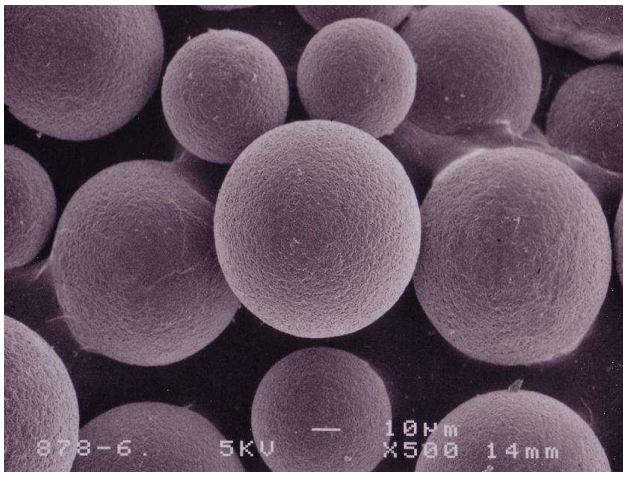
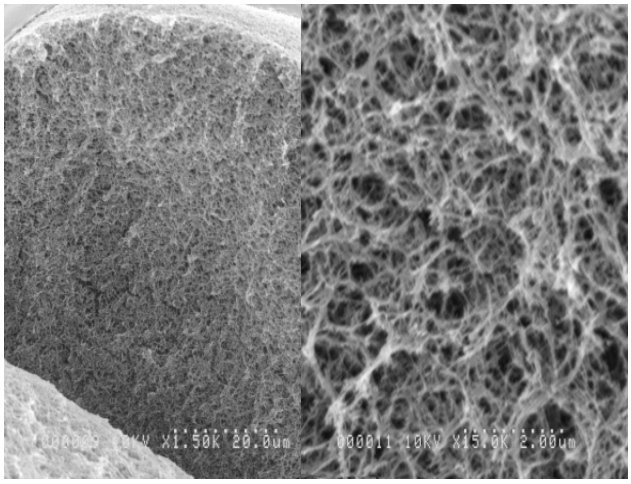
Cellufine™

CHROMATOGRAPHY MEDIA





JNC CORPORATION

Cellufine™ is the trade mark of liquid chromatography media for purifying proteins, enzymes and other bio-active substances. Since it is made from spherical cellulose particles having high chemical stability, high mechanical strength and bio-compatibility, it is suitable for the production in pharmaceutical industry. Leaking from this matrix is much less than that from the synthetic polymer media. Cellufine™ MAX is a next generation Cellufine™ utilizing new cross-linking technology for improved flow property. Cellufine™ MAX series offers the largest pore size of all Cellufine™ chromatography media. The benefit of such pore size in Cellufine™ MAX resin provides excellent mass transfer.
The production of Cellufine™ is guaranteed by ISO 9001.

- Used worldwide for purification of biomolecules and therapeutics
- Robust, spherical beads that resists compression
- Can operates at high pressures and high flow rates
- Significantly lower leachables as compared to other polymeric beads

Protein A Chromatography

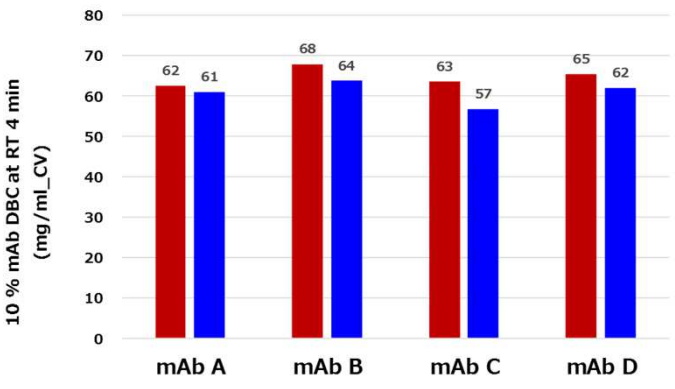
For mAb purification

Cellufine™ SPA-HC

Cellufine™ SPA-HC is an affinity chromatography resin designed for the isolation of monoclonal antibodies (mAb). This resin shows excellent flow properties, low ligand leachate levels, high dynamic binding capacity and good retention of binding after multiple cycles of base cleaning in place (CIP) and re-use. This high performance affinity resin enables development of efficient purification processes for downstream purification of therapeutic monoclonal antibodies.

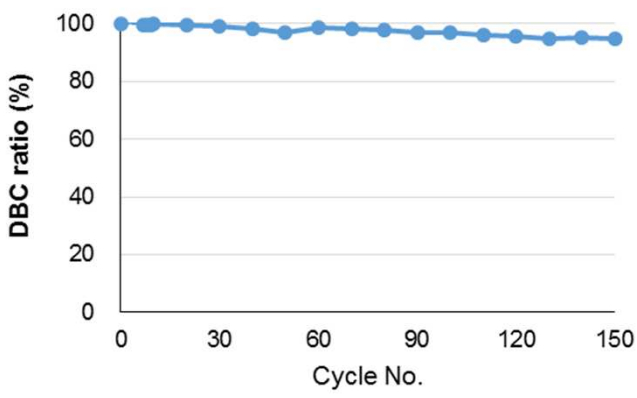
Characteristics	
Ligand	Alkali stable r-Protein A
Matrix	70 µm of Highly cross-linked cellulose beads
Adsorption capacity	pAb > 70 mg/mL (at R.T. = 6 min), mAb > 65 mg/mL (at R.T.= 4 min)
Recommended elution pH	pH3.0 - pH3.5, Acetate or citrate buffer
Recommended CIP solution	0.1 M NaOH

