PROTEIN PURIFICATION
PRODUCT MANUAL

Innovative / Reproducible
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Welch Materials, Inc.

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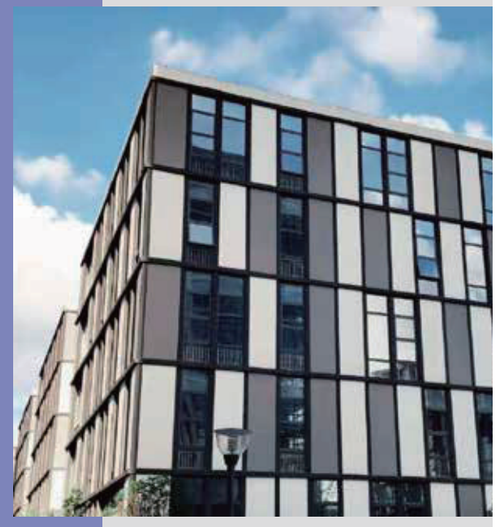
COMPANY PROFILE

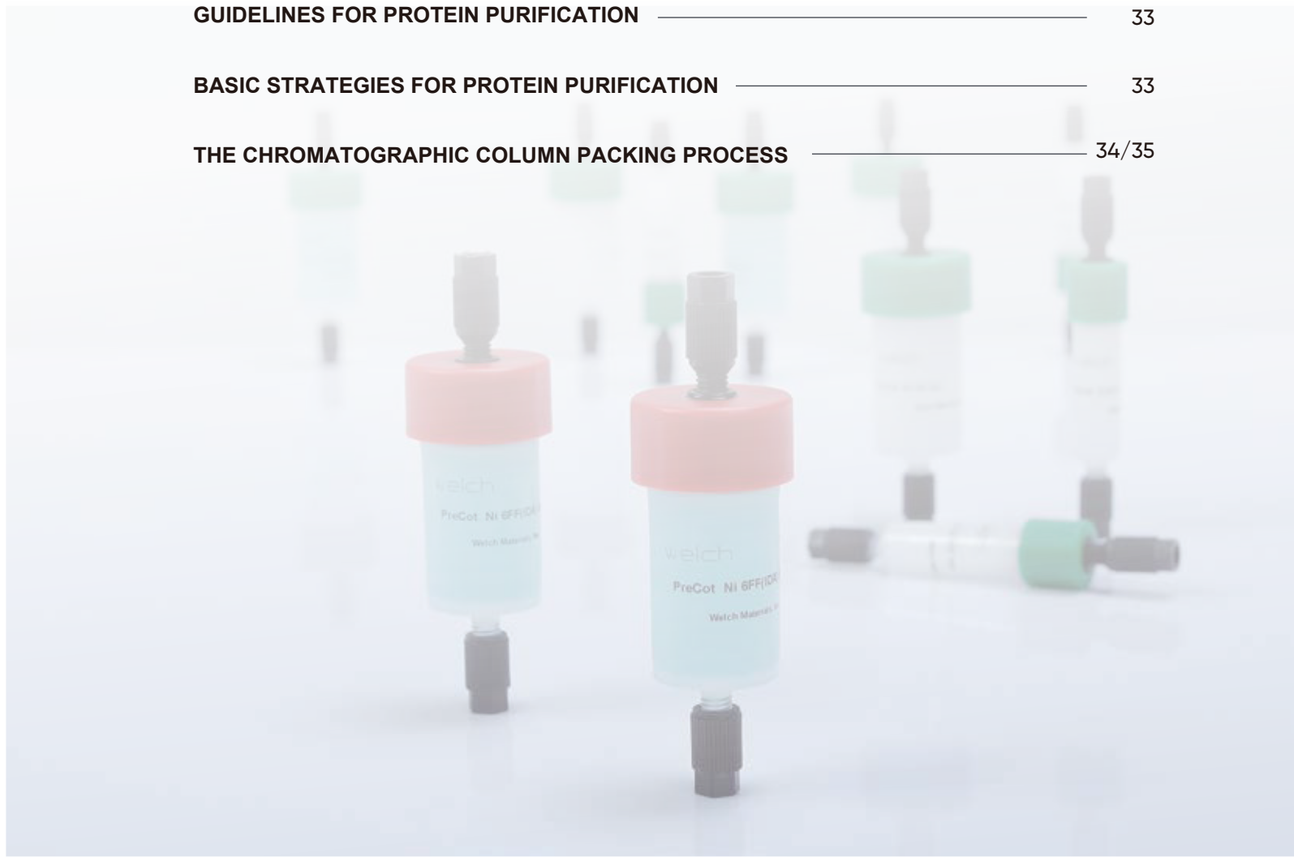
Welch Materials is a multinational company that develops and manufactures chromatography consumables including HPLC column, Solid Phase Extraction (SPE) cartridge, GC column,Prep column, Flash column and packing materials.

