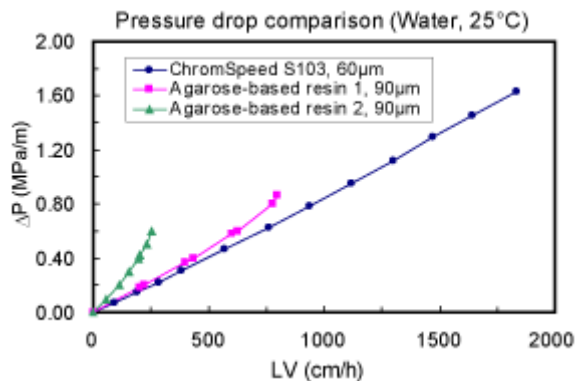
High flow rate available: > 600 cm/h

- Improves throughput
- Shorter process time suitable for higher efficacy of purified therapeutic mAb

High durability:

- Rigid spherical macroporous polymer
- Chemically and mechanically stable

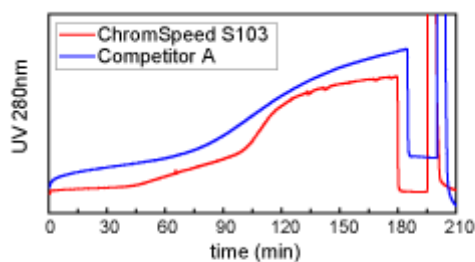
Hydraulic properties of ChromSpeed™ S



Characteristics of ChromSpeed™ S

Product	ChromSpeed™ S103
Matrix	Crosslinked polymethacrylate
Functionality	-SO ₃ ⁻
Ion exchange capacity	> 0.05 eq/L
IgG-DBC	> 100 g/L
Particle size	60μm

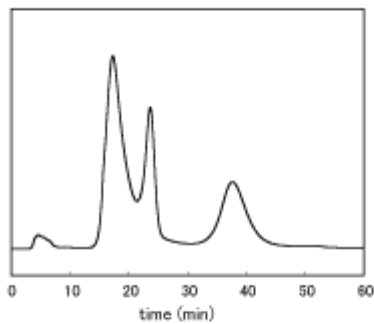
IgG binding profile comparison (Mouse polyclonal IgG, pH: 5.2)



Conditions:
 Column, 30 x 6.4 mm I.D.;
 Adsorption, mouse polyclonal IgG, 1mg/mL in 20mM Na citrate + 15mM NaCl (pH5.2)
 Washing, 20mM Na citrate (pH5.2)
 Desorption, 20mM Na citrate + 1M NaCl (pH5.2)
 Flow rate, 1.0 mL/min; Residence time, 1.0 min; Detector, UV 280 nm.

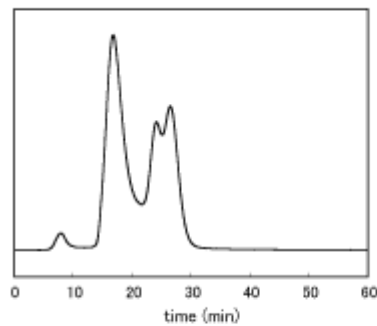
Example of protein separation on ChromSpeed™ S packed in a 50cm height column - comparison with agarose-based resin packed in a 12.5cm height column

ChromSpeed S103 (pH6.0, 0-100%B over 30min)
Hemoglobin/Cytochrome c /Lysozyme = 25/6.25/6.25mg/2.5mL



Conditions:
Column, 500 x 8mmI.D., 25mL
Eluent A, 20mM Na phosphate (pH6.0);
Eluent B, 20mM Na phosphate + 1M NaCl (pH6.0)
Gradient, 0-100%B; Flow rate, 2.5mL/min;
SV=6; LV=300cm/h
Detector, UV 280nm.

Agarose-based resin (pH6.0, 0-100%B over 30min)
Hemoglobin/Cytochrome c /Lysozyme = 25/6.25/6.25mg/2.5mL



Conditions:
Column, 125 x 16mmI.D., 25mL
Eluent A, 20mM Na phosphate (pH6.0);
Eluent B, 20mM Na phosphate + 1M NaCl (pH6.0)
Gradient, 0-100%B; Flow rate, 2.5mL/min;
SV=6; LV=75cm/h
Detector, UV 280nm.

