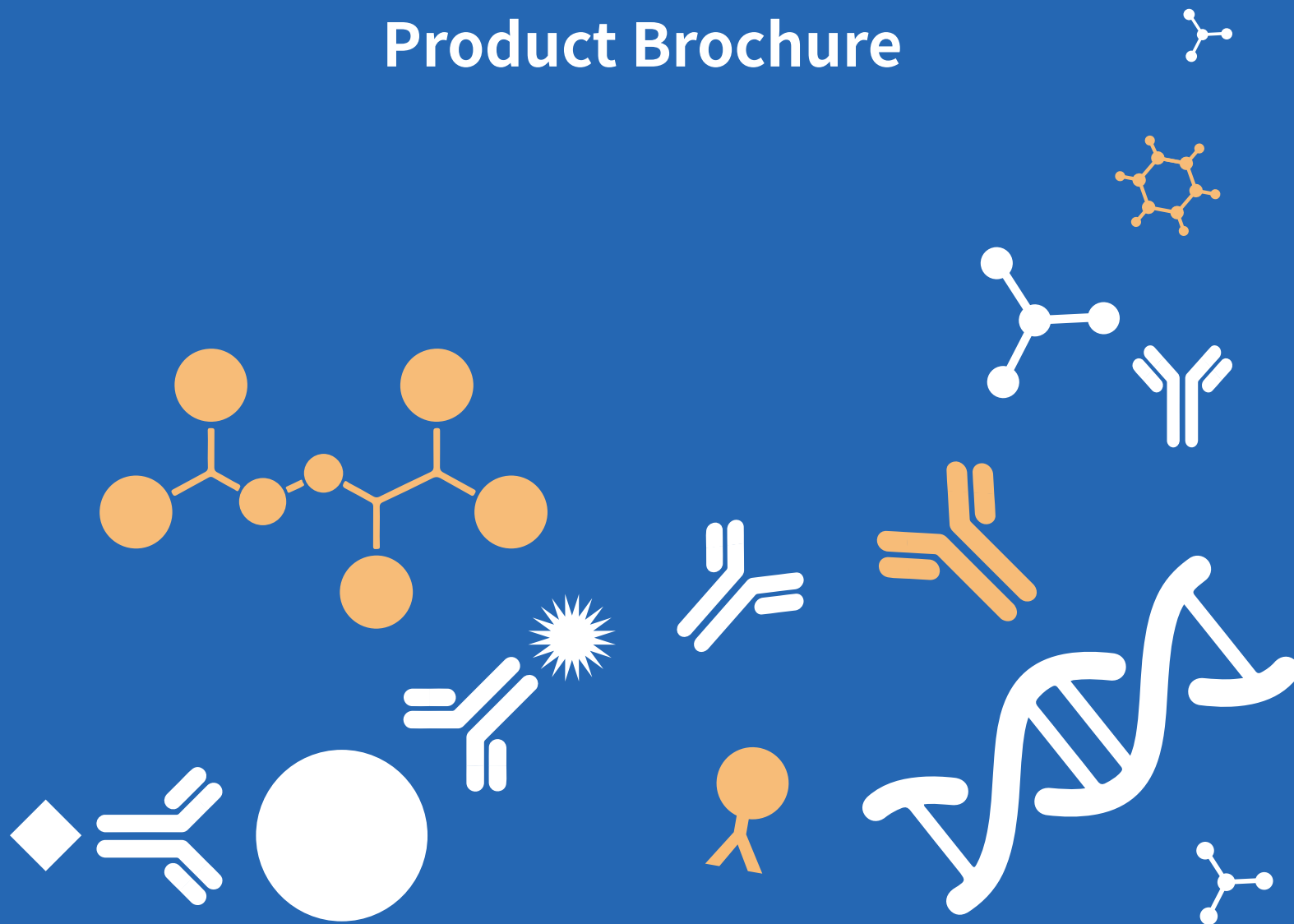


Chromatography Resins Product Brochure



COMPANY PROFILE |



VDO Biotech Co., Ltd. is a high-tech enterprise dedicated to innovative microsphere technologies and the production of a variety of high-quality microsphere products for global customers. VDO was founded in 2014, and is headquartered in the BioBAY of Suzhou Industrial Park, China, with a total facility area of over 10,000 square meters. Committed to R&D and innovation, VDO holds 6 authorized patents and 17 pending patents, and have successfully acquired high-tech enterprise certification.

VDO Biotech is deeply engaged in the microsphere innovative development and large-scale production and application. VDO provides microspheres and technical services for both IVD (in vitro diagnostics) and pharmaceutical applications. The IVD microspheres include magnetic microspheres, latex microspheres, color-dyed microspheres, fluorescent microspheres, flow cytometry microspheres, and standard microspheres. while the chromatography resins cover size exclusion resins, affinity resins, ion exchange resins, hydrophobic interaction resins and multimodal resins. Products can be widely used in molecular diagnosis, immunodiagnosis, and large-scale purification of biological drugs and vaccines. VDO also provide customized services of various types of microspheres, large-scale microsphere conjugation services with antibodies or nucleic acid probes, OEM services for microspheres and intermediates, and complete solutions for microsphere applications.

Led by senior scientists from world-renowned universities, VDO's microsphere scientific team has established an advanced technology platform and a continuously innovative R&D system. VDO has always adhered to high standards of production management, and manufacturing facilities have acquired ISO 9001:2015 certification. VDO has been endorsed by users all over the world for its high-quality products and services, and constantly creating new legends of core suppliers in the IVD field with higher-quality microsphere products.

To better support partners in the IVD and pharmaceutical fields, VDO has also expanded service scope, introduced a protein raw materials product line, added IVD antibody raw materials, bulk packages, and resins. With the mission of inspiring and enabling life science innovation, VDO will continue to move forward, innovate constantly, and strive to become the world's leading supplier of life science solutions and diagnostic raw materials. VDO's dedicated staff is your reliable partner for life science applications!



Enterprise Cultures

Vision

To be a world-class biotech company

Mission

Healthy life starts here

Values

Preciseness Innovation Collaboration Openness



Integrated Solutions for Biologics Separation and Purification

- Microsphere OEM services for global customers
- Large scale protein-microsphere conjugation services
- OEM services of microsphere intermediates
- High quality microspheres of nanometer and micrometer level
- Customized microsphere services
- Overall solution for microsphere applications
- Biomacromolecule separation and purification services
- Development of separation and purification process for biological macromolecules
- Optimization of separation and purification process for biological macromolecules
- Overall solution for separation and purification of biological macromolecules



ISO 9001 Quality Management System Certification



High-tech Enterprise

ICAS

Intertek Certification and Testing

SGS

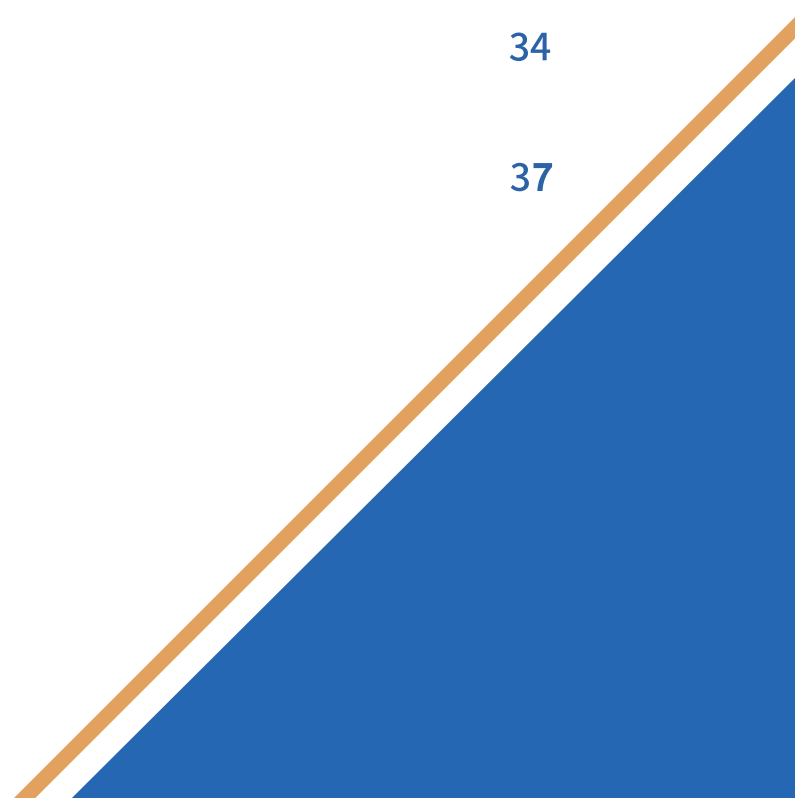
SGS TÜV Standards



Contents

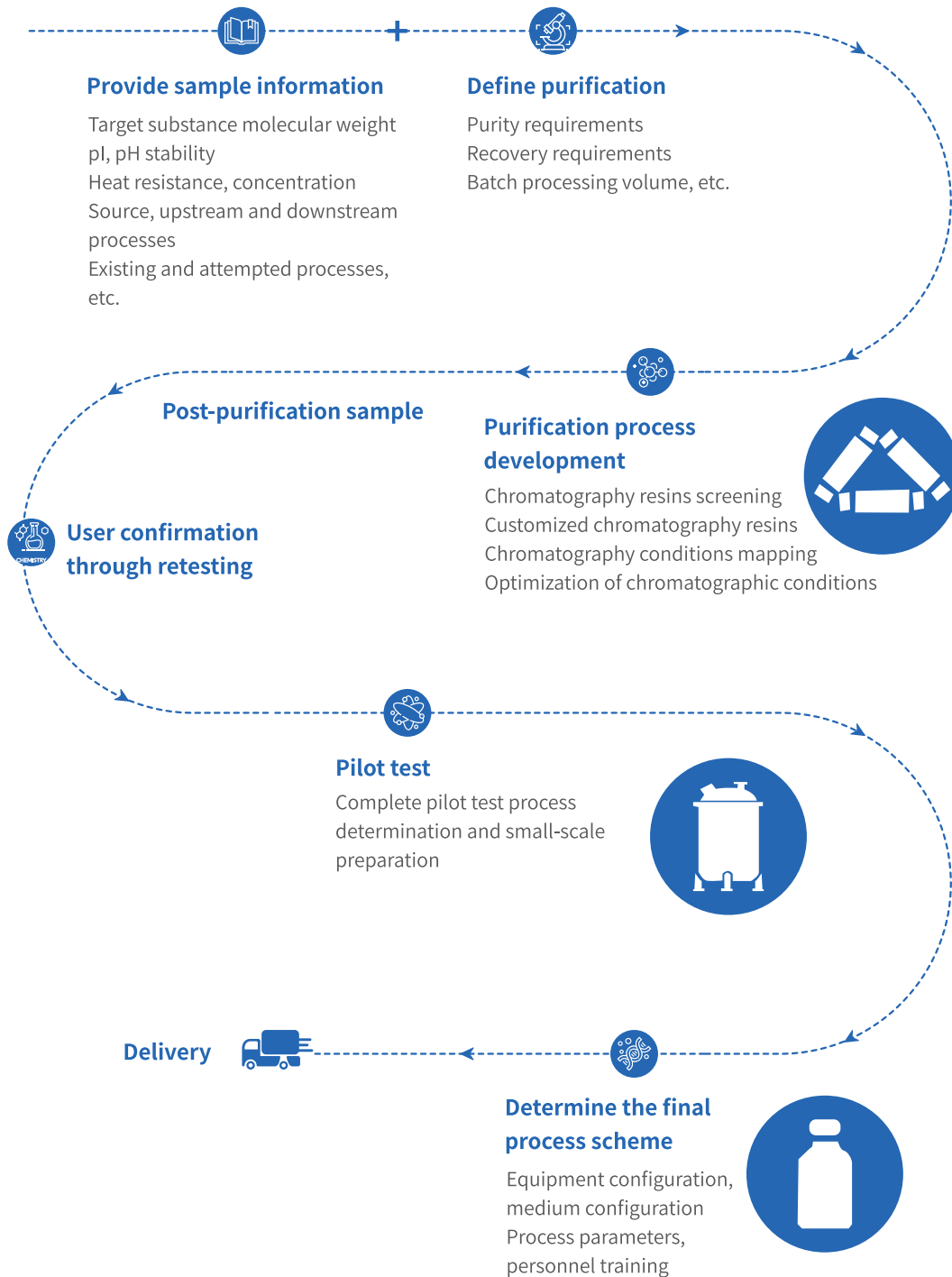
目录

Overall Solution for the separation and Purification of Bioproducts	01
Guidelines for Selection of Biomolecular Purification Resins	02
Size Exclusion Chromatography Resins	04
Ion Exchange Chromatography Resins	11
Affinity Chromatography Resins	21
Hydrophobic Interaction Chromatography Resins	31
Mixed-mode Chromatography Resins	34
Chromatography Empty Columns	37



Overall Solution for Separation and Purification of Bioproducts

VDO has provided a complete solutions for the separation and purification of bioproducts for multiple clients, including the selection and customization of separation and purification resins, the selection and configuration of chromatography equipment and columns, purification processes from small-scale trials to production-scale processes, personnel training, and technical guidance services, to provide customers with the highest quality products and services.

