Hydrophobic Interaction Chromatography Media

Cellufine MAX HIC

Butyl, Phenyl

Technical Data Sheet

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Technical DATA Sheet

Cellufine MAX HIC (Phenyl and Butyl)

High Flow Rate typed Media

Cellufine MAX is a 2nd generation Cellufine media **with** high flow characteristics. JNC developed a new, highly cross-linked base resin for Cellufine MAX series. Cellufine MAX hydrophobic interaction chromatography is now available with MAX Phenyl and Butyl chemistries.

Cellufine MAX base resin

Cellulose, a natural polysaccharide, possesses unique crystalline molecular structure differing from non-crystalline polysaccharides such as agarose. Thus Cellufine has distinctive pore structure as shown in the pictograph (Fig. 1). The new Cellufine MAX series offers the largest pore size of all Cellufine chromatography media. The benefit of such pore size in Cellufine MAX HIC media provides superior strength and excellent mass transfer.

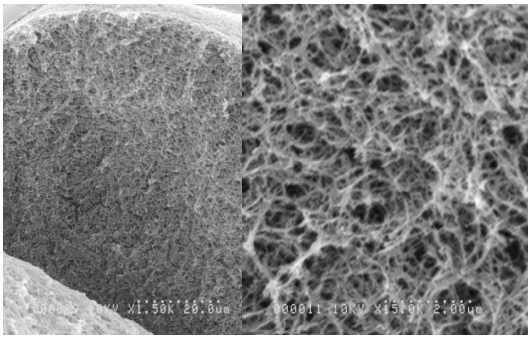


Fig 1. SEM analysis of Cellufine MAX base resin

Partial structure of Cellufine MAX HIC

Ligand structure for Cellufine MAX HIC media are described in Fig.2.

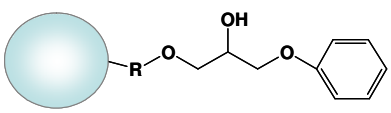
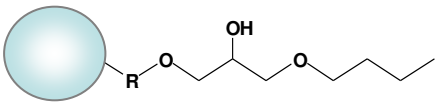
Cellufine MAX Phenyl Phenyl LS	
Cellufine MAX Butyl	

Fig.2. Ligand Structure of Cellufine MAX HIC

Characteristics of Cellufine MAX HIC Media

The basic characteristics of Cellufine MAX HIC media are shown in Table 1. All Cellufine MAX HIC media are based on 90 µm (average) highly cross-linked cellulose beads. Cellufine MAX HIC media are designed for use in bio-pharmaceuticals manufacturing processes.

	MAX Butyl	MAX Phenyl	MAX Phenyl LS
Matrix	Highly Cross-linked Cellulose		
Particle size	40～130 µm		
Ligand type	Butyl	Phenyl	
BSA adsorption capacity (mg/ml)	9	11	4
BSA elution efficiency (%)	70	40	90
Polyclonal IgG 10% DBC (mg/ml)	17	30	19
Operating pressure	< 0.3 MPa		
pH stability	pH 2 ~ 13		
Storage	20 % ethanol		

Table 1. Characteristics of Cellufine MAX HIC media

Ligand content is controllable in Cellufine MAX HIC media.

JNC is able to optimize both MAX Phenyl and MAX Butyl media on request as indicated in Figure 2.

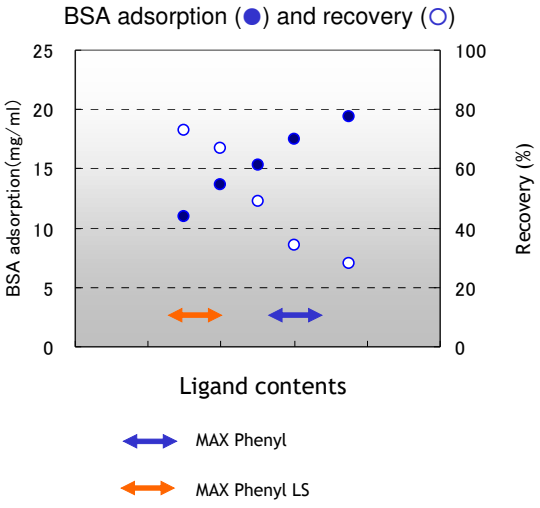


Fig.2. Relationships between ligand contents and BSA adsorption capacity or protein recovery in Cellufine MAX Phenyl.