ChromSpeed Q Series

Superior IgG binding capacity: > 100 g/L

- Suitable for therapeutic mAb production
- Reduces packing material cost

Extremely high bed height available: > 50 cm

- Compatible with simple structured columns
- Enables equipment cost reduction

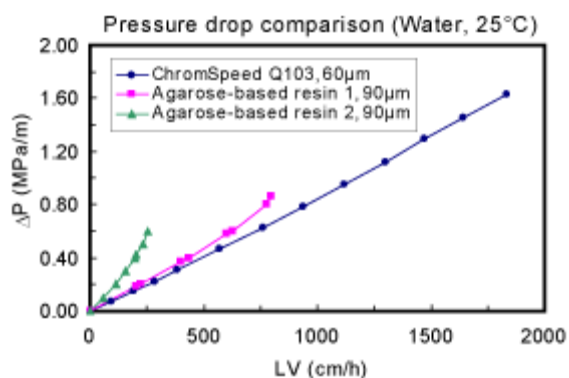
High flow rate available: > 600 cm/h

- Improves throughput
- Shorter process time suitable for higher efficacy of purified therapeutic mAb

High durability:

- Rigid spherical macroporous polymer
- Chemically and mechanically stable

Hydraulic properties of ChromSpeed™ Q

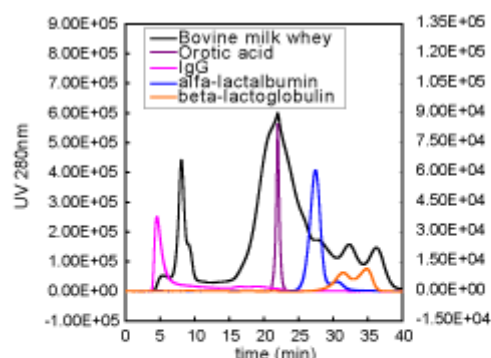


Characteristics of ChromSpeed™ Q

Product	ChromSpeed™ Q103
Matrix	Crosslinked polymethacrylate
Functionality	-N(CH ₃) ₃ ⁺
Ion exchange capacity	> 0.05 eq/L
IgG-DBC	> 100 g/L
Particle size	60µm

IgG binding profile comparison

(Mouse polyclonal IgG, pH: 5.2)

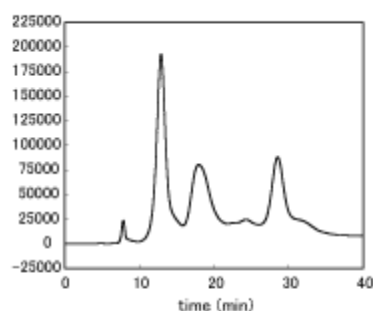


Conditions: Column, 500 x 8mm I.D. (ChromSpeed-Q103, 60µm);
 Eluent A, 20mM sodium phosphate (pH7.0);
 Eluent B, 20mM sodium phosphate + 1.0M NaCl (pH7.0);
 Flow rate, 2.5ml/min (300cm/h);
 Gradient, 0-30% B over 30min.
 Orotic acid, 40 µg; IgG, α-lactalbumin and β-lactoglobulin,
 400µg; Whey, 400µl.

Example of protein separation on ChromSpeed™ Q packed in a 50cm height column

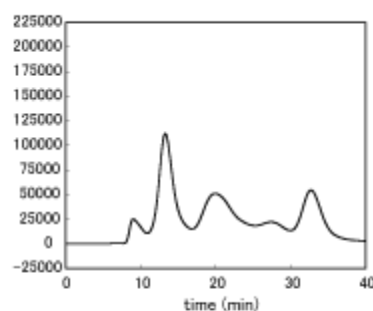
- comparison with agarose-based resin packed in a 12.5cm height column

ChromSpeed™ Q103 (pH8.0, 0-50%B over 30min)
 Myoglobin/Conalbumin/Trypsin inhibitor = 12.5/12.5/25mg/2.5mL



Conditions:
 Column, 500 x 8mm I.D., 25mL
 Eluent A, 20mM Tris-HCl (pH8.0);
 Eluent B, Tris-HCl + 1M NaCl (pH8.0)
 Gradient, 0-50%B; Flow rate, 2.5mL/min;
 SV=6; LV=300cm/h
 Detector, UV 280nm.

Agarose-based resin (pH8.0, 0-50%B over 30min)
 Myoglobin/Conalbumin/Trypsin inhibitor = 12.5/12.5/25mg/2.5mL



Conditions:
 Column, 125 x 16mm I.D., 25mL
 Eluent A, 20mM Tris-HCl (pH8.0);
 Eluent B, Tris-HCl + 1M NaCl (pH8.0)
 Gradient, 0-50%B; Flow rate, 2.5mL/min;
 SV=6; LV=75cm/h
 Detector, UV 280nm.