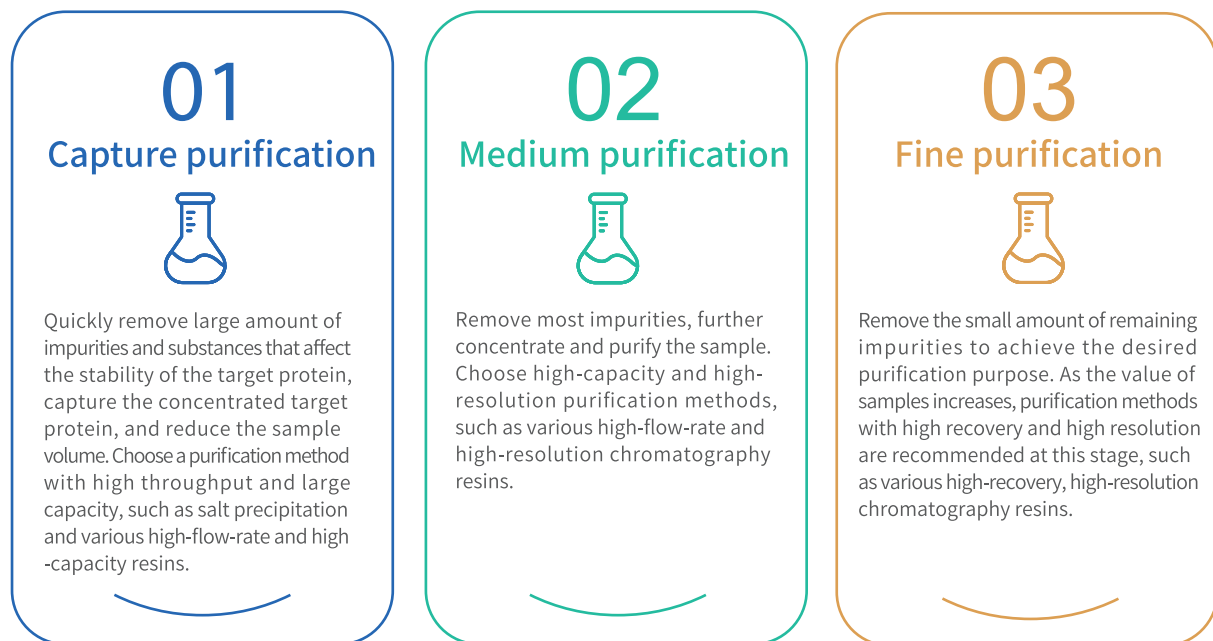


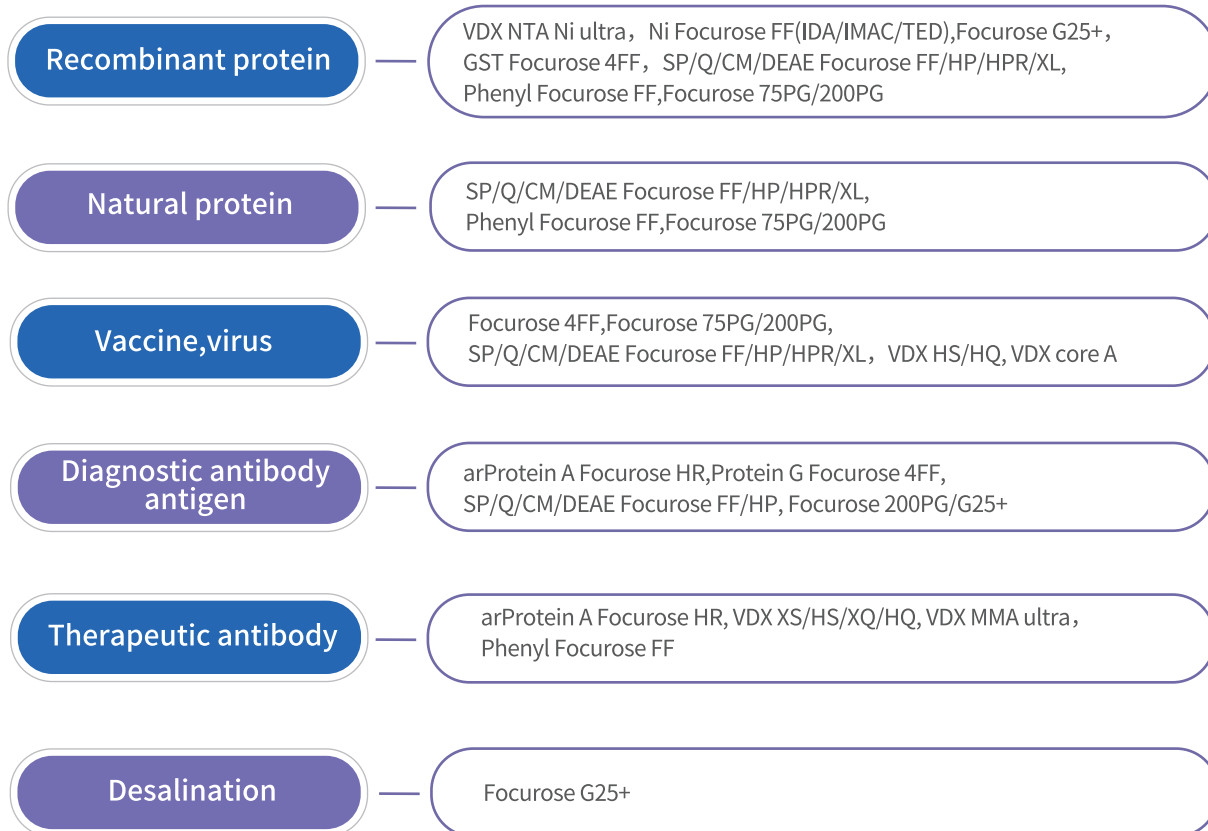
Guidelines for Selection of Purification Resins for Biomolecules

Guiding Principles for Biomolecule Purification:

1. Prior to purification, validate a rapid analytical method to quantify target protein concentration, activity, yield, and key impurities (e.g., HCP, DNA).
2. Define purification objectives including final product purity (e.g., >98%), specific activity (IU/mg), minimum yield (%), and batch scale (L).
3. During resin screening, characterize target protein properties (pI, hydrophobicity, size) and identify critical differences from impurities to select optimal separation modes.
4. Optimize purity-yield balance through orthogonal purification steps (e.g., IEX followed by HIC) and validate analytical methods
5. Evaluate buffer additives (e.g., reducing agents, protease inhibitors) for impact on target protein stability and activity, incorporating essential additives into purification buffers.

Biomacromolecule Purification Resins





Size Exclusion Chromatography Resins



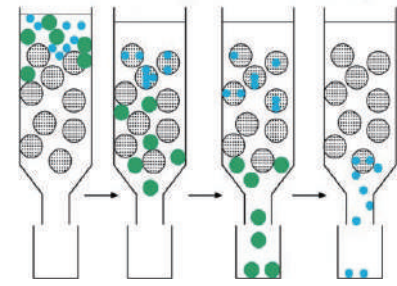
Gel filtration chromatography, also called size exclusion chromatography or molecular sieve chromatography, separates molecules by size. Larger molecules elute before smaller ones, achieving effective separation.

★ Size exclusion resins are commonly used in later purification stages with less impurities.

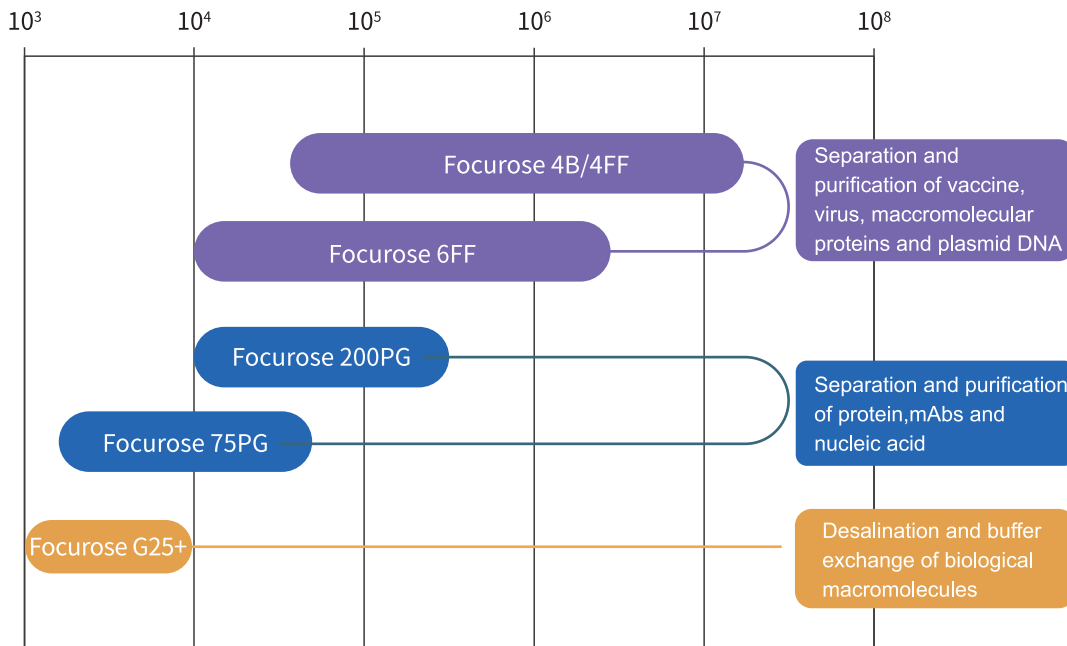
★ Size exclusion resins are used for the purification of small-volume samples.

★ Size exclusion resins can also be used in capture stage, such as desalination.

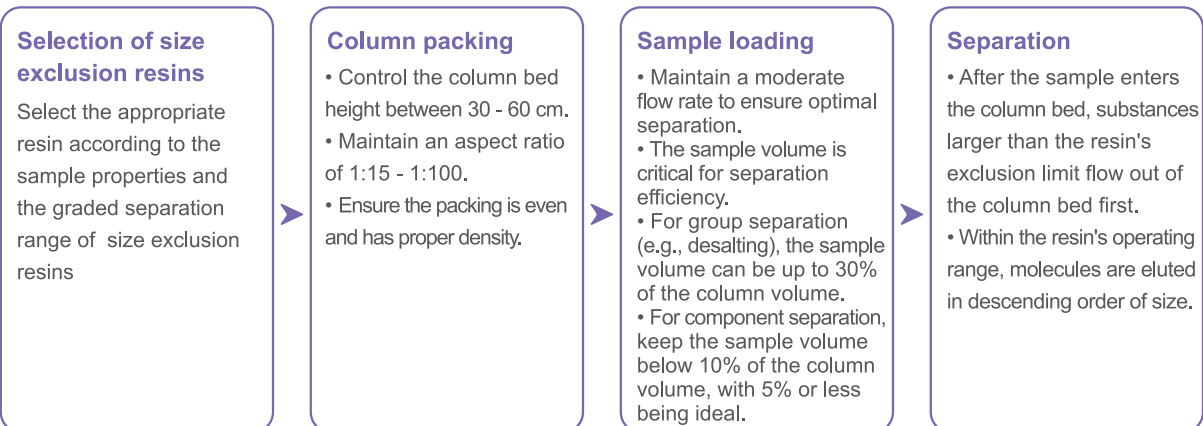
★ Adding 150 mM NaCl to the buffer can effectively reduce the non-specific adsorption of the target protein.



Size exclusion resins graded separation range (globulin Da)



The process of graded separation by size exclusion resins



Size Exclusion Resins

Product number	Product name	Spec	Separation range (globulin)	Particle size range μm	Average particle size μm	Withstand pressure MPa	Flow rate cm/h	pH stability Long-term [short-term]	Application
HN030301025M		25 mL							
HN030301100M		100 mL							
HN030301500M	Focurose 4B	500 mL	6×10^4 - 2×10^7	45-165	90 ± 5	≤ 0.02	11	4-9 [4-9]	MW determination for proteins, polysaccharides, and peptides
HN030301001L		1 L							
HN030301005L		5 L							
HN030301020L		20 L							
HN030303005M		5 mL							
HN030303025M	25 mL								
HN030303100M	Focurose 4FF	100 mL	6×10^4 - 2×10^7	45-165	90 ± 5	≤ 0.1	250	2-12 [2-14]	Isolation of biological macromolecules such as vaccines, viruses, etc.
HN030303500M		500 mL							
HN030303001L		1 L							
HN030303005L		5 L							
HN030303020L		20 L							
HN060307005M		5 mL							
HN060307025M		25 mL							
HN060307100M	Focurose 6FF	100 mL	1×10^4 - 4×10^6	45-165	90 ± 5	≤ 0.1	300	2-12 [2-14]	Isolation of biological macromolecules such as plasmid DNA, viruses, vaccines, etc.
HN060307500M		500 mL							
HN060307001L		1 L							
HN060307005L		5 L							
HN060307020L		20 L							
HN120210005M		5 mL							
HN120210025M		25 mL							
HN120210100M	Focurose 200PG	100 mL	1×10^4 - 6×10^5	25-45	35 ± 5	≤ 0.3	90	3-12 [1-14]	Isolation and purification of monoclonal antibodies and proteins
HN120210500M		500 mL							
HN120210001L		1 L							
HN120210005L		5 L							
HN120210020L		20 L							

Size Exclusion Resins

Product number	Product name	Spec	Separation range (globulin)	Particle size range μm	Average particle size μm	Withstand pressure MPa	Flow rate cm/h	pH stability Long-term [short-term]	Application
HN120209005M		5 mL							
HN120209025M		25 mL							
HN120209100M		100 mL							
HN120209500M	Focurose 75PG	500 mL	3×10^3 - 7×10^4	25-45	35 ± 5	≤ 0.3	90	3-12 [1-14]	Isolation and purification of peptides and low molecular proteins
HN120209001L		1 L							
HN120209005L		5 L							
HN120209020L		20 L							
HN120350025M		25 mL							
HN120350100M		100 mL							
HN120350500M	Focurose G25+	500 mL	1×10^4 6×10^7	45-165	90 ± 5	≤ 0.3	300	3-12 [1-14]	Biomolecule desalination, buffer exchange
HN120350001L		1 L							
HN120350005L		5 L							
HN120350020L		20 L							

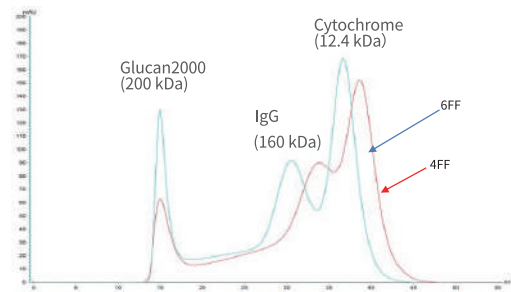
Tips

- ★ The diameter - to - height ratio of the packed column is between 1:15 and 1:010. If the packing is too high, the back pressure will increase.
- ★ When performing gel filtration chromatography, try to minimize the viscosity of the sample.
- ★ During chromatography, the loading volume should be less than 10% of the column bed volume, and preferably controlled within 5%.
- ★ Avoid the presence of solids in chromatographic samples.
- ★ When using gel filtration chromatography, the molecular weights of the substances to be separated should differ by more than two times.