$C_{10\,\%}$ mAb DBC at R.T. = 4 min with Cellufine™ SPA-HP



Column: Super Edge 1ml
Protein: mAb A, B,C,D
Buffer: 20 mM Tris-HCl + 0.15 M NaCl, pH7.5
Flow rate: 0.265 mL/min

0.1 M NaOH CIP vs Cycles of Cellufine™ SPA-HC (contact time = 15 min)



Affinity Chromatography

For purification of virus & heparin binding protein

Cellufine™ Sulfate

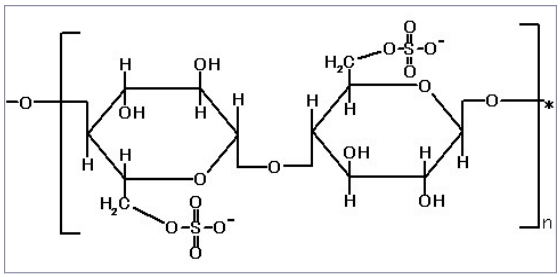
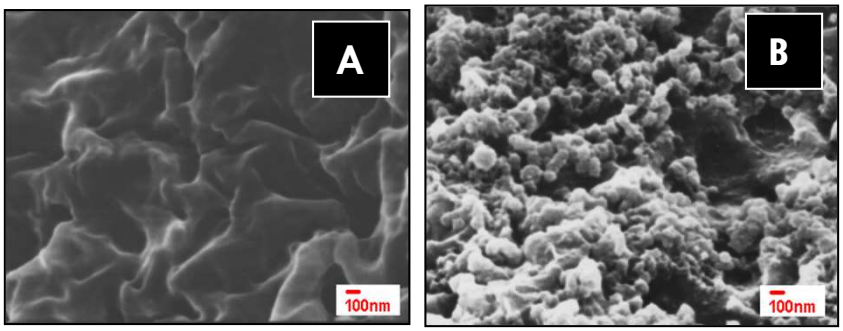


Figure 1
Partial Structure of Cellufine Sulfate

Cellufine™ Sulfate is a pseudo affinity ligand that mimics heparin. This resin has been used to purify viral vaccines, such as influenza, rabies and Japanese encephalitis virus from egg allantoin and more recently cell culture upstream processes. Adsorbed viral particles are recovered by mild high salt conditions.

Characteristics	
Ligand	Sulfate ester
Ligand conc.	approx. 8 μM/mL
Adsorption capacity	Lysozyme > 3mg/mL HBsAg 6 - 8 mg/mL



Virus Strain: Influenza virus A/duck/Hokkaido /Vac-2/04(H7N7)
A: Surface structure of Cellufine Sulfate
B: Surface of Cellufine Sulfate after influenza virus particles loading.
The data representing from professor Kida.(Hokkaido Univ. Graduate school of veterinary medicine).

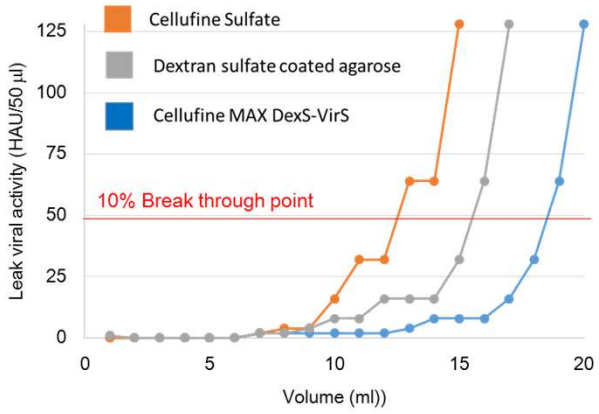
Cellufine™ MAX DexS-HbP

Cellufine™ MAX DexS-VirS

Cellufine™ MAX DexS is a new pseudo affinity ligand based on dextran sulfate modification. This non-animal derived affinity ligand can be used instead of immobilized Heparin. JNC offers two different Cellufine™ DexS resins, DexS-HbP and DexS-VirS, on the intended use by adapting of different polymer length of dextran sulfate. Cellufine™ MAX DexS-HbP is mainly designed for heparin binding proteins. Cellufine™ MAX Dex-S-VirS is for purifying virus and virus like particles.

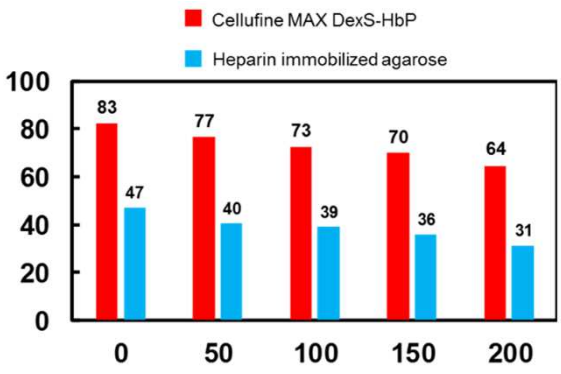
Characteristics	Cellufine MAX DexS-HbP	Cellufine MAX DexS-VirS
Ligand	Dextran sulfate	
Sulfur contents	≥ 36 μmol/mL	≥ 74 μmol/mL
Lactoferrin adsorption capacity	≥ 50 mg/mL	≥ 56 mg/mL