Pressure-flow Properties of Cellufine MAX HIC Media

Cellufine MAX HIC media enable high-flow operation, which is essential to efficient purification of bio-pharmaceuticals. The figures below show pressure-flow velocity curves of Cellufine MAX HIC media (Fig. 3). All Cellufine MAX HIC media are operable at practical flow velocities and pressures.

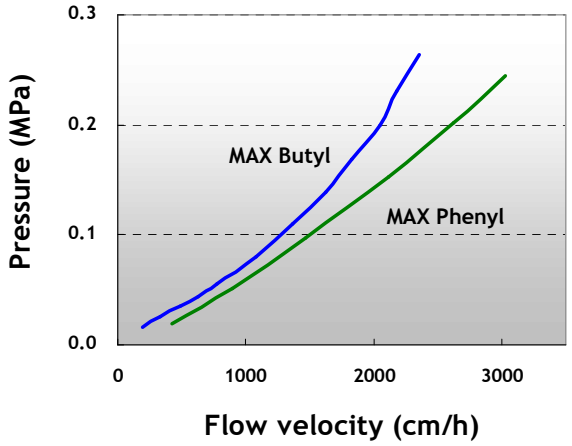


Fig 3. Pressure-flow velocity curves of Cellufine MAX Butyl and Phenyl (2.2 cm I.D. x 20 cm L), Mobile phase: pure water at 24 ℃.

Model Protein Separation Performance for Cellufine HIC media

Cellufine MAX HIC media are optimized for high resolution. Fig. 4 shows Model protein separation with Cellufine MAX Phenyl (standard and LS) and Cellufine MAX Butyl. Protein separation studies show that relative binding strength are MAX Phenyl > MAX Phenyl LS > MAX Butyl.

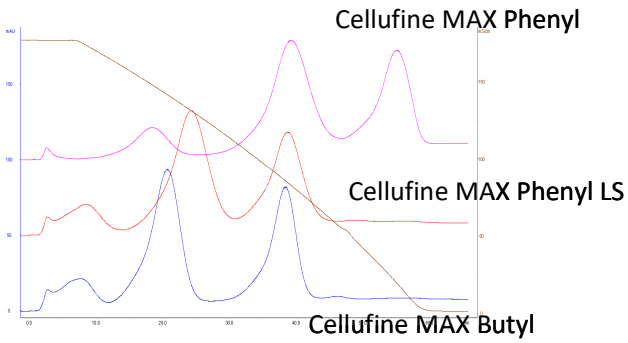
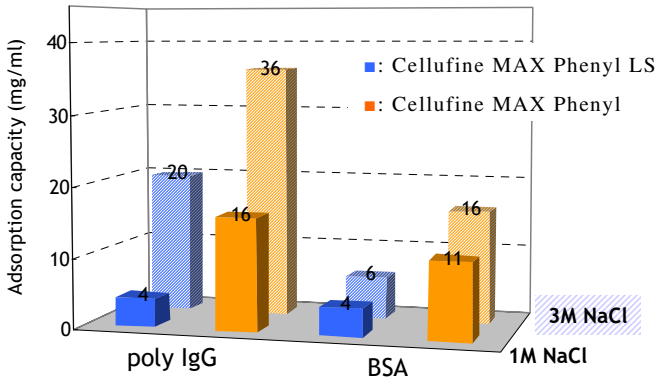


Fig. 4 Model Proteins Separation for Cellufine MAX Phenyl and MAX Butyl

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-chymotrypsinogen A, Lysozyme

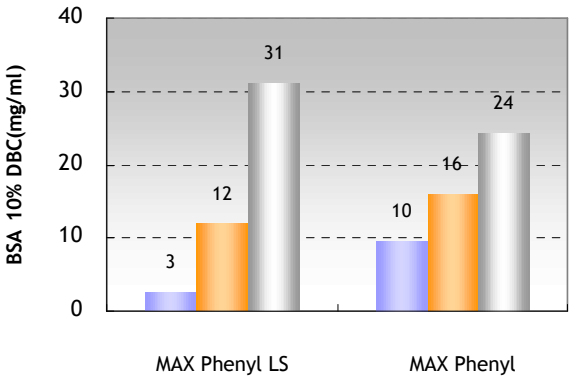
Model Protein Adsorption for Cellufine MAX Phenyl