Application Cases

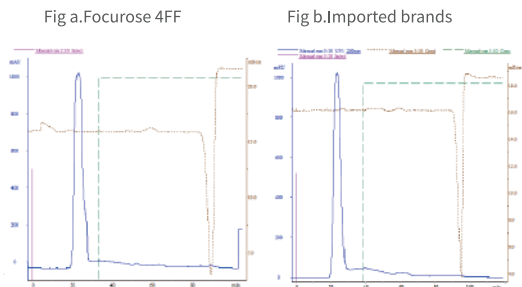
Focurose 4FF/6FF for the separation of substances with different molecular weights

Focurose 4FF and 6FF were compared using the same column volume and sample volume. The separation of IgG (160 kDa) and cytochrome C (12.4 kDa) was better with 6FF than 4FF.



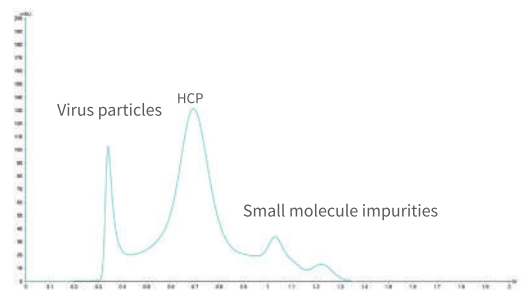
Comparison of Focurose 4FF purified influenza vaccine with imported brands

The purification profiles of Focurose 4FF and imported brand influenza vaccine were compared using the same column volume, sample volume and purification method.



Focurose 4FF purified rabies virus

The molecular weight of rabies virus was larger than that of host cell protein (HCP) and impurities, and the peaks were preferential. The spectrum reflected that rabies virus was effectively separated from HCP and small molecule impurities.



Seperation Comparison: Focurose 200PG vs. Imported Media

Sample: Ferritin, IgG, Bovine Serum Albumin(BSA)
 Column: HK 16/70
 Equilibrium Buffer: 200 mM PB, 150 mM NaCl, pH 7.2

Fig a. Focurose 200PG

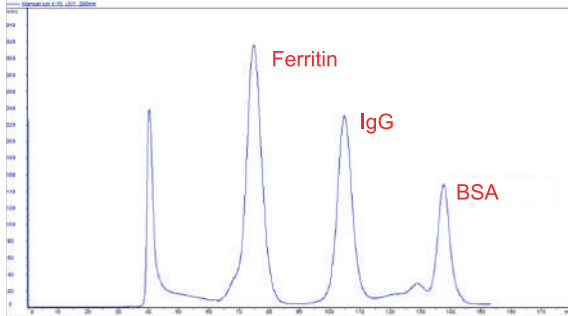
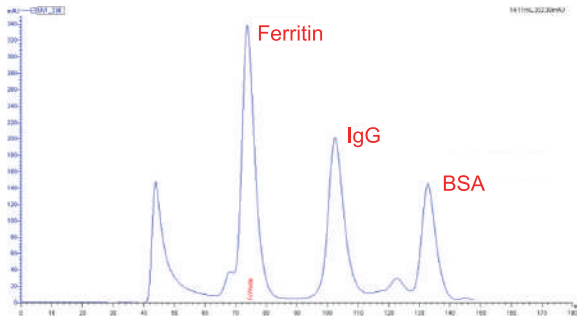


Fig b. Imported media

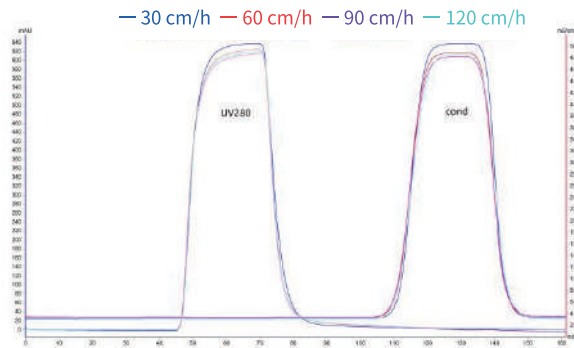


Focurose 200PG Delivers Comparable Resolution of Standard Proteins to Imported Media
 Validated under identical chromatographic conditions.

Sample	MW kD	Retention factor K_{av} of Focurose 200PG	Retention factor K_{av} of imported media
Ferritin	440	0.13	0.14
IgG	80	0.22	0.27
BSA	66.4	0.33	0.41

Consistent Desalting Performance of Focurose G25+ Across Flow Rates

Sample: 5 mg/mL BSA
 Column: HK 16/70
 Equilibrium Buffer: 20 mM PB, pH 7.5
 Flow rate: 30/60/90/120 cm/h



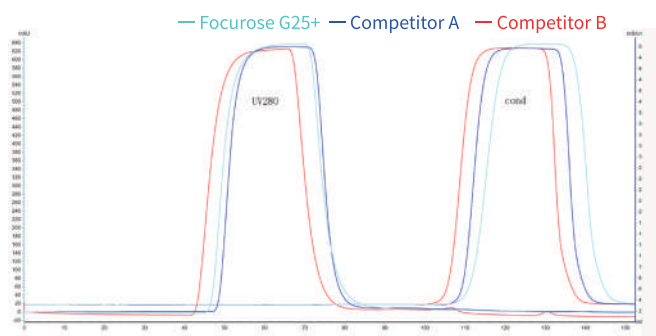
Linear flow(cm/h)	Yield(%)	Resolution (Rs)	Rate of desalination(%)
30	107.49	1.711	93.62
60	98.31	1.851	93.09
90	95.80	1.948	93.10
120	100.91	1.857	93.89

Focurose G25+ Maintained Peak Resolution at High Flow Rates: When linear flow velocity increases from 30 cm/h to 120 cm/h, G25+ Demonstrating robust performance under demanding process conditions:

- Complete separation of UV and conductivity peaks
- Resolution factor (Rs) consistently >1.5
- Desalting efficiency: 93.43% ±1%

**Desalting Performance Comparison:
Focurose G25+ vs. Competitor**

Sample: 5 mg/mL BSA
 Column: HK 16/70,60 cm
 Resins: Focurose G25+/Media 1/Media 2
 Start buffer: 20 mM PB, pH 7.5

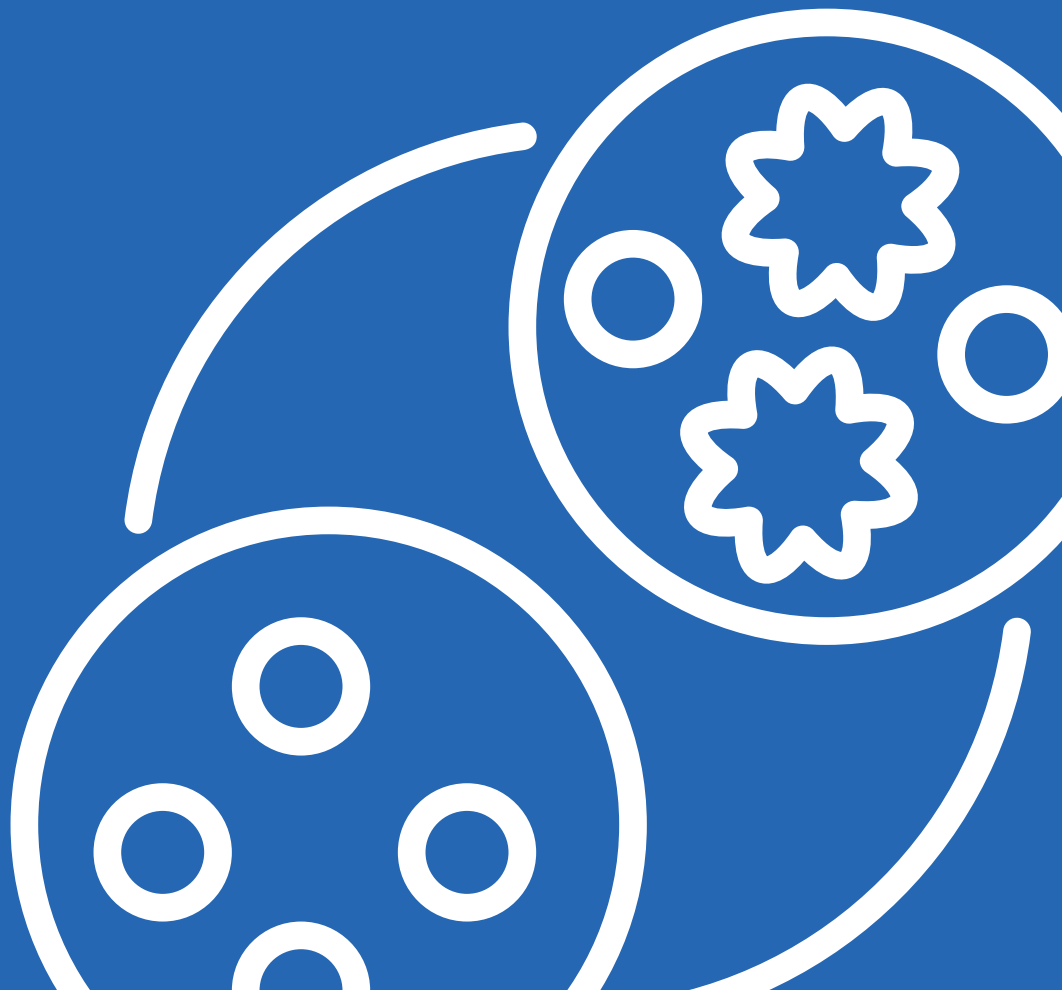


Resins	Yield(%)	Resolution (Rs)	Rate of desalination(%)
Focurose G25+	107.49	1.711	93.62
Competitor A	102.67	1.756	93.53
Competitor B	101.97	1.759	93.48

Chromatographic Performance Comparison: Focurose G25+, Competitor Media A, and Competitor Media B all demonstrate:

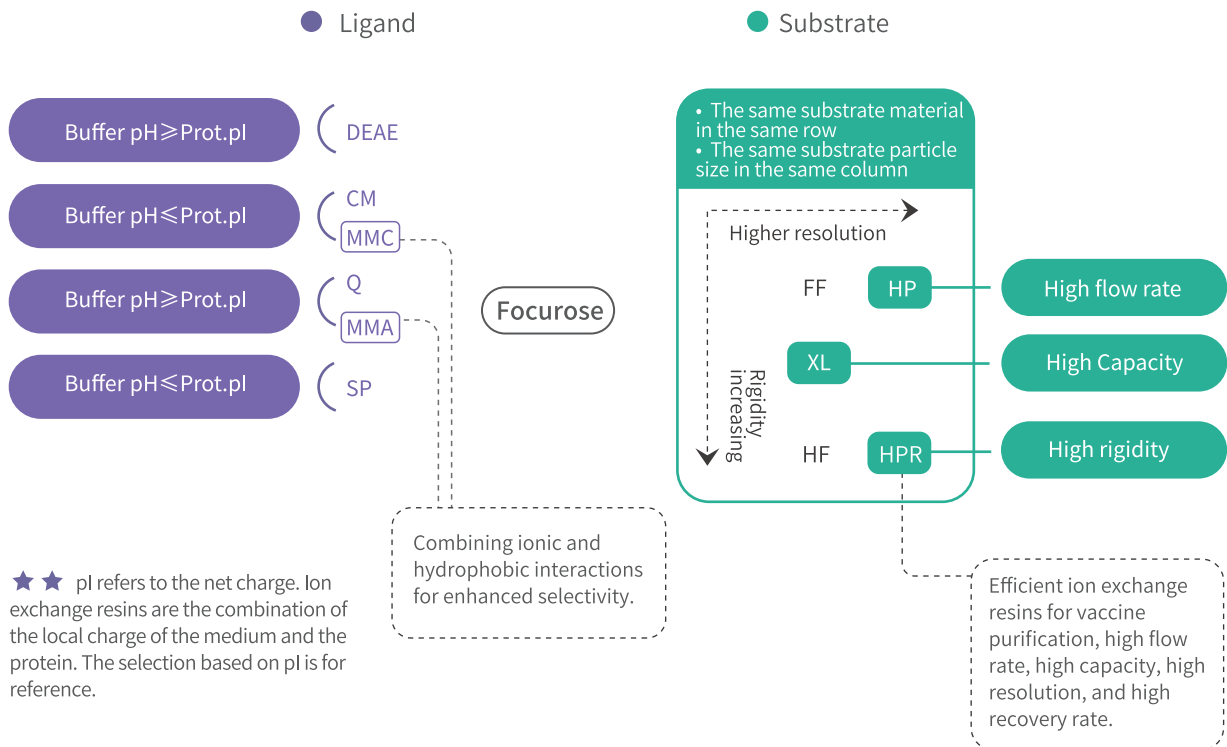
- Resolution factor (Rs) >1.7 for protein/salt peaks
- Baseline separation in all tested conditions
- Desalting efficiency consistently >93%

Ion Exchange Chromatography Resins



Ion exchange chromatography is one of the most widely used methods for protein separation and purification. Different proteins have different isoelectric points, different molecular sizes, different charge density distributions in the same mobile phase, different charge amounts, different binding strengths to ion exchange resin with opposite charges, and different retention times when eluting in the mobile phase, thus allowing separation.