10% DBC of inactivated Influenza Virus with Cellufine MAX DexS-VirS



Resin	10% DBC HAU/ml-resin
Cellufine MAX DexS-VirS	348,160 (100)
Cellufine Sulfate	225,280 (64)
Dextran sulfate coated Agarose resin	286,720 (82)

Lactoferrin binding to Cellufine MAX DexS-HbP and Heparin cross-linked agarose

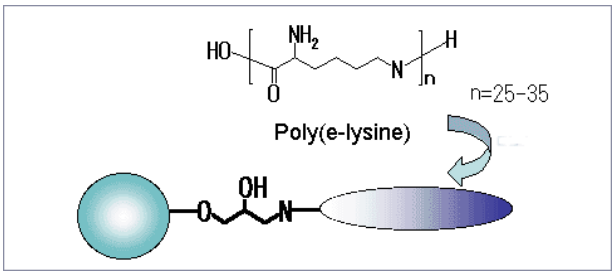


For endotoxin removal

Cellufine™ ET clean L / S

Cellufine™ ET clean is poly(ε-lysine) immobilized Cellufine. The resin binds and removes endotoxin from your sample solution. The poly(ε-lysine) is a microbial poly (amino acid) that consist of 30-35 lysine residues produced by *Streptomyces albulus*.

Characteristics		
Products	Ligand conc.	Exclusion limit
Cellufine™ ET cleanS	> 1 μmol/mL	< 10^3
Cellufine™ ET cleanL	> 1 μmol/mL	2 × 10^6



Removal of LPS from a Protein Solution by Cellufine ET clean

Sample solution			**ET cleanS** (NaCl 50 mM, pH7.0)		**ET cleanL** (NaCl 50 mM, pH7.0)	
Protein	pI	LPS con. in protein solution (pg mL^{-1})	Remained LPS(pg /mL^{-1})	Recovery of Protein (%)	Remained LPS (pg/mL	Recovery of Protein (%)
BSA	4.9	32,000	45	99	<10	97
γ-Globuline	7.4	5,600	20	99	<10	97
CytochromeC	10.6	1,500	15	99	<10	98

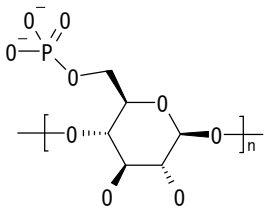
Reference: Todokoro et al, *J. LIQ. CHROM & REL. TECHNOL.*, 25 (4) , 601-614 (2002)

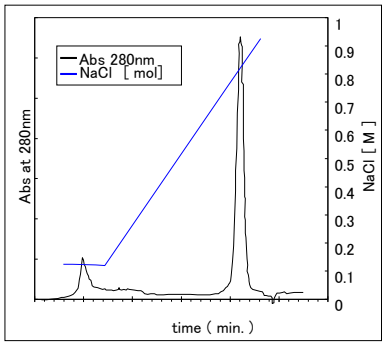
For purification of DNA binding protein

Cellufine™ Phosphate

Cellufine™ Phosphate is preferably applicable to purification of DNA binding protein and nucleic acids related protein. The resin can work as cation exchange chromatography resin.

Characteristics	
Ligand	Phosphate ester
Ligand conc.	0.3 - 0.8 meq/mL
Adsorption capacity	≧ 20 mg/mL (lysozyme)





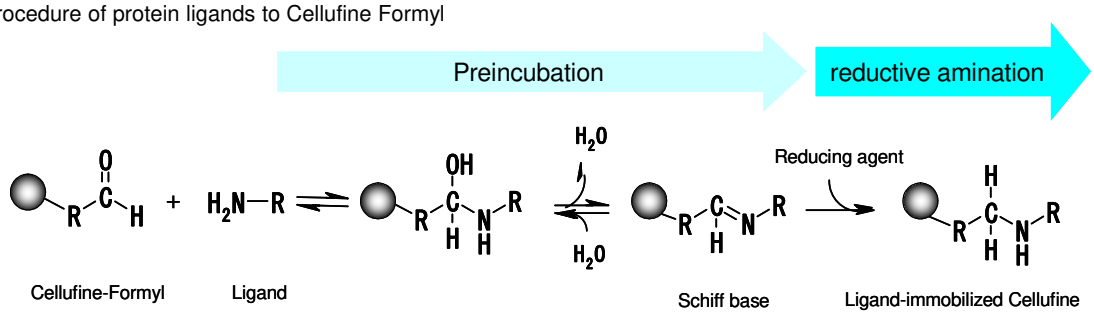
Rus A D70N purification with Cellufine Phosphate
Column: 1.6x10cm (20ml) packed with Cellufine Phosphate
Flow rate: 3ml/min(90cm/h)
Sample: 7.5mg of RusA D70N obtained after Heparin-agarose media
Gradient: 200ml from 0.1 to 1.3M NaCl in 50mM tris-HCl pH 8.0

Activated supports for immobilization

Cellufine™ Formyl

Characteristics	
Active group	Formyl group (-CHO)
Active group conc.	10 - 15 μmol/mL

Coupling procedure of protein ligands to Cellufine Formyl

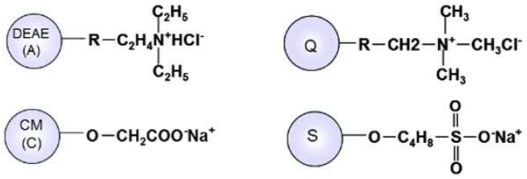


Ion Exchange Chromatography

Cellufine™ IEX chromatography media are based on spherical cross-linked cellulose beads. Each offers excellent flow properties, mechanical stability and chemical resistance. These ion exchangers are ideally suited for both laboratory and process scale chromatography of proteins, peptides and other biomolecules. Applications include the purification of antibodies, growth factors, albumin, enzymes and nucleic acids.