Welch Materials (Shanghai), Inc. was established in 2003 at Shanghai, China and Welch Materials (Zhejiang) was set in 2011 at Jinhua, Zhejiang, China. We also have set Welch Materials, Inc. at Hurst and Welch Materials India Pvt, Ltd. at Gurgaon. Our initial strength was our extensive experience on particle surface modification science and techniques. We are experts on bonding chemistry and innovative packing materials for chromatography applications. Through the optimal utilization of our resources, we have developed many innovative five series of HPLC columns: Ultisil®, Welchrom®, Xtimate®, Topsil®, and Boltimate®.



CONTENTS

CONTENTS



GEL FILTRATION CHROMATOGRAPHY MEDIUM

Introduction

Gel filtration chromatography is also called exclusion chromatography or molecular sieve method, which is mainly based on the size and shape of the protein, that is, the weight of the protein for separation and purification. The packing materials in the chromatography column are some inert porous network structure substances, mostly cross-linked glycans (such as dextran or agarose) so that protein mixtures could be separated according to different molecular sizes. Generally, large molecules flow out first and small molecules flow out later. Therefore, the key to selecting gel filtration medium is to choose a suitable separation range, and then mechanical properties and scalability of the medium can be taken into account.

Advantages

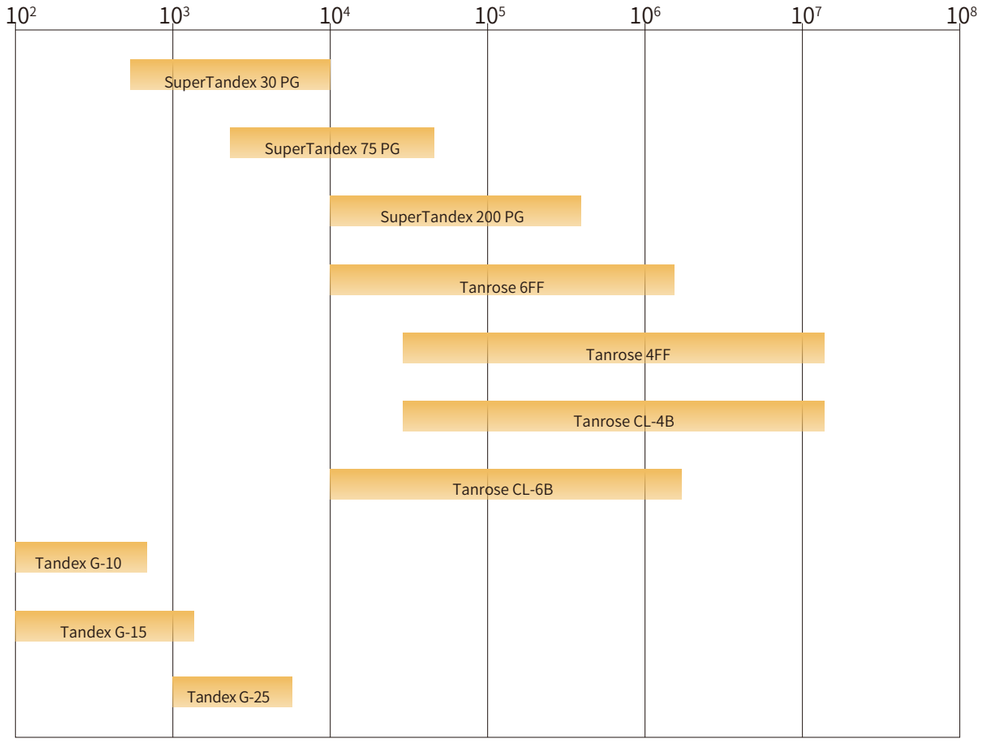
* No charge, weak adsorption, mild operating conditions
* Can work in a wide temperature range, no need of organic solvents
* Good separation effect on polymer materials.