Vdo Biotech provides a comprehensive portfolio of ion exchange media. Our product lines feature four key ligands—SP, Q, CM, and DEAE, precisely paired with a range of advanced matrices, including Focurose FF, Focurose HP, Focurose XL, and Focurose HPR. This sophisticated design ensures our media aligns with purification schemes in downstream bioprocessing, and offering tailored-purification strategies to our customer.



Resin selection principles

★ Capture Stage

Select high-flow, high-DBC ion exchange media (e.g., XL-series matrices) for rapid processing and maximal binding capacity.

★ Intermediate Purification

Select media balancing high DBC and superior resolution (e.g., FF/XL matrices) for impurity clearance without yield compromise.

★ Polishing Stage

Select high-resolution, high-recovery media (e.g., HP/FF/HPR matrices) for final product quality control.

VDX Series IEX Resins

VDX Series Products represent Vdo Biotech's premium chromatography media line with fully independent intellectual property rights. They deliver high performance, superior selectivity, and cost-efficiency, addressing the market's urgent demand for high-performance bioprocessing consumables. VDX Series ion exchange media are categorized into three lines based on following performance characteristics: High-Resolution, High-Capacity, Strong-Binding.

High-Resolution Series

Product number	Product name	Spec	Ionic capacity $\mu\text{mol/mL}$	DBC capacity mg/mL	Particle size range μm	Maximum flow rate cm/h	Withstand pressure MPa	pH stability long-term [short-term]	Application characteristics
HL270818025M		25 mL							
HL270818100M		100 mL							
HL270818500M		500 mL							
HL270818001L	VDX HQ	1 L	80-100 Cl^-	≥ 70 BSA	45-165	200-300	0.3	4-12 [2-14]	High resolution Separation of recombinant protein monomers & aggregates, empty/full capsids in viral vectors
HL270818005L		5 L							
HL270818020L		20 L							
HL270820025M		25 mL							
HL270820100M		100 mL							
HL270820500M		500 mL							
HL270820001L	VDX HS	1 L	70-100 H^+	≥ 70 IgG	45-165	200-300	0.3	4-13 [2-14]	High Resolution Separation of antibody monomers & aggregates Fine purification of recombinant proteins
HL270820005L		5 L							
HL270820020L		20 L							

High-Capacity Series

Product number	Product name	Spec	Ionic capacity $\mu\text{mol/mL}$	DBC capacity mg/mL	Particle size range μm	Maximum flow rate cm/h	Withstand pressure MPa	pH stability long-term [short-term]	Application characteristics
HL270819025M		25 mL							
HL270819100M		100 mL							
HL270819500M		500 mL							
HL270819001L	VDX XQ	1 L	75-90 Cl^-	≥ 160 BSA	45-165	200-300	0.3	4-12 [2-14]	High resolution Separation of recombinant protein monomers & aggregates, empty/full capsids in viral vectors
HL270819005L		5 L							
HL270819020L		20 L							
HL270821025M		25 mL							
HL270821100M		100 mL							
HL270821500M		500 mL							
HL270821001L	VDX XS	1 L	70-100 H^+	≥ 150 IgG	45-165	200-300	0.3	4-13 [2-14]	High Resolution Separation of antibody monomers & aggregates Fine purification of recombinant proteins
HL270821005L		5 L							
HL270821020L		20 L							

Application Cases

Antibody Aggregate Separation with VDX HS Media

Buffer A: 50 mM NaAc-HAc, pH 5.5

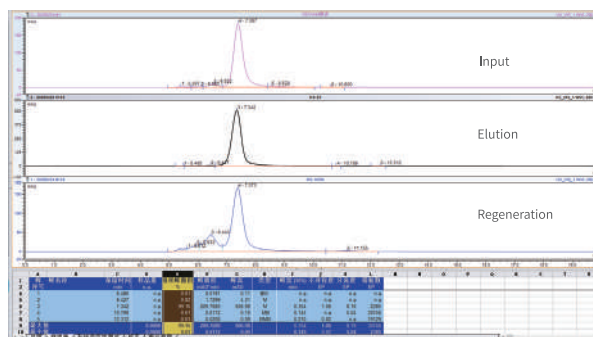
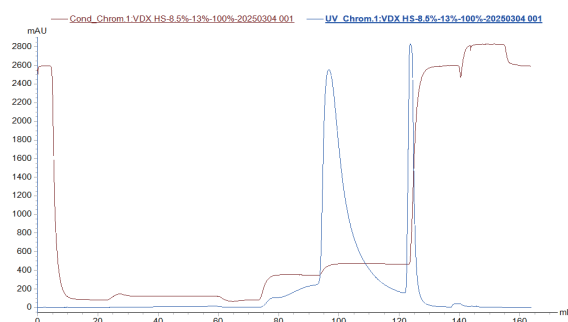
Buffer B: 50 mM NaAc-HAc, 1 M NaCl, pH 5.5

Elution: 13% B over 6 CV

Regeneration: 100% B over 3 CV Result

- Purity: 99.16%

- Recovery : 75%



Monomer-Aggregate Separation of Recombinant Protein with VDX HQ Media

Flow-through mode purification of 20 kDa recombinant protein

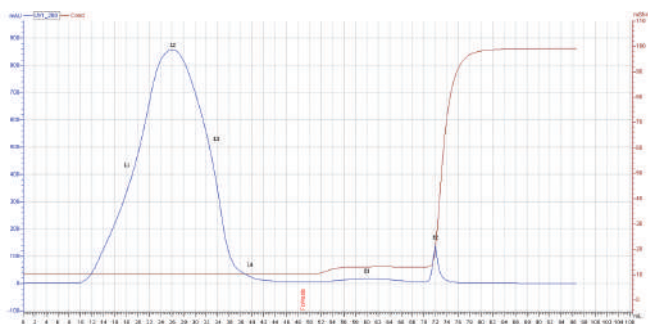
Buffer A: 20 mM Tris, 0.0 8M NaCl, pH 7.5

Buffer B: 20 mM Tris, 1 M NaCl, pH 7.5

Sample: 20 kDa recombinant protein, 100 mg

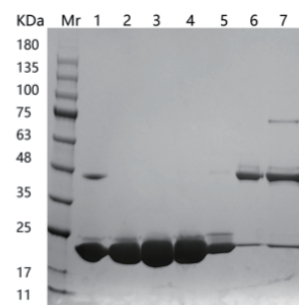
Result:

- Flow-through purification
- Impurities bind to media
- Purity: 99%



Non-reduced SDS-PAGE

- Lane 1: Input(6 µL)
- Lane 2: FT-1(30 µL)
- Lane 3: FT-2(20 µL)
- Lane 4: FT-3(30 µL)
- Lane 5: FT-4
- Lane 6: elution-1
- Lane 7: elution-2



4-20%-1.0 mm-11 lanes-40 µL

Pre-assembled column ordering information

Product name	Spec	Product number	Product name	Spec	Product number
VDX HQ	1 mL	HL270818001E	VDX HS	1 mL	HL270820001E
	5 mL	HL270818005E		5 mL	HL270820005E
VDX XQ	1 mL	HL270819001E	VDX XS	1 mL	HL270821001E
	5 mL	HL270819005E		5 mL	HL270821005E

Ion Exchange Resins

High flow rate, high resolution

This media series utilizes rigid 6% highly cross-linked agarose microspheres as the base matrix, functionalized with DEAE, CM, Q, or SP ligands.



- ★ Quick, simple and convenient.
- ★ Wide range of use, suitable for the separation or fine purification of all components of charged biomolecules.
- ★ High loading capacity (compared to other types of chromatography resins).
- ★ High flexibility of purification process, can improve sample purity by pre-purification process condition screening.

Product number	Product name	Spec	Ionic capacity $\mu\text{mol/mL}$	Particle size range (μm)	Maximum flow rate (cm/h)	Withstand pressure MPa	pH stability long-term [short-term]	Application characteristics
HL060301025M		25 mL						
HL060301100M		100 mL						
HL060301500M		500 mL						
HL060301001L	SP Focurose FF	1 L	180-250 H ⁺	45-165	700	≤ 0.3	4-13 [3-14]	Fast, high throughput purification
HL060301005L		5 L						
HL060301020L		20 L						
HL060303025M		25 mL						
HL060303100M		100 mL						
HL060303500M		500 mL						
HL060303001L	CM Focurose FF	1 L	90-130 H ⁺	45-165	700	≤ 0.3	4-13 [2-14]	Fast, high throughput purification
HL060303005L		5 L						
HL060303020L		20 L						
HL060306025M		25 mL						
HL060306100M		100 mL						
HL060306500M		500 mL						
HL060306001L	Q Focurose FF	1 L	180-250 Cl ⁻	45-165	700	≤ 0.3	2-12 [2-14]	Fast, high-throughput purification
HL060306005L		5 L						
HL060306020L		20 L						

Product number	Product name	Spec	Ionic capacity $\mu\text{mol/mL}$	Particle size range (μm)	Maximum flow rate (cm/h)	Withstand pressure MPa	pH stability long-term [short-term]	Application characteristics
HL060307025M		25 mL						
HL060307100M		100 mL						
HL060307500M	DEAE Focurose FF	500 mL	110-160 Cl ⁻	45-165	700	≤ 0.3	2-12 [2-14]	Fast, high throughput purification
HL060307001L		1 L						
HL060307005L		5 L						
HL060307020L		20 L						
HL060207025M		25 mL						
HL060207100M	100 mL							
HL060207500M	DEAE Focurose HP	500 mL	70-120 Cl ⁻	25-45	150	≤ 0.3	2-13 [1-14]	High resolution
HL060207001L		1 L						
HL060207005L		5 L						
HL060207020L		20 L						
HL060207025M		25 mL						

Application Cases

DEAE Focurose FF isolated recombinant protein

Sample: 20 mL (recombinant protein expressed by *E. coli*)

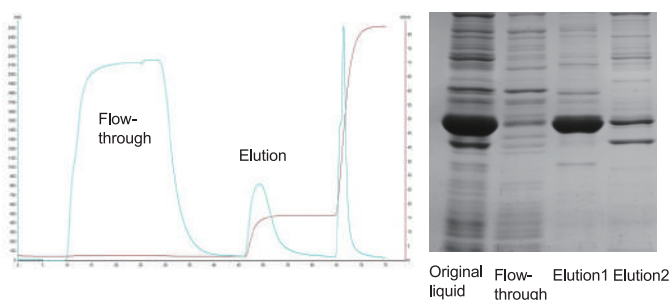
Column: HT01, 1.0 mL

Buffer A (20 mM PB, pH 7.5)

Buffer B (20 mM PB, 1.0 M NaCl, pH 7.5)

Flow rate: Sample loading at 0.6 mL/min;

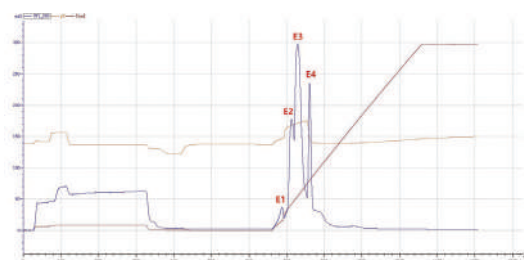
all other steps at 1.0 mL/min



Purification process for Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) (high purity/high recovery options)

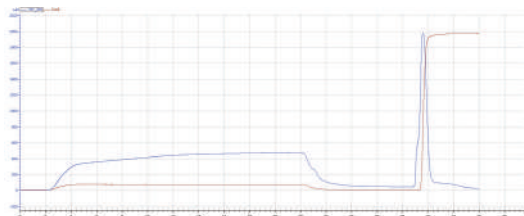
1. DEAE weak anion gradient elution mode - high purity

The virus is absorbed and eluted in this purification process with gradient, the protein removal rate \approx 98%, recovery rate is $>$ 60%.



2. Q Focurose FF isocratic elution mode - high recovery rate

In this purification process, PRRSV is absorbed and eluted with isocratic elution, protein removal rate \approx 75%, recovery rate $>$ 70%.