<Common Features>

- Flow rates up to 1200 cm/h at < 0.3 MPa backpressure
- Base stable at up to 0.5 M NaOH
- Very stable cross-linked cellulose beads



Cellufine™ A-200/A-500/A-800

Cellufine™ Q-500

Cellufine™ C-500

Cellufine™ S-500

Characteristics							
		Cellufine A-200	Cellufine A-500	Cellufine A-800	Cellufine Q-500	Cellufine C-500	Cellufine S-500
Ion exchange type (Functional group)		Weak Anion			Strong Anion	Weak Cation	Strong Cation
Base matrix		Spherical, cross-linked cellulose beads					
Particle size (μm)		40-130 μm (ca. 90 μm)					
Exclusion limit (kDa)		> 30	> 500	> 1000	> 500	> 500	> 500
pH stability		2-12	2-12	2-12	2-12	2-12	2-13
Operating pressure		Up to 0.2 MPa					
Ion exchange capacity (meq/ml-gel)		0.13-0.18	0.13-0.17	0.05-0.08	0.14-0.29	0.07-0.14	0.11-0.22
Dynamic Binding Capacity (mg/ml)	BSA* or Lysozyme**	46*	57*	84*	16*	130**	156**
	human-γ-globulin	38	42	68	10	58	42

Ion Exchange Chromatography

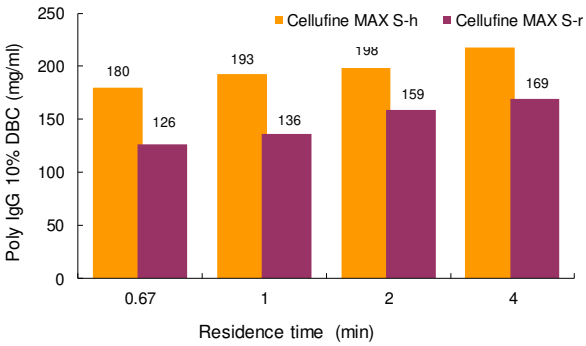
Cellufine™ MAX IEX
<Dextran based IEX coating>

➢ The basic characteristics of Cellufine™ MAX IEX media

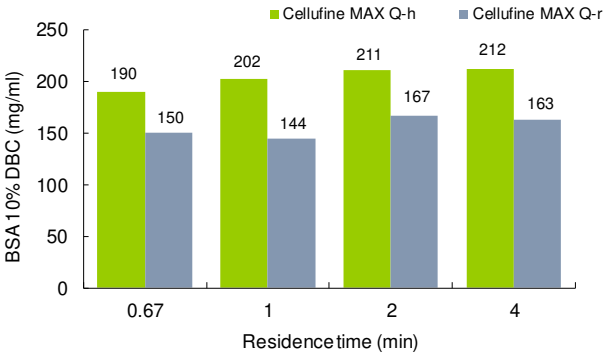
		MAX CM	MAX S-r	MAX S-h	MAX DEAE	MAX Q-r	MAX Q-h
Particle size (μm)		40 -130 μm (ca. 90 μm)					
Ligand		CM	S	S	DEAE	Q	Q
Ion exchange capacity (meq / ml-gel)		0.09 - 0.22	0.09 - 0.21	0.10 - 0.22	0.12 - 0.22	0.10 - 0.20	0.13 - 0.22
10% DBC (mg/ml)	Lysozyme/BSA	220	144	191	197	141	225
	human-γ-globulin	104	131	216	108	74	135
pH stability		2 -13	2 -13	3 -14	2 - 12	2 - 12	2 - 12
Operating pressure		< 0.3 MPa					

➢Dynamic binding capacities of Cellufine™ MAX IEX media

Efficient mass-transfer characteristics of Cellufine™ MAX IEX resins translate to superior dynamic binding capacities (DBC). All Cellufine™ MAX IEX resins exhibit superior dynamic binding performance and have a good stability over a range of residence times.



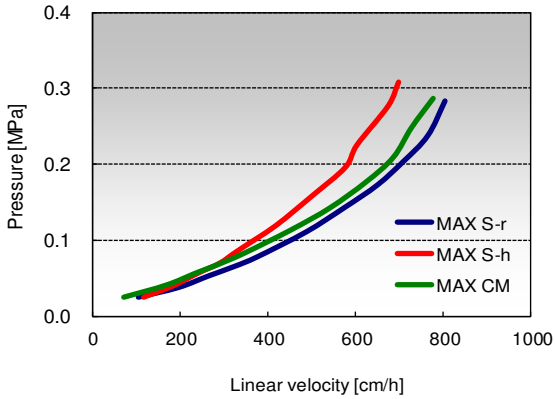
Column:5 mmID × 100 mmL
IgG concentration:1 mg/ml
Buffer: Acetate-50mMNaCl (pH4.3)