Column: 5 mm ID x 10 cm L
BSA concentration: 1 mg/ml
Buffer: 50 mM Tris-HCl (pH 8.5) + NaCl

Fig.5. Salt Concentration vs. Model Protein Adsorption of Cellufine MAX Phenyl

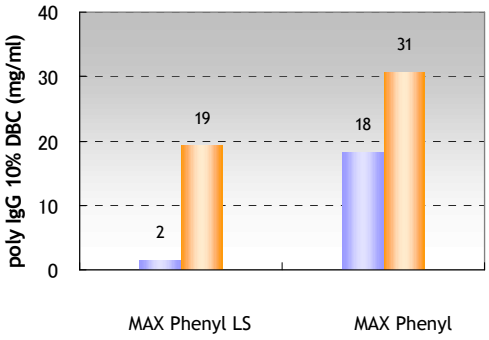
Dynamic Binding Capacity for Cellufine MAX Phenyl vs. Salt Concentration



Column: 5 mm ID x 50 mm L
Flow velocity: 150 cm/hr
BSA concentration: 1 mg/ml
Buffer: 20 mM Phosphate (pH7) + $(NH_4)_2SO_4$

Fig.6. Salt Concentration vs. BSA-DBC of Cellufine MAX Phenyl

Polyclonal IgG)



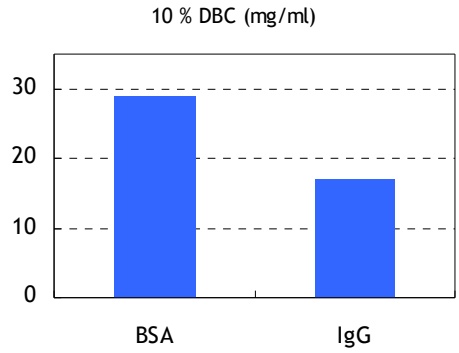
0.5 M $(NH_4)_2SO_4$

1 M $(NH_4)_2SO_4$

Column: 5 mm ID x 50 mm L
Flow velocity: 150 cm/hr
IgG concentration: 1 mg/ml
Buffer: 20 mM Phosphate (pH 7) + $(NH_4)_2SO_4$

Fig.7. . Polyclonal IgG-DBC of Cellufine MAX Phenyl at different salt concentrations

Dynamic Binding Capacity for 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

Fig.8. DBC of Cellufine MAX Butyl

Efficient mass-transfer characteristics of Cellufine MAX HIC media translate to superior dynamic binding capacities (DBC). Figures 6 to 8 show DBC of model proteins for Cellufine MAX HIC media. Cellufine MAX HIC media are suitable for use in down-stream steps in bio-pharmaceutical purification.

Chemical Stability and Cleaning-In-Place

Cellulose is well-known as a natural product having chemical and physical stability. Thus, since Cellufine is derived from cellulose, it also is stable to chemicals and caustic and acidic solutions. CIP of all Cellufine MAX HIC media can be carried out with 0.5 M NaOH solution. Used media should be stored in 20 % ethanol at 2-25 ℃ after cleaning.

- ✓ Ethanol (70%)
- ✓ Isopropyl alcohol (30%)
- ✓ Guanidine hydrochloride (6M)
- ✓ Urea (6M)
- ✓ NaOH (0.5M)
- ✓ Detergents
- ✓ Autoclave (121 ℃, 20 min)

Ordering Information

Product Name	Pack Size	Catalogue No.	Product Name	Pack Size	Catalogue No.
Cellufine MAX Phenyl	1ml x 5 (Mini-Column) 5ml x 5 (Mini-Column) 100 ml 500 ml 5 lt 10 lt	20700-51 20700-55 20700 20701 20702 20703	Cellufine MAX Phenyl LS	1ml x 5 (Mini-Column) 5ml x 5 (Mini-Column) 100 ml 500 ml 5 lt 10 lt	20800-51 20800-55 20800 20801 20802 20803
Cellufine MAX Butyl	1ml x 5 (Mini-Column) 5ml x 5 (Mini-Column) 100 ml 500 ml 5 lt 10 lt	21100-51 21100-55 21100 21101 21102 21103			

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