Pre-assembled column ordering information

Product name	Spec	Product number
SP Focurose FF	1 mL	HL060301001E
	5 mL	HL060301005E
CM Focurose FF	1 mL	HL060303001E
	5 mL	HL060303005E
Q Focurose FF	1 mL	HL060306001E
	5 mL	HL060306005E
DEAE Focurose FF	1 mL	HL060307001E
	5 mL	HL060307005E
DEAE Focurose HP	1 mL	HL060207001E
	5 mL	HL060207005E

Ultra-High Capacity

Ultra-High Capacity Agarose Matrix Ion Exchange Media is manufactured by incorporating linear dextran molecules into a robust 6% agarose matrix. This design reduces steric hindrance during protein binding and increases the density of ion exchange ligands, which significantly increases binding capacity. This product is designated as Focurose XL.



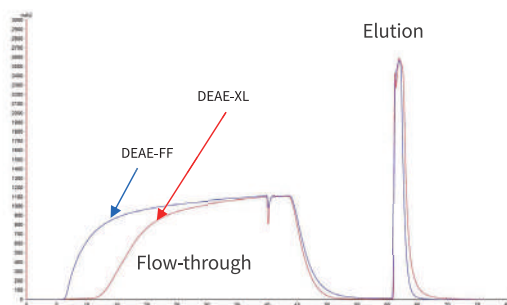
- ★ Ultra-high capacity captures more target substances from samples, offering highly cost-effective performance.
- ★ Maintains high dynamic binding capacity (DBC) even at high flow rates.
- ★ Suitable for rapid purification of all biomolecules: vaccines, viruses, proteins, and polysaccharides.

Product number	Product name	Spec	Ionic capacity $\mu\text{mol/mL}$	Particle size range (μm)	Maximum flow rate (cm/h)	Withstand pressure MPa	pH stability long-term [short-term]	Application characteristics
HL120307025M		25 mL						
HL120307100M		100 mL						
HL120307500M	DEAE Focurose XL	500 mL	200-400 Cl^-	45-165	500	≤ 0.3	2-12 [2-14]	High capacity High flow rate
HL120307001L		1 L						
HL120307005L		5 L						
HL120307020L		20 L						

Application Cases

Binding Capacity Comparison of High Flow Rate Agarose - Based IEX media (DEAE Focurose FF) and Ultra - High Capacity Agarose - Based IEX media (DEAE Focurose XL)

Sample: 10 mg/mL BSA
 Load: 40 mL (full-load)
 Column: HT01, 1.0 mL
 Buffer A: 20 mM Tris-HCl, pH 8.5
 Buffer B: 20 mM Tris-HCl, 1M NaCl, pH 8.5
 Flow: 1 mL/min



Pre-assembled column ordering information

Product name	Spec	Product number
DEAE Focurose XL	1 mL	HL120307001E
	5 mL	HL120307005E

High Rigidity

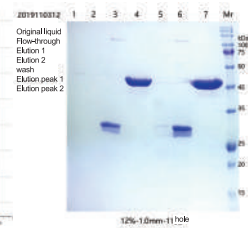
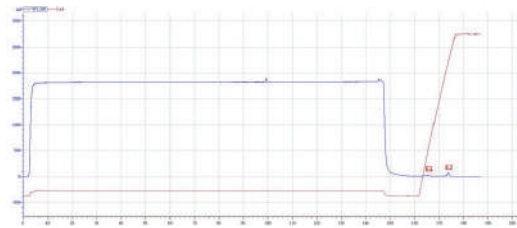
The high rigidity agarose based ion - exchange medium is composed of a highly cross - linked cellulose-agarose matrix coupled with diverse ligands. Compared to high - flow agarose based media, it demonstrates higher rigidity, faster mass transfer, and greater durability. The linear cellulose molecules inserted into the agarose enhance its capacity. The matrix, resulting from the cross - linking of agarose and cellulose, ensures good biocompatibility, which is crucial for achieving high recovery rates and preserving the activity of biomolecules like vaccines during purification. Its high rigidity also allows for high - flow operation, effectively improving product quality and reducing costs in industrial production

Product number	Product name	Spec	ionic capacity $\mu\text{mol/mL}$	Particle size range (μm)	Maximum flow rate (cm/h)	Withstand pressure MPa	pH stability long-term [short-term]	Application characteristics
HL190801025M	SP Focurose HPR	25 mL	100-140 H ⁺	45-165	400	≤ 0.3	4-12 [3-14]	High flow rate, high throughput, high resolution, high recovery
HL190801100M		100 mL						
HL190801500M		500 mL						
HL190801001L		1 L						
HL190801005L		5 L						
HL190801020L		20 L						
HL190206025M	Q Focurose HPR	25 mL	130-160 Cl ⁻	25-45	400	≤ 0.3	2-12 [2-14]	High flow rate, high throughput, high resolution, high recovery
HL190206100M		100 mL						
HL190206500M		500 mL						
HL190206001L		1 L						
HL190206005L		5 L						
HL190206020L		20 L						

Application Cases

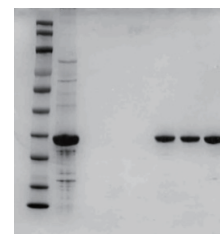
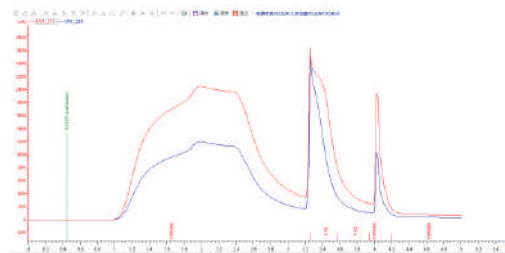
SP Focurose HPR purified recombinant certain kinase supernatant

Equilibrium Buffer: 50 mM PB, pH 6.5
 Elution Buffer: 50 mM PB, 1 M NaCl, pH 6.5



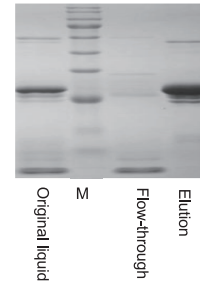
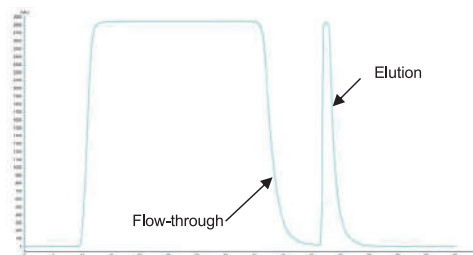
SP Focurose HPR Purified Recombinant Type III Collagen

Equilibrium Buffer: 20 mM PB, pH 6.0
 Elution Buffer: 20 mM PB, pH 6.0
 The first step of purification was performed in strong cation binding mode with 80% purity.



SP Focurose HPR purified circlet vaccine

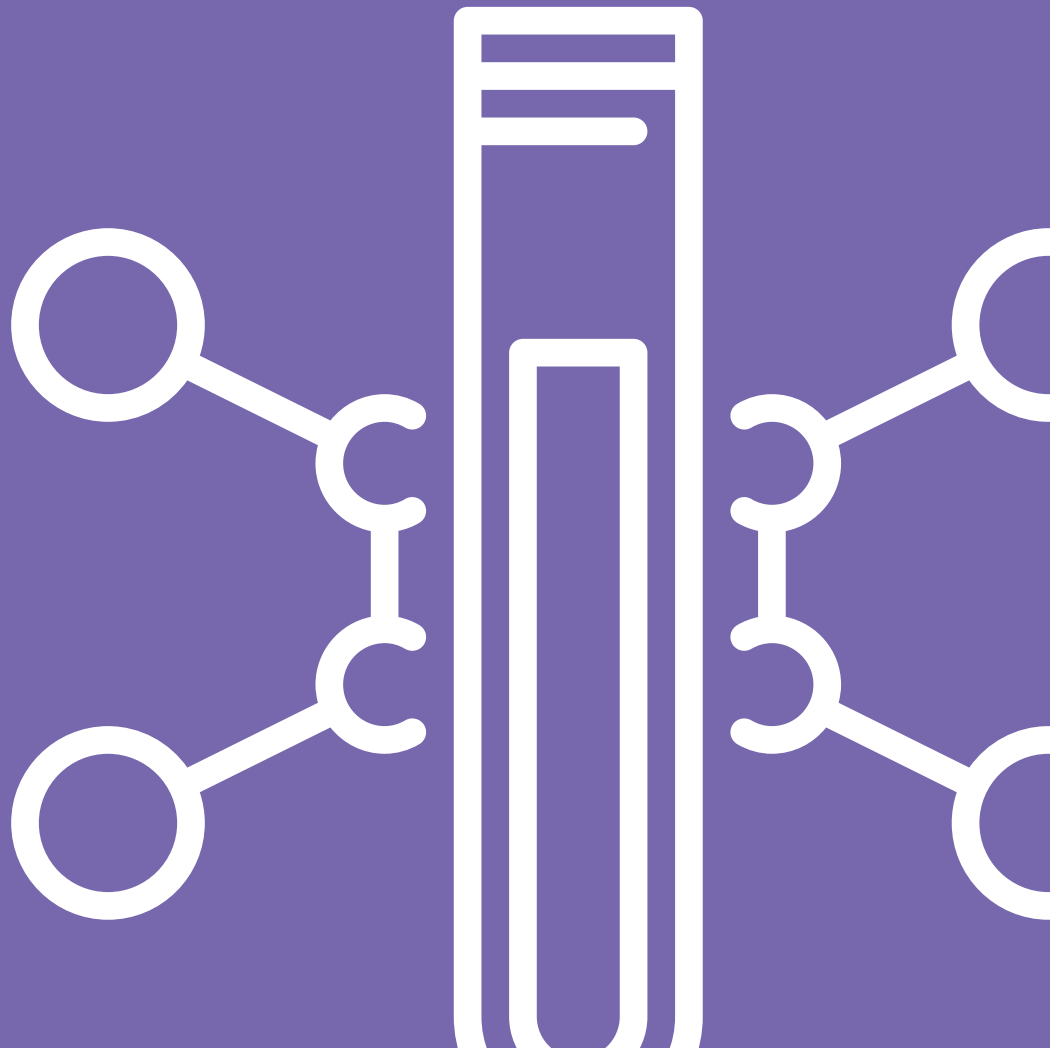
Equilibrium Buffer: 0.05 M NaAc, pH 5.0
 Elution Buffer: 0.02 M PB, 0.5 M NaCl, pH 8.0



Pre-assembled column ordering information

Product name	Spec	Product number	Product name	Spec	Product number
SP Focurose HPR	1 mL	HL190801001E	Q Focurose HPR	1 mL	HL190206001E
	5 mL	HL190801005E		5 mL	HL190206005E

Affinity Chromatography Resins



Antibody Purification

Coupling substances such as Protein A and Protein G on high-strength cross-linked agarose is widely used for the purification of antibodies.

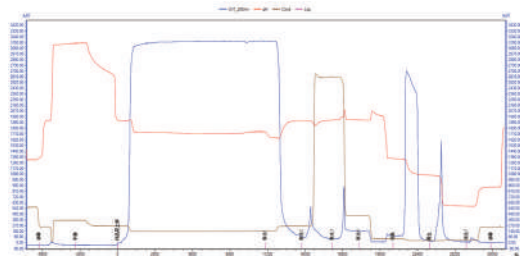
Product number	Product name	Spec	Binding capacity /mL	Particle size range μm	Maximum flow rate (cm/h)	Withstand pressure MPa	pH stability long-term [short-term]	Application characteristics
HQ320827025M		25 mL						
HQ320827100M		100 mL						
HQ320827500M		500 mL						
HQ320827001L	arProtein A Focurose HR	1 L	~60 mg human IgG	45-165	500	≤ 0.5	3-12 [2-14]	Purified antibodies, immunoglobulin and FC fusion fused proteins. Tolerant to 0.5 M NaOH for CIP
HQ320827005L		5 L						
HQ320827020L		20 L						
HQ030316025M		25 mL						
HQ030316100M		100 mL						
HQ030316500M		500 mL						
HQ030316001L	Protein G Focurose 4FF	1 L	≥ 20 mg human IgG	45-165	400	≤ 0.3	3-9 [2-10]	One-step purification multi-species source antibodies
HQ030316005L		5 L						
HQ030316020L		20 L						
HQ320863025M		25 mL						
HQ320863100M		100 mL						
HQ320863500M		500 mL						
HQ320863001L	VDX VH3	1 L	~ 60 mg mAb	45-165	500	≤ 0.5	3-12 [2-14]	High capacity High flow rate
HQ320863005L		5 L						
HQ320863020L		20 L						

Application Cases

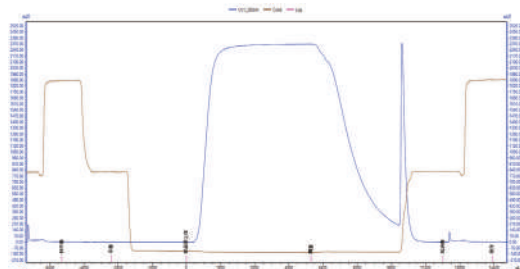
Two-step affinity and ion-exchange chromatography purification of murine IgG antibody (pilot test)

arProtein A Focurose HR was used for large-scale sample preparation (chromatographic column size 7.0 cm * 24 cm) with the pressure maintained below 0.20 Mpa. The resin performance was good in three replicate sample preparations with the yield above 93%. The purity of HCP, HCD and endotoxin all met the requirements.