Column:5 mm ID × 100 mmL
BSA concentration:1 mg/ml
Buffer: 50 mM Tris-HCl (pH8.5)

➢ Pressure-flow properties of Cellufine™ MAX IEX media

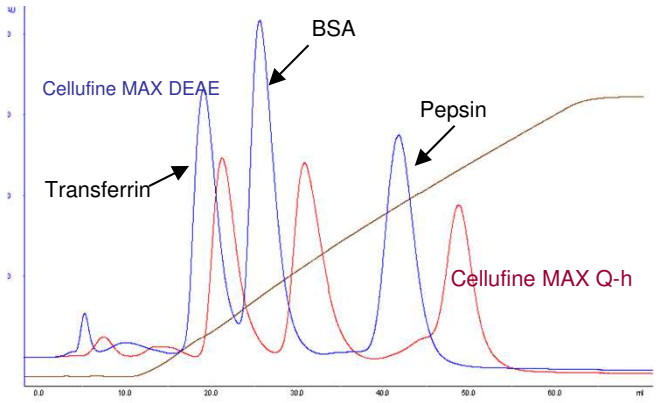
Cellufine™ MAX IEX resins enable high-flow operation, which is essential to efficient purification of bio-pharmaceuticals. The figure below shows pressure-flow velocity curves of Cellufine™ MAX cation IEX resin in a 30 cm column with a 20 cm bed height. All Cellufine™ MAX IEX resins are operable at practical flow velocities (500 cm/h) and pressures.



Column: 30 cm I.D. x 20 cm L
Mobile phase: Pure water at 20 ℃

➢ Model proteins separation performance for Cellufine™ MAX IEX media

Figure below shows model protein separation with Cellufine™ MAX Q-h and Cellufine™ MAX DEAE (strong anion vs. weak anion). Cellufine™ MAX IEX resins are optimized for high adsorption and high resolution.



Column: 6.6 mm ID × 50 mm L
Buffer A: 50 mM Tris-HCl (pH 8.5)
Buffer B: 50 mM Tris-HCl (pH 8.5)- 1 M NaCl
(0→75 % linear gradient)
Flow rate: 0.86 ml/min (residence time 2 min)
Proteins: Transferrin (5 mg/ml), BSA (10 mg/ml),
Pepsin (5 mg/ml)
Injection volume: 1.5 ml

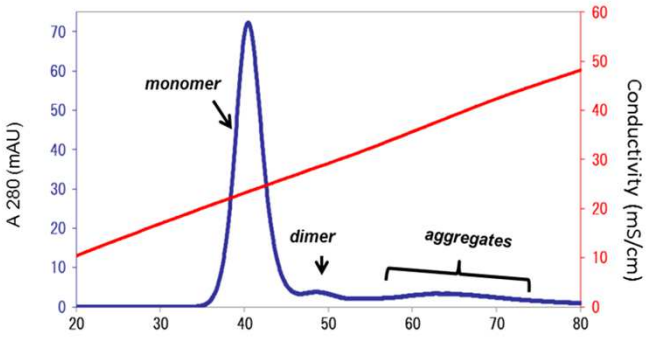
Cellufine™ MAX GS

<Graft homo-polymer based IEX coating>

A cation exchange resin, Cellufine™ MAX GS, is designed for especially for removal of mAb aggregates after an initial Protein A capture step. Surface modification with grafted polymeric chains containing ion exchange functionality created a unique platform to resolve aggregates from monomeric mAb's.

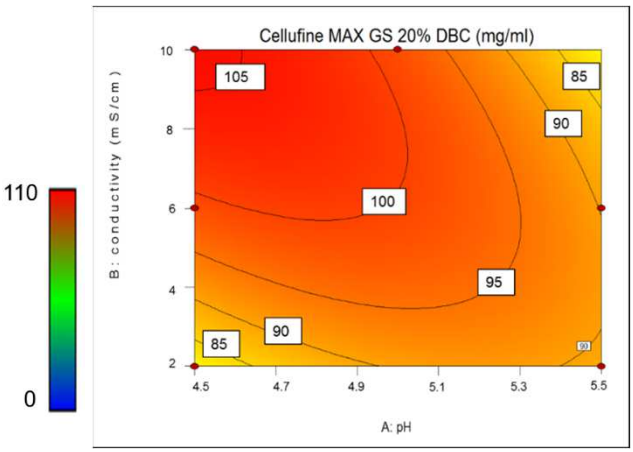
Characteristics	
Particle size	40 - 130 μm (ca. 90 μm)
Ligand	−R-$SO_3^-Na^+$ (Graft)
Polyclonal IgG 10% DBC	≧70 mg/mL (RT=4min)
pH stability	2 - 13
Operating pressure	< 0.3 MPa

The peak tops of mAb monomer and aggregates are separated in shallow gradient elution with Cellufine MAX GS

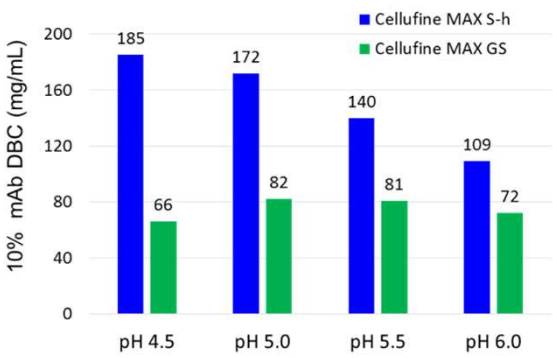


A:10 mM Acetate pH4.5 + 50 mM NaCl, B:10 mM Acetate pH4.5 + 0.5M NaCl,
Gradient : 75CV, Inject: Acid Treated mAb1

Counter plots analysis suggests Cellufine MAX GS is less susceptible to pH and conductivity for polyclonal antibodies adsorption.