Step 1: arProtein A Focurose HR affinity capture target IgG



Step 2: Q Focurose FF anion-exchange chromatography purification



High-Capacity Protein G Focurose 4FF Purification of Sheep Serum

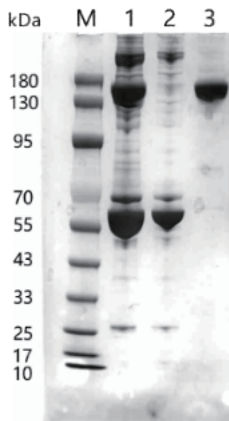
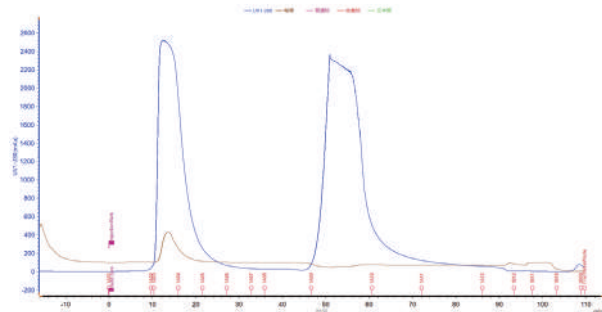
Sample: Sheep serum, 11 mL

Column: 5 mL, column height 10 cm

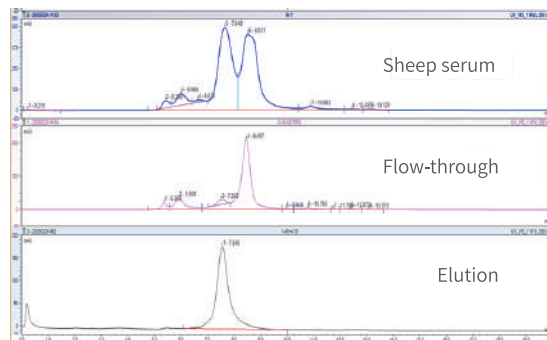
Buffer A: 20 mM PB, pH 7.0

Buffer B: 0.1 M Glycine-HCl, pH 2.7

Result: After one-step affinity purification using sheep serum, the purity reaches 100%



Lanes:
M:Marker
1:Sheep serum input
2:Pro G flow-through
3:Pro G elution

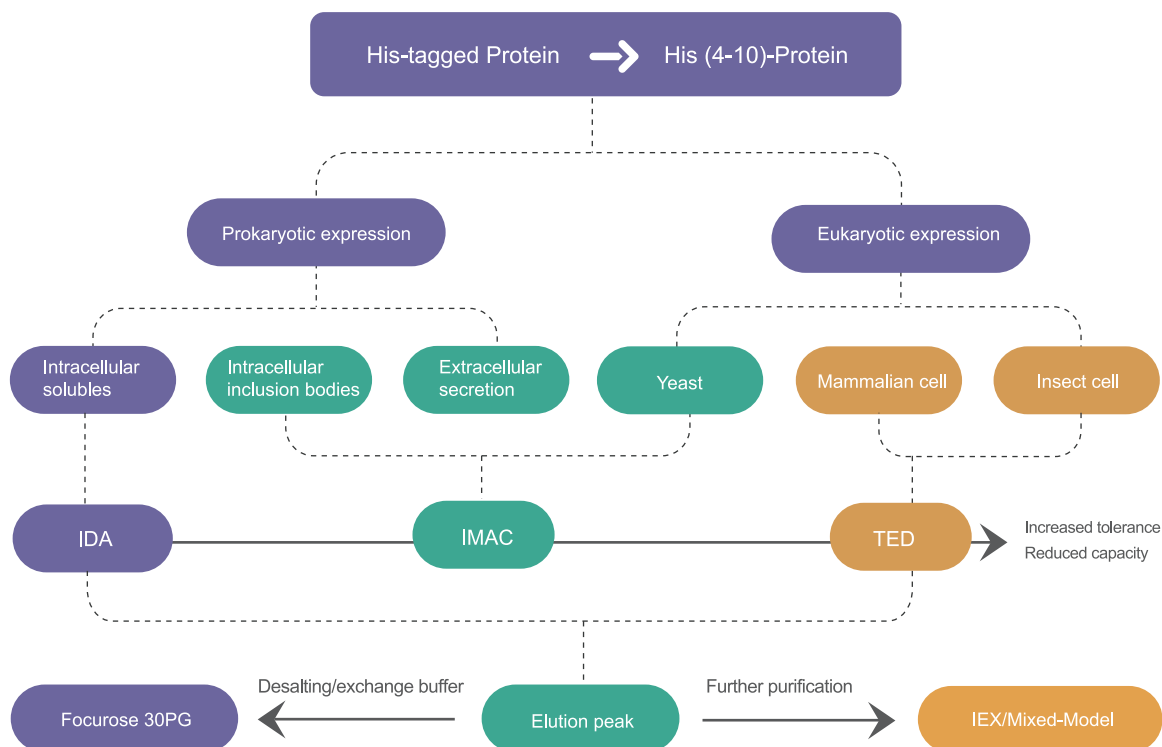


Pre-assembled column ordering information

Product name	Spec	Product number	Product name	Spec	Product number
arProtein A Focurose HR	1 mL	HQ320827001E	Protein G Focurose 4FF	1 mL	HQ030316001E
	5 mL	HQ320827005E		5 mL	HQ030316005E

His-tagged Protein Purification

Transition state metal ions ($\text{Cu}^{2+} > \text{Ni}^{2+} > \text{Zn}^{2+} > \text{Co}^{2+}$) can bind to electron donors, such as N, S, O and other atoms with coordination bonds. The remaining empty orbitals on the metal ions are ligand sites for electron donors, which will be occupied by water molecules or anions in solution. When the amino acid residues (His) on the protein surface are strongly bound to metal ions, the powered atoms of the amino acid residues will bind to the metal ions to form a complex, replacing the previously bound water molecules or anions, thus enabling the protein molecules to bind to the solid surface. His-tagged proteins with His and mediator binding are purified by selecting different metal ligands depending on the affinity of the metal ligands due to the different types, numbers, positions and spatial conformations of the amino acids on the protein surface.



The chelating ion binding affinity to His - tag follows the order: $\text{Cu}^{2+} > \text{Ni}^{2+} > \text{Zn}^{2+} > \text{Co}^{2+}$. Cu^{2+} has the strongest binding affinity. Ni^{2+} is the most widely used. Co^{2+} , despite its relatively weak binding affinity, offers high - resolution separation.

According to the different chelation methods, there are three kinds of IDA, IMAC and TED.

Name	Ni-IDA	Ni-IMAC	Ni-TED
Chelation ratio	3 : 3	4 : 2	5 : 1
Reducing agent (mM)	Avoid	1	20
Chelating agent (mM)	Avoid	5	100
pH range	3-12(working) 2-14(cleaning)	3-12 (working) 2-14 (cleaning)	3-12 (working) 2-14 (cleaning)
Cleaning regeneration	9 steps (nickel removal - cleaning - regeneration)	9 steps (nickel removal - cleaning - regeneration)	5 steps (cleaning)
Application scope	Conventional His-tagged Protein Purification (Active Conditions)	Routine His-tagged protein purification (active and denaturing conditions)	Can be used for high reductant, chelator His-tagged protein samples and eukaryotic His-tagged protein purification (low abundance samples and denaturant samples are less effective)

VDX NTA Ni Ultra: High-Affinity IMAC Purification Media

Engineered for superior his-tagged protein recovery, VDX NTA Ni Ultra leverages immobilized nickel ions to selectively bind proteins via interactions with histidine, cysteine, and tryptophan residues. Featuring advanced surface engineering, this media significantly enhances the structural flexibility of Ni²⁺-histidine coordination, delivering unprecedented binding capacity and high target protein recovery. Specifically engineered to overcome limitations of traditional Ni-IMAC media, VDX NTA Ni Ultra is ideal for purifying His - tagged proteins that show weak or no binding to conventional Ni - based affinity media, which often leads to significant flow - through.



- ★ **Stronger Binding Ability:** Effectively binds His-tagged proteins that traditional nickel - based media fail to capture.
- ★ **Higher Binding Capacity:** Significantly outperforms traditional nickel - based media in binding capacity under the same conditions.
- ★ **Superior Purification Effect:** Enhanced target protein purity and yield while minimizing impurities.

Product number	Product name	Spec	Binding capacity /mL	Particle size range μm	Maximum flow rate (cm/h)	Withstand pressure MPa	pH stability long-term [short-term]	Application characteristics
HQ320862025M		25 mL						
HQ320862100M		100 mL						
HQ320862500M	VDX NTA Ni ultra	500 mL	≥ 40 mg	45-165	100-150	0.3	3-12 [2-14]	High-efficiency capture of weakly binding or non-binding tagged proteins
HQ320862001L		1 L	His-tagged protein					
HQ320862005L		5 L						
HQ320862020L		20 L						

Purification of a Tagged Protein Using Traditional Ni-NTA and VDX NTA Ni Ultra

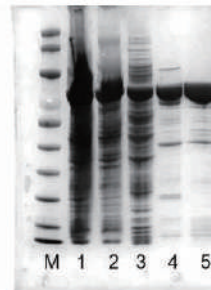
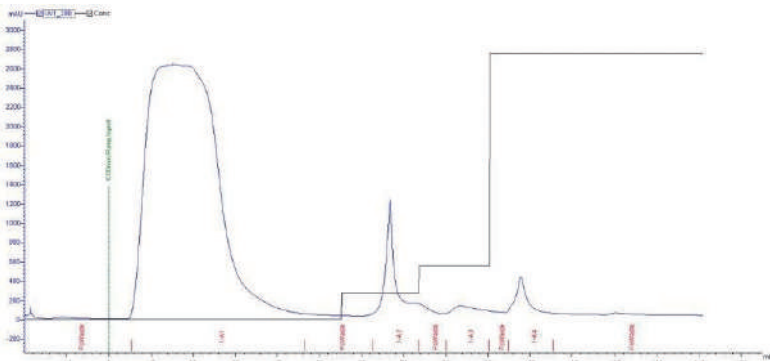
Columns: VDX NTA Ni Ultra and conventional Ni-NTA; 5 mL columns, 10 cm height

Sample: *E. coli* lysate

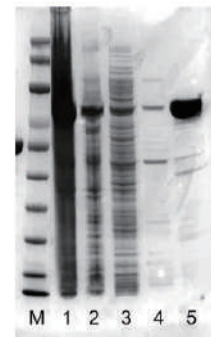
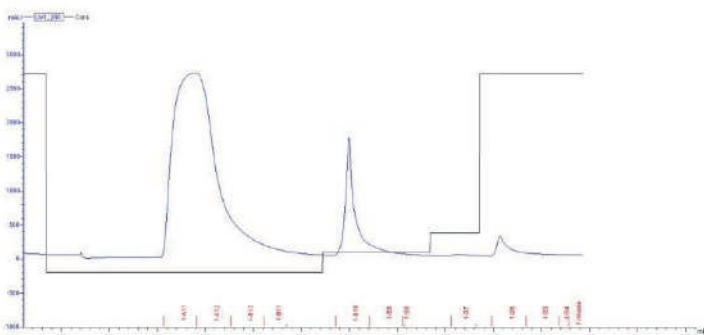
Equilibrium Buffer: 50 mM PB, 300 mM NaCl, pH 8.0.

Elution Buffer: 50 mM PB, 300 mM NaCl, 500 mM imidazole, pH 8.0

Result: Under the same loading conditions, the traditional Ni-NTA medium showed significant loss of the target protein during binding and washing steps, resulting in a much lower protein recovery. In contrast, VDX NTA Ni Ultra demonstrated a stronger binding capacity for the target protein, with a significantly higher recovery rate than the traditional Ni-NTA medium.



Lanes
M:Marker
1:Lysate
2:Flow-through
3:10% wash
4:30% wash
5:100% elution



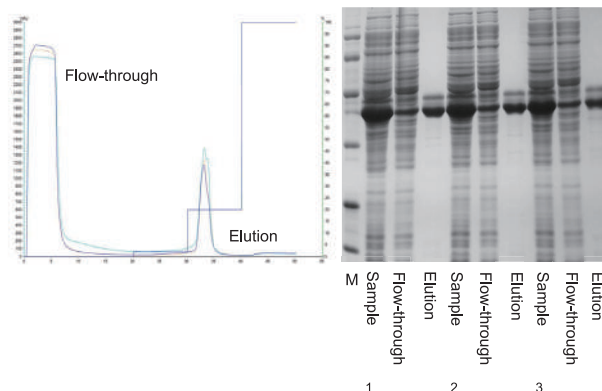
Lanes
M:Marker
1:Lysate
2:Flow-through
3:10% wash
4:30% wash
5:100% elution

Product number	Product name	Spec	Binding capacity /mL	Particle size range μm	Maximum flow rate (cm/h)	Withstand pressure MPa	pH stability long-term [short-term]	Application characteristics	
HQ060311025M			25 mL						
HQ060311100M			100 mL						
HQ060311500M	Ni Focurose FF (IDA)		500 mL	≥ 30 mg His-tagged proteins	45-165	370	≤ 0.3	3-12 [2-14]	Purification of His-tagged proteins
HQ060311001L			1 L						
HQ060311005L			5 L						
HQ060311020L			20 L						
HQ060312025M			25 mL						
HQ060312100M		100 mL							
HQ060312500M	Ni Focurose FF (IMAC)		500 mL	≥ 40 mg His-tagged proteins	45-165	250-400	≤ 0.3	3-12 [2-14]	Large-scale purification of His-tagged proteins
HQ060312001L			1 L						
HQ060312005L			5 L						
HQ060312020L			20 L						
HQ060313025M			25 mL						
HQ060313100M		100 mL							
HQ060313500M	Ni Focurose FF (TED)		500 mL	≥ 10 mg His-tagged proteins	45-165	600	≤ 0.3	3-12 [2-14]	Resistant to 100 mM EDTA and 10 mM DTT, direct 1 M NaOH thorough cleaning without nickel removal.
HQ060313001L			1 L						
HQ060313005L			5 L						
HQ060313020L			20 L						

Application Cases

Ni Focurose FF (TED) purification of His-tagged proteins

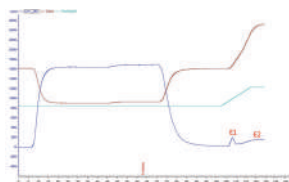
Sample 1: His-tagged protein
 Sample 2: His-tagged protein (containing 0.1 M EDTA)
 Sample 3: His-tagged protein (containing 0.1 M EDTA + 0.01 M DTT)
 Column: HT01, 1.0 mL
 Equilibrium Buffer: 0.05 M Tris-HCl, 0.5 M NaCl, pH 8.0
 Elution Buffer: 0.05 M Tris-HCl, 0.5 M imidazole, 0.5 M NaCl, pH 8.0
 Sample loading flow rate: 0.5 mL/min, other flow rates: 1 mL/min.



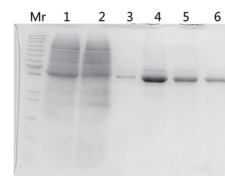
Ni Focurose FF (IDA) purification of recombinant COVID-19 antigen (His label)

Equilibrium Buffer: 20 mM PB, 0.15 M NaCl, pH7.5

Elution Buffer: 20 mM PB, 0.15 M NaCl, 500 mM Imidazole, pH 7.5



Ni Focurose 6FF (IDA)
Reduction
Original liquid
Flow-through
Elution peak E2
Elution peak E1
Elution peak E1 (2-fold dilution)
Elution peak E1 (3-fold dilution)

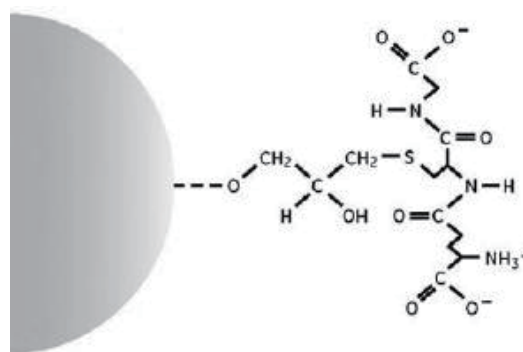


Pre-assembled column ordering information

Product name	Spec	Product number	Product name	Spec	Product number
Ni Focurose FF (IDA)	1 mL	HQ060311001E	Ni Focurose FF (IMAC)	1 mL	HQ060312001E
	5 mL	HQ060311005E		5 mL	HQ060312005E
Ni Focurose FF (TED)	1 mL	HQ060313001E	VDX NTA Ni ultra	1 mL	HQ320862001E
	5 mL	HQ060313005E		5 mL	HQ320862005E

GST-tagged Protein Purification

GST (glutathione transferase) can specifically bind to glutathione, exhibiting the principle of enzyme and substrate action. Using this principle, GST is made into a tag to express a fusion protein that binds specifically to the affinity mediator of glutathione ligand, thus purifying the target protein. The characteristics of GST fusion protein purification are: high purity, mild purification conditions to maintain protein activity, promotion of protein soluble expression, etc.



Product number	Product name	Spec	Binding capacity /mL	Particle size range μm	Maximum flow rate (cm/h)	Withstand pressure MPa	pH stability long-term [short-term]	Application characteristics
HQ030307025M		25 mL						
HQ030307100M		100 mL						
HQ030307500M	GST Focurose 4FF	500 mL	≥ 20 mg	45-165	450	≤ 0.3	3-12 [3-12]	Purification of GST-tagged proteins
HQ030307001L		1 L	GST-tagged proteins					
HQ030307005L		5 L						
HQ030307020L		20 L						

Application Cases

GST Focurose 4FF purified GST-tagged protein

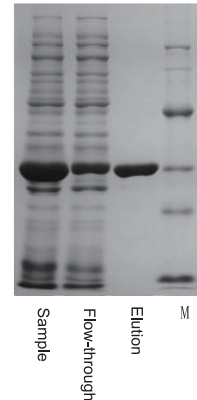
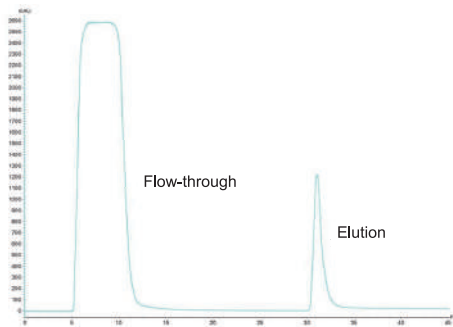
Sample: GST-tagged protein

Column: HT01, 1.0 mL

Equilibrium Buffer: 0.05 M Tris-HCl, 0.14 M NaCl, pH 7.3

Eluent Buffer: 0.05 M Tris-HCl, 0.01 M GSH, pH 8.0

Sample loading flow rate 0.5 mL/min, other stage flow rate 1 mL/min.

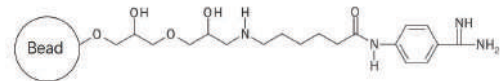


Pre-assembled column ordering information

Product name	Spec	Product number
GST Focurose 4FF	1 mL	HQ030307001E
	5 mL	HQ030307005E

Serine Protease Purification

The affinity resin for the purification of serine proteases is prepared by coupling a broad-spectrum inhibitor of serine proteases, aminobenzamidine, to agarose microspheres Focurose FF and highly cross-linked agarose Focurose 4FF. This affinity resin is referred to as Benzamidine Focurose FF (LS) and Benzamidine Focurose 4FF (HS).



Product number	Product name	Spec	Binding capacity /mL	Particle size range μm	Maximum flow rate (cm/h)	Withstand pressure MPa	pH stability long-term [short-term]	Application characteristics
HQ030317025M		25 mL						Serine protease inhibitor that binds exclusively to serine proteases, trypsin and trypsin-like proteases.
HQ030317100M		100 mL						
HQ030317500M	Benzamidine Focurose 4FF(HS)	500 mL	≥ 30 mg	45-165	300	≤ 0.3	2-8 [1-9]	
HQ030317001L		1 L	trypsin					
HQ030317005L		5 L						
HQ030317020L		20 L						

Pre-assembled column ordering information

Product name	Spec	Product number
Benzamidine Focurose 4FF(HS)	1 mL	HQ030317001E
	5 mL	HQ030317005E

Pre-activation Resins

Pre-activation resins, also known as affinity resin activation intermediates, are based on various cross-linked strength agarose, bonded with different active groups (active spacer arms) by different coupling methods. The active groups can be further coupled with various ligands for the preparation of other resins (mainly affinity resins) and fixation of the corresponding substances, and users can easily couple the ligands to be coupled according to their needs, avoiding the tedious process of connecting active groups in the first stage.

Product number	Product name	Spec	Ligand coupling /mL	Particle size range μm	Maximum flow rate (cm/h)	Withstand pressure MPa	pH stability long-term [short-term]	Functional group	Application characteristics
HQ030301005M		5 mL							Commonly used for coupling macromolecules containing amino groups.
HQ030301025M	CNBr Focurose	25 mL	30 mg	45-165	≤ 0.3	600	3-11	-NH ₂	
HQ030301100M	4FF	100 mL	Trypsinogen				[2-11]		
HQ030301500M		500 mL							

Application Cases

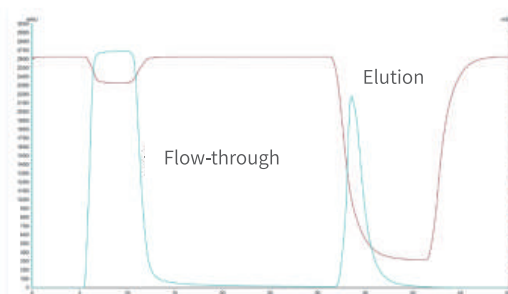
CNBr Focurose 4FF Coupling Human IgG for Purification of Recombinant Protein G

Sample: Recombinant Protein G expressed in *E.coli*

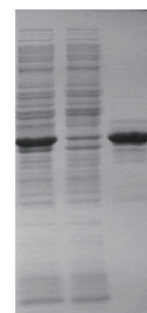
Column: HT01, 1.0 mL.

Equilibrium Buffer: 0.02 M PB, 0.15 M NaCl, pH 7.4

Elution Buffer: 0.05 M Citrate Buffer, pH 3.0



Sheep serum, 11 mL

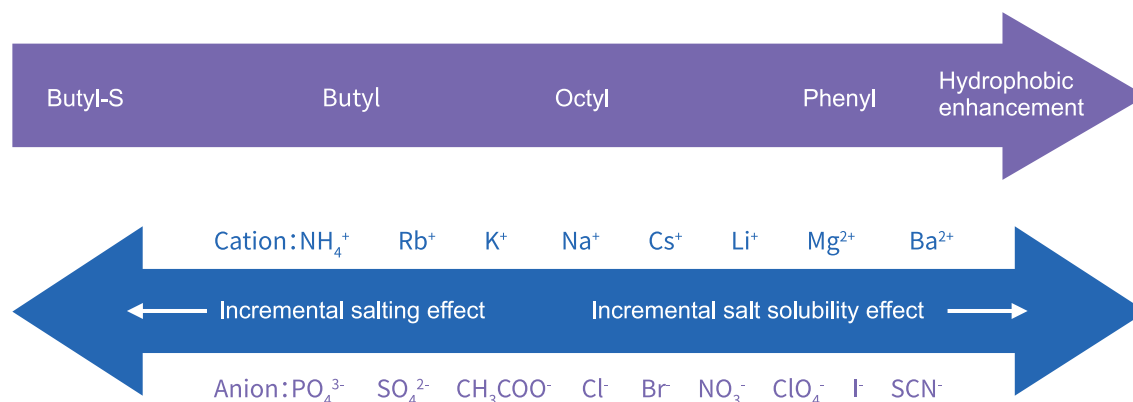


IP FT ELU

Hydrophobic Interaction Chromatography Resins



Hydrophobic interaction chromatography separates proteins based on differences in hydrophobicity, i.e., based on reversible interactions between proteins and hydrophobic groups on the surface of hydrophobic interaction resins. Hydrophobicity is enhanced at high ionic strengths and therefore binding in a high ionic strength environment is usually eluted by reducing the ionic strength. The unique adsorption separation mode makes hydrophobic interaction resins an ideal purification method after ammonium sulfate chromatography or after ion exchange high salt elution.



Product number	Product name	Spec	Ligand density $\mu\text{mol/mL}$	Particle size range μm	Maximum flow rate (cm/h)	Withstand pressure MPa	pH stability long-term [short-term]	Application characteristics
HS060302025M		25 mL						
HS060302100M		100 mL						
HS060302500M	Phenyl Focurose FF (HS)	500 mL						High hydrophobicity and high loading capacity, suitable for aromatic ligands biomolecules
HS060302001L		1 L	40	45-165	400	≤ 0.3	3-13 [2-14]	
HS060302005L		5 L						
HS060302020L		20 L						
HS060202025M			25 mL					
HS060202100M		100 mL						
HS060202500M	Phenyl Focurose HP	500 mL	25	25-45	150	≤ 0.3	3-13 [2-14]	Precise separation
HS060202001L		1 L						
HS060202005L		5 L						
HS060202020L		20 L						

Application Cases

Separating proteins based on hydrophobicity with Phenyl Focurose FF(HS) and Phenyl Focurose HP

Sample: 4 mg/mL of mixed protein

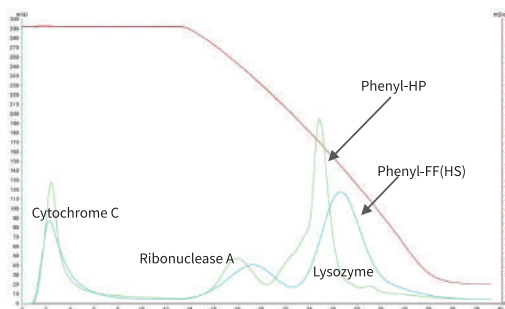
(Cytochrome C: Ribonuclease A:Lysozyme=1:2:1)