Comparison of mAb Dynamic Binding Capacity (DBC) with Cellufine MAX GS and Cellufine MAX S-h



Load condition
mAb: momoclonal antibody (5 mg/mL)
Actual bed volume: 0.59 mL (3 cm bed height)

This research is partially supported by the developing key technology for discovering and manufacturing pharmaceuticals used for next-generation treatments and diagnoses both from the Ministry of Economy, Trade and Industry, Japan (METI) and from Japan Agency for Medical Research and Development (AMED).

Hydrophobic Interaction Chromatography

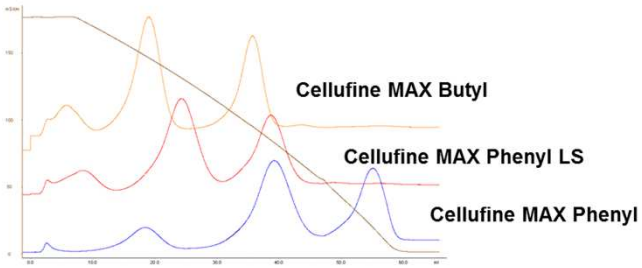
Cellufine™ MAX HIC

➢ The basic characteristics of Cellufine™ HIC media

	Cellufine MAX Butyl	Cellufine MAX Phenyl	Cellufine MAX Phenyl LS
Particle size	40 -130 μm (ca. 90 μm)		
Ligand type	Butyl	Phenyl	
BSA adsorption capacity (mg/ml)	≧ 9	≧ 11	≧ 4
BSA elution efficiency (%)	> 70	> 35	> 65
Polyclonal IgG 10% DBC (mg/ml)	17	19	30
Operating pressure	< 0.3 MPa		
pH stability	pH 2 - 13		

➢ Model protein separation performance for Cellufine™ HIC media

Figure below displays the optimized high resolution of Cellufine™ MAX Phenyl [standard and LS (low substitute)] and Cellufine™ MAX Butyl. Protein separation studies show that relative binding strengths are MAX Phenyl > MAX Phenyl LS > MAX Butyl.

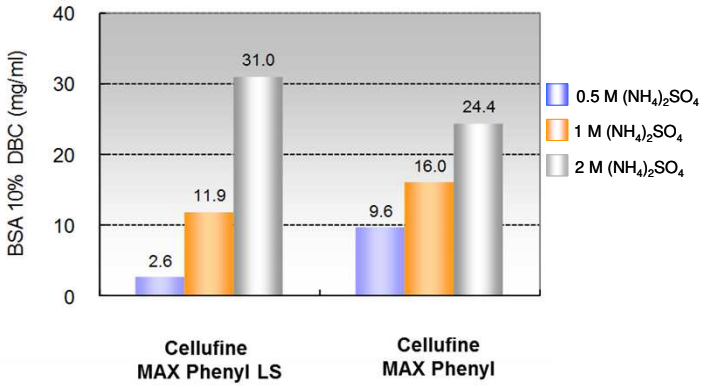


Column: 6.6 mm ID × 50 mm L
Buffer A: 10 mM phosphate buffer (pH 7) + 1.5 M $(NH_4)_2SO_4$
Buffer B: 10 mM phosphate (pH 7)
Proteins: Ribonuclease A, α-Chymotripsinogen A, Lysozyme

➢ Dynamic binding capacities of Cellufine™ HIC media

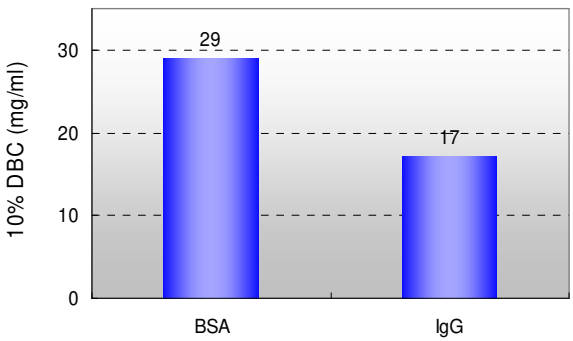
Efficient mass-transfer characteristics of Cellufine™ MAX HIC resins translate to superior dynamic binding capacities (DBC). Figures below show DBC of model proteins for Cellufine™ MAX Phenyl LS and Phenyl resin (left), and MAX Butyl resin (right), respectively. Both ligand design concepts will allow for flexibility in applying, Cellufine™ MAX HIC resins to a wide range of fields in bio-pharmaceutical purification.

BSA-DBC of Cellufine MAX Phenyl at different salt concentrations



Column: 5 mm I.D. x 5 cm L
Flow rate: 0.5 ml/ min
Protein concentration: 1 mg/ml
Buffer: 20 mM Phosphate + $(NH_4)_2SO_4$

DBC of Cellufine MAX Butyl



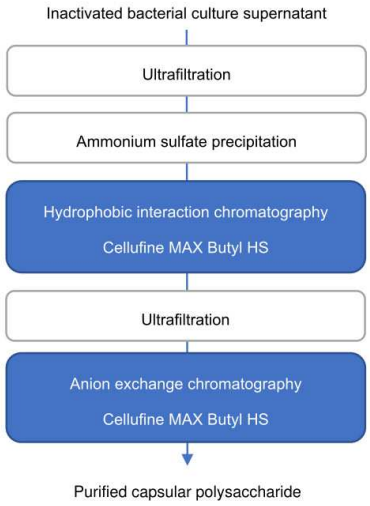
Column: 5 mm ID x 5 cm L
Flow rate: 0.5 ml/ min
Buffer: 10 mM Phosphate (pH 7.0) +
2 M $(NH_4)_2SO_4$ / BSA
1 M $(NH_4)_2SO_4$ / polyclonal IgG

For purification of polysaccharide vaccines

Cellufine™ MAX Butyl HS

Cellufine™ MAX Q-hv

Polysaccharide vaccine purification process

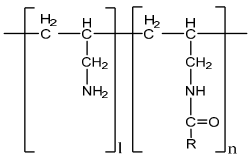


Mixed Mode Chromatography

For impurities removal

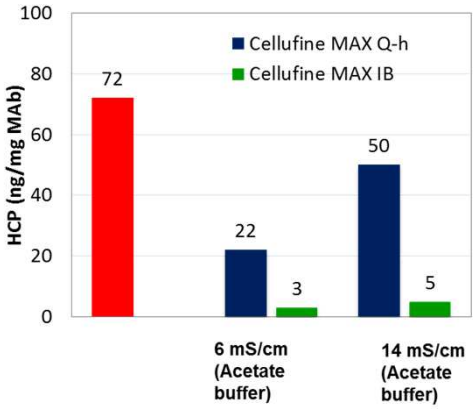
Cellufine™ MAX IB

A mixed mode resin, Cellufine™ MAX IB, especially for monoclonal antibody (Mab) purification after Protein A step. This resin has a salt tolerant polyamine surface modification that has been partially modified with butyl groups.



Characteristics	
Particle size	40 - 130 μm (ca. 90 μm)
Ligand	Polyallyl amine partially modified with a butyl group
Adsorption capacity (BSA)	64 mg/mL (low salt) * 59 mg/mL (high salt) **
Operating pressure	< 0.3 MPa

HCP removal by Cellufine MAX IB and Cellufine MAX Q-h (polymer modified Q) after ProA step



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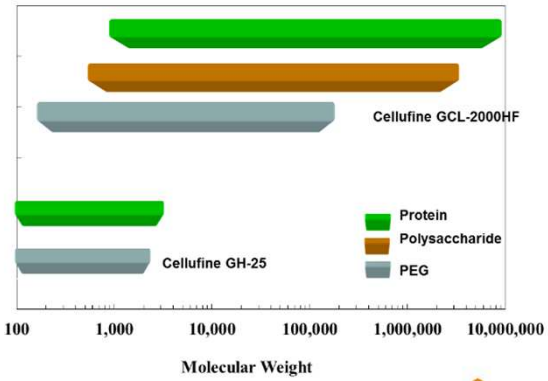
Gel Filtration Chromatography

Cellufine™ GCL-2000HF

Cellufine™ GCL-2000HF resin offers an extraordinarily broad selection of fractionation ranges, especially works for very high molecular weight protein complexes.

Cellufine™ GH-25

Cellufine™ GH-25 desalting resin is based on porous, spherical, cellulose particles. The sharp 3kD exclusion limit allows proteins to pass through the column in the void volume while retarding smaller molecular weight solutes in the internal pores.



Ordering Information

Product Name	Quantity	Catalogue No.
ProA Affinity		
Cellufine SPA-HC	1 mL x 1 (Mini-Column) 1 mL x 5 (Mini-Column) 5 mL x 1 (Mini-Column) 10 mL 50 mL 500 mL 5 L 10 L	21900-11 21900-51 21900-15 21900 21901 21902 21903 21904
Affinity		
Cellufine Sulfate	1 mL x 5 (Mini-Column) 5 mL x 1 (Mini-Column) 10 mL 50 mL 500 mL 5 L 10 L	19845-51 19845-15 676943324 19845 19846 19847 19849
Cellufine MAX DexS-HbP	1 mL x 5 (Mini-Column) 5 mL x 1 (Mini-Column) 10 mL 50 mL 500 mL 5 L 10 L	21700-51 21700-15 21700 21701 21702 21703 21704
Cellufine MAX DexS-VirS	1 mL x 5 (Mini-Column) 5 mL x 1 (Mini-Column) 10 mL 50 mL 500 mL 5 L 10 L	21800-51 21800-15 21800 21801 21802 21803 21804
Cellufine ET clean L	1 mL x 5 (Mini-Column) 5 mL x 1 (Mini-Column) 10 mL 50 mL 500 mL 5 L 10 L	20051 20015 681984324 681984326 681984328 681984330 681984335
Cellufine ET clean S	1 mL x 5 (Mini-Column) 5 mL x 1 (Mini-Column) 10 mL 50 mL 500 mL 5 L 10 L	20151 20115 682985324 682985326 682985328 682985330 682985335
Cellufine Formyl	10 mL 50 mL 500 mL 5 L 10 L	676944324 19853 19854 19855 676944335
Cellufine Phosphate	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 10 mL 50 mL 500 mL 5 L 10 L	19551 19515 19524 19545 19546 684987330 684987335