Column: HT01, 1.0 mL

Equilibrium Buffer: 0.1 M Na_2HPO_4 , 1.7 M $(\text{NH}_4)_2\text{SO}_4$, pH 7.0

Elution Buffer: 0.1 M Na_2HPO_4 , pH 7.0

Flow rate: 1 mL/min



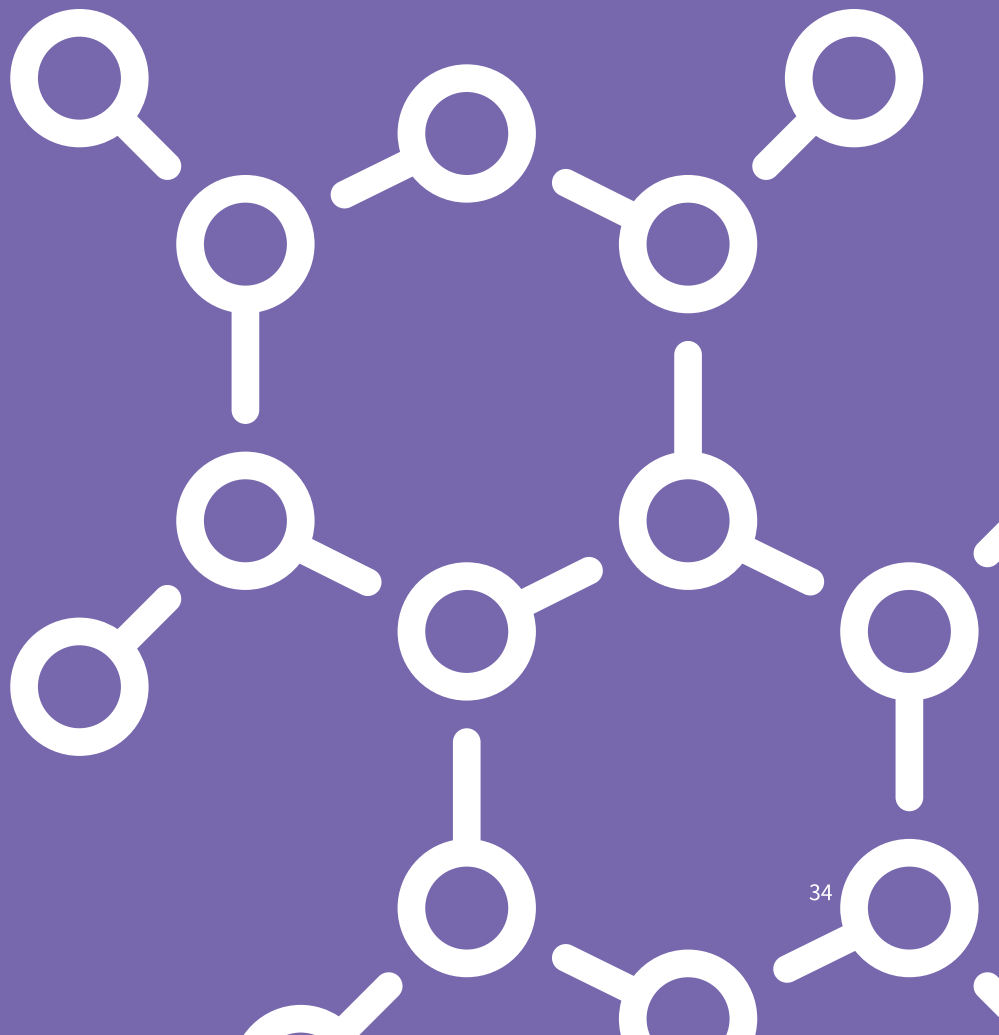
≡ Tips

- ★ The hydrophobic interaction strength varies with different ligands and ligand concentrations in the media.
- ★ Adjust the salt concentration in the buffer when performing hydrophobic chromatography for different proteins or using different media.
- ★ Temperature and pH significantly affect protein hydrophobicity. Maintain consistent pH and temperature during hydrophobic chromatography.

Pre-assembled column ordering information

Product name	Spec	Product number	Product name	Spec	Product number
Phenyl Focurose HP	1 mL	HS060202001E	Phenyl Focurose FF (HS)	1 mL	HS060302001E
	5 mL	HS060202005E		5 mL	HS060302005E

Mixed-mode Chromatography Resins



MMA ligand enables various interactions with target molecules, primarily via strong anion exchange, alongside hydrogen bonding and hydrophobic interactions. VDX MMA ultra, a high salt-tolerant multi-mode medium in the VDX series, offers unique selectivity. Unlike traditional ion exchange media, it efficiently binds target proteins under high-conductivity conditions, enhancing purification efficiency for complex samples. This makes it ideal for purifying monoclonal antibodies, recombinant proteins, and other biopharmaceuticals.



- ★ **High Salt Tolerance:** Enables efficient target binding at high salt concentrations, minimizing sample dilution requirements.
- ★ **High Recovery Rates:** Outperforms comparable products with its superior protein recovery efficiency.
- ★ **Unique Selectivity:** Combines hydrophobic and ion-exchange interactions for enhanced specificity in protein adsorption.

Product number	Product name	Spec	Ligand density μmol/mL	Particle size range μm	Maximum flow rate (cm/h)	Withstand pressure MPa	pH stability long-term [short-term]	Application characteristics
HF190826025M		25 mL						
HF190826100M		100 mL						
HF190826500M	VDX MMA ultra	500 mL	80-120	45-165	200-300	≤0.3	4-13 [2-14]	High-resolution For antibody aggregates separation
HF190826001L		1 L						
HF190826005L		5 L						
HF190826020L		20 L						

VDX Core A features a unique structure, high-rigidity agarose core coupled with an octylamine functional group, and enclosed in an inert shell. The size-exclusion limit is 500 kDa. It combines gel-filtration with multimodal ion-exchange and hydrophobic interactions. At high-conductivity conditions, molecules >500 kDa flow through the pores, while impurities <500 kDa are captured by the internal octylamine groups. This design effectively removes small proteins and impurities, making it ideal for flow-through purification.



- ★ **Higher Loading Capacity:** Unlike gel filtration, impurities are adsorbed within the internal core of VDX Core A, allowing for a larger sample loading volume and improved purification efficiency.
- ★ **High Recovery and Bioactivity Preservation:** The inert outer shell ensures no adsorption of the target molecule, resulting in high recovery rates and better retention of the biological activity of the target molecules.

Product number	Product name	Spec	Particle size range μm	Maximum flow rate (cm/h)	Withstand pressure MPa	pH stability long-term [short-term]	Application characteristics
HF270325025M		25 mL					
HF270325100M		100 mL					
HF270325500M		500 mL					
HF270325001L	VDX core A	1 L	45-165	200-300	≤ 0.3	3-13 [2-14]	Separation and purification of viruses, virus - like particles, and viral vectors in flow - through mode.
HF270325005L		5 L					
HF270325020L		20 L					

Application Cases

Separation of Antibody Monomers and Aggregates Using VDX MMA Ultra

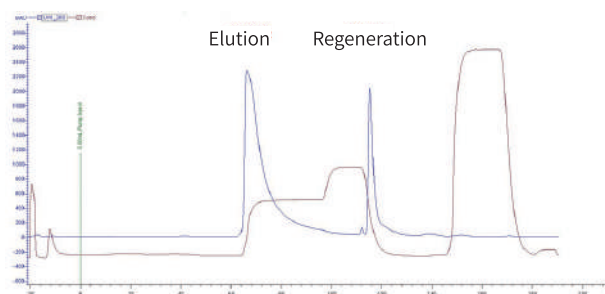
Buffer A: 20 mM PB, pH 7.0

Buffer B: 20 mM PB, 1 M NaCl, pH 7.0

Elution: 60% Buffer B for 3 CV

Regeneration: 1 M Acetic acid for 3 CV

Result: Purification using VDX MMA Ultra achieved a purity of 98.96% and a recovery rate of 72%.

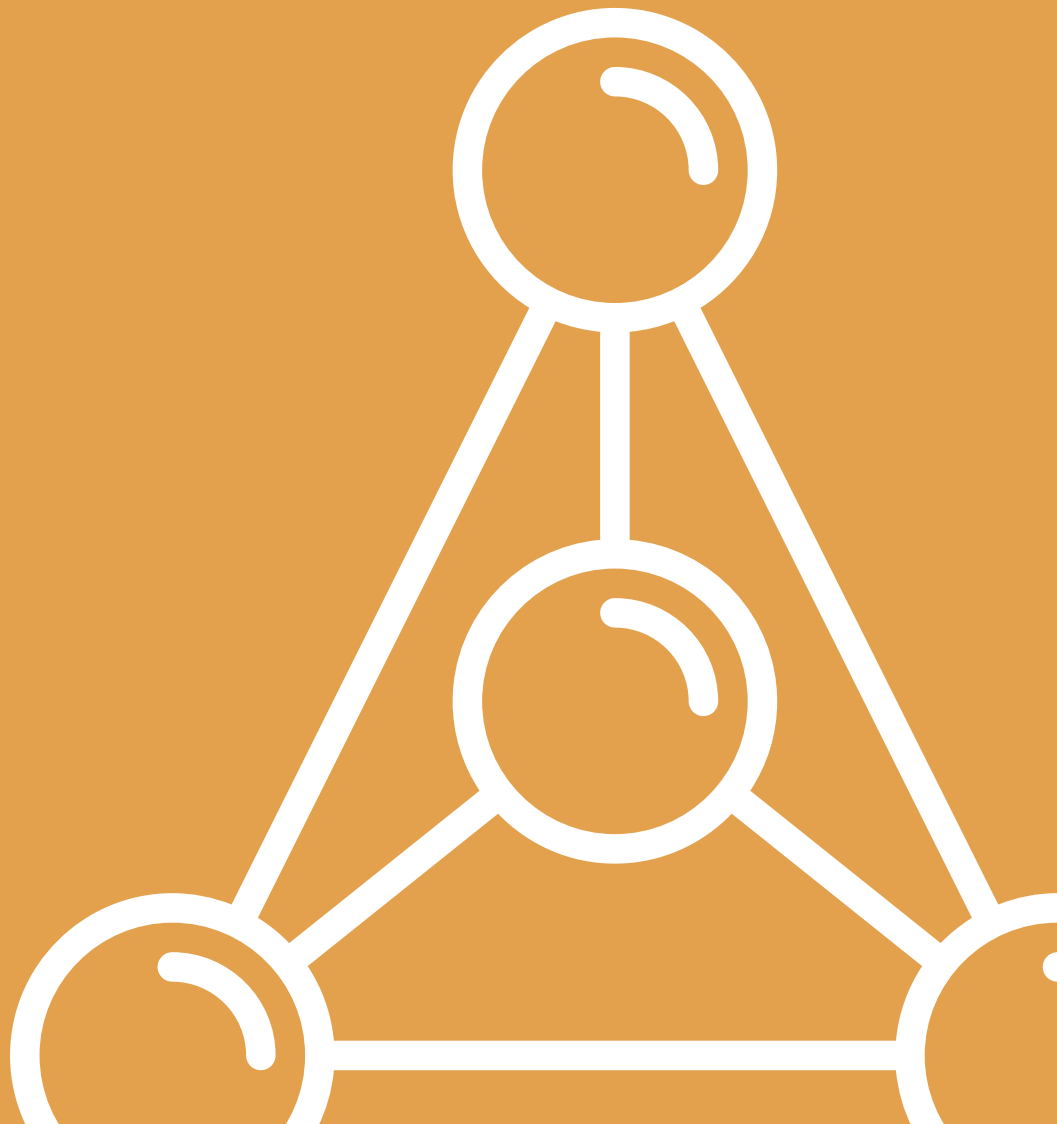


Pre-assembled column ordering information

Product name	Spec	Product number	Product name	Spec	Product number
VDX MMA ultra	1 mL	HF190826001E	VDX core A	1 mL	HF270325001E
	5 mL	HF190826005E		5 mL	HF270325005E

Chromatography

Empty Columns



Resin screening chromatography columns

Product number	Product name	Filling volume (mL)	Filling medium	Use	Remarks
HT01	1 mL Empty column	1		Syringe, pump, AKTA connection use	The material of column tube is polypropylene, and the material of screen plate is polyethylene
HT05	5 mL Empty column	5			
HT12	12 mL Empty column	1-10	All resins are available	Mainly used for manual purification by affinity resins	Empty column contains upper and lower sieve plate, upper and lower plugs, column tube, outer ring sleeve
HT30	30 mL Empty column	5-20			
HT60	60 mL Empty column	10-50			

Process development chromatography empty columns

Product number	Product name	Specification (Diameter/Length) mm/mm	Filling volume (mL)	Filling height mm	Application characteristics
HT16-20	HK 16/20	16/200	4-34	20-170	For laboratory protein purification and process development, suitable for filling all resin materials for size exclusion, ion exchange, affinity and hydrophobic interaction resins
HT16-40	HK 16/40	16/400	44-76	220-370	
HT16-70	HK 16/70	16/700	104-134	520-670	
HT16-100	HK 16/100	16/1000	164-194	820-970	
HT26-20	HK 26/20	26/200	10-90	20-170	
HT26-40	HK 26/40	26/400	117-193	220-370	
HT26-70	HK 26/70	26/700	276-355	520-670	
HT26-100	HK 26/100	26/1000	435-514	820-970	
HT50-30	HK 50/30	50/300	235-529	120-270	
HT50-70	HK 50/70	50/700	1020-1314	520-670	
HT50-100	HK 50/100	50/1000	1607-1901	820-970	
HP16	HK16 Column loader	-	-	-	HK series column loading
HP26	HK26 Column loader	-	-	-	
HP50	HK50 Column loader	-	-	-	
HS16	HK16 Adapter	-	-	-	
HS26	HK26 Adapter	-	-	-	
HS50	HK50 Adapter	-	-	-	

- Remarks
- The HK series chromatography empty columns can be operated at temperatures ranging from 4 to 60°C, and the columns can be used within the pH range of 1 to 14.
 - The HK series chromatography columns come with a quick-locking adapter to ensure uniform flow rate and minimal dead volume.
 - The jacket of the column maintains a stable operating temperature.
 - The accompanying column packing device is used to pack the column, ensuring even packing without air bubbles and guaranteeing good column efficiency.
 - The material of the empty column exhibits excellent chemical resistance and is suitable for a wide range of applications.



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