Product Name	Quantity	Catalogue No.
IEX		
Cellufine A-200	1 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	19611-51 676980327 19611 19612 676980335
Cellufine A-500	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	19805-51 19805-55 675980327 19805 19806 675980335
Cellufine A-800	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	19865-51 19865-55 673980327 19800 19801 673980335
Cellufine Q-500	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	19907-51 19907-55 675982327 19907 19908 675982335
Cellufine C-500	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	19800-51 19800-55 675983327 19865 19866 675983335
Cellufine S-500	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	21200-51 21200-55 21200 21201 21202 21203
Cellufine MAX DEAE	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	21000-51 21000-55 21000 21001 21002 21003
Cellufine MAX Q-r	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	20500-51 20500-55 20500 20501 20502 20503

Product Name	Quantity	Catalogue No.
IEX		
Cellufine MAX Q-h	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	20600-51 20600-55 20600 20601 20602 20603
Cellufine MAX Q-hv	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	22100-51 22100-55 22100 22101 22102 22103
Cellufine MAX CM	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	20900-51 20900-55 20900 20901 20902 20903
Cellufine MAX S-r	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	20300-51 20300-55 20300 20301 20302 20303
Cellufine MAX S-h	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	20400-51 20400-55 20400 20401 20402 20403
Cellufine MAX GS	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	21300-51 21300-55 21300 21301 21302 21303

Product Name	Quantity	Catalogue No.
Hydrophobic Interaction		
Cellufine MAX Butyl	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	21100-51 21100-55 21100 21101 21102 21103
Cellufine MAX Butyl HS	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	22200-51 22200-55 22200 22201 22202 22203
Cellufine MAX Phenyl	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	20700-51 20700-55 20700 20701 20702 20703
Cellufine MAX Phenyl LS	1 mL x 5 (Mini-Column) 5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	20800-51 20800-55 20800 20801 20802 20803
Mixed mode		
Cellufine MAX IB	1 mL x 5 (Mini-Column) 5 mL x 1 (Mini-Column) 10 mL 50 mL 100 mL 500 mL 5 L 10 L	21600-51 21600-15 21600 21601 21602 21603 21604 21605
Gel filtration		
Cellufine GH-25	5 mL x 5 (Mini-Column) 100 mL 500 mL 5 L 10 L	19711-55 670000327 19711 19712 670000335
Cellufine GCL-2000HF	100 mL 500 mL 5 L 10 L	21400 21401 21402 21403

Super Edge

Empty Mini-Column Kit

Product Name	Constitution	Catalogue No.
Empty 5 ML Mini-Column Starter Kit	1 x Screw-press/Stand & Rod 1 x Packing reservoir 10 x Empty column set 4 x Easy fitting	EMC5SK
Empty 1 ML Mini-Column Starter Kit	1 x Screw-press/Stand & Rod 1 x Packing reservoir 10 x Empty column set 4 x Easy fitting	EMC1SK
Empty 5 ML Column Set	10 x Column top cap & tube 10 x Frit (top & bottom) 20 x Stop plug	EMC5C10
Empty 1 ML Column Set	10 x Column top cap & tube 10 x Frit (top & bottom) 20 x Stop plug	EMC1C10

Cellufine™

ADSORPTION

ION EXCHANGE

DEAE Weak Anion

Cellufine A-200	90 µm (Ave)
Cellufine A-500	90 µm (Ave)
Cellufine A-800	90 µm (Ave)
Cellufine MAX DEAE	90 µm (Ave)

QA Strong Anion

Cellufine Q-500	90 µm (Ave)
Cellufine MAX Q-r	90 µm (Ave)
Cellufine MAX Q-h	90 µm (Ave)
Cellufine MAX Q-hv	90 µm (Ave)

CM Weak Cation

Cellufine C-500	90 µm (Ave)
Cellufine MAX CM	90 µm (Ave)

S Strong Cation

Cellufine S-500	90 µm (Ave)
Cellufine MAX S-r	90 µm (Ave)
Cellufine MAX S-h	90 µm (Ave)

mAb Aggregate removal

Cellufine MAX GS	90 µm (Ave)

ProA

mAb Capture

Cellufine SPA-HC	70 µm (Ave)

AFFINITY

Virus & Heparin Binding Proteins

Cellufine Sulfate	80 µm (Ave)
Cellufine MAX DexS-HbP	90 µm (Ave)
Cellufine MAX DexS-VirS	90 µm (Ave)

Endotoxin Removal

Cellufine ET clean L	80 µm (Ave)
Cellufine ET clean S	90 µm (Ave)

Nucleic Acid Related Molecules

Cellufine Phosphate	90 µm (Ave)

Activated Supports

Cellufine Formyl	150 µm (Ave)

HYDROPHOBIC INTERACTION

Cellufine MAX Phenyl	90 µm (Ave)
Cellufine MAX Phenyl LS	90 µm (Ave)
Cellufine MAX Butyl	90 µm (Ave)
Cellufine MAX Butyl HS	90 µm (Ave)

MIXED MODE

mAb Polishing

Cellufine MAX IB	90 µm (Ave)

PARTITION

GEL FILTRATION

Purification of bio-molecules and proteins by molecular size

MW 50 - 3,000 kDa

Cellufine GCL-2000HF	90 µm (Ave)

Salt and solvent removal and buffer exchange

Cellufine GH-25	80 µm (Ave)

Contact information

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