Selection of Gel Filtration Chromatography Columns

For group separation, gel filtration chromatography columns with a length of 2-30 cm are generally used.

For gradient separation, columns with a length of around 100 cm and a diameter in the range of 1-5 cm are usually required. A diameter smaller than 1 cm produces wall effects, while a diameter larger than 5 cm results in significant dilution. The length-to-diameter ratio (L/D) is generally recommended to be between 7-10, but for substances with slow mobility, it should be between 30-40.

Gel filtration separating list (Da, protein globules)



Tandex G Series & LH-20 Multi-mode Gel Filtration Series

Tandex G series gel filtration medium use dextran as raw material and chloropropylene oxide as cross-linked agent. Dextran gel is a bead-like gel containing a large number of hydroxyl groups, so it swells easily in water and electrolyte solutions. G-type dextran gels have varying degrees of cross-linking, so their swelling degree and fractionation range also differ. The swelling degree of glucan gel is basically unaffected by the presence of salts and detergents.

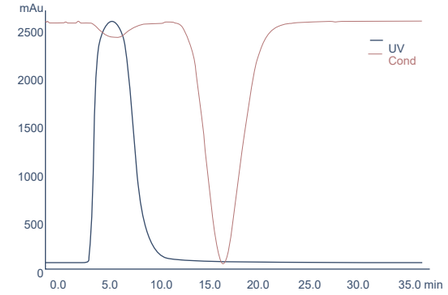
Tandex LH-20 is a product obtained by hydroxypropylation on the basis of Tandex G-25. It can be used in water, in polar organic solvents and in their mixture. It is suitable for the separation of effective ingredients of traditional Chinese medicine and the fine purification of antibiotics and chemical drugs. If reverse phase solvents are used for elution, dextran gel LH-20 also plays a role in reversed-phase distribution of compounds. Hence, the compounds with large polarity and weak retention are eluted first, whereas compounds with small polarity and strong retention are eluted later. If elute with normal phase solvents, gel filtration is the main separation mode.

Technical parameters

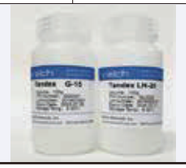
	pH stability (working)	CIP stability (short term)	Dry powder particle(μm)	Separation range dextran (Mr)	Separation range size globulin (Mr)	Maximum flow rate(cm/h)	Maximum pressure(bar)
Tandex G10	2-13	2-13	40-120	<700	<700	D	D
Tandex G15	2-13	2-13	40-120	<1500	<1500	D	D
Tandex G25 C	2-13	2-13	100-300	100-5000	1000-5000	D	D
Tandex G25 M	2-13	2-13	50-150	100-5000	1000-5000	150	D
Tandex G25 F	2-13	2-13	20-80	100-5000	1000-5000	60	D
Tandex G25 SF	2-13	2-13	20-50	100-5000	1000-5000	20	D
Tandex LH-20	2-13	2-13	30-120	-	<5000	700	D
Path note: D indicates that the characteristics of the ball follow Darcy's law							

Application

Column: PreCot 5ml G-25, two in series
Medium type: Tandex G-25 medium
Buffer: 0.2M $NaHCO_3$, 0.5M NaCl, pH = 8.3
Injection volume: 1.9ml
Elution peak volume: 3ml
Determination of eluted protein concentration: 4.9mg/ml
Recovery rate of changed buffer: 98%



Ordering information

Product	P/N	Specification	Product	P/N	Specification	Product	P/N	Specification
Tandex G10	00051-10001	25g	Tandex G15	00051-20001	25g	Tandex G25 C	00051-31001	25g
	00051-10002	100g		00051-20002	100g		00051-31002	100g
	00051-10003	500g		00051-20003	500g		00051-31003	500g
	00051-10004	1000g		00051-20004	1000g		00051-31004	1000g
Tandex G25 M	00051-32001	25g	Tandex G25 F	00051-33001	25g	Tandex G25 SF	00051-34001	25g
	00051-32002	100g		00051-33002	100g		00051-34002	100g
	00051-32003	500g		00051-33003	500g		00051-34003	500g
	00051-32004	1000g		00051-33004	1000g		00051-34004	1000g
Tandex LH-20	00051-00001	25g						
	00051-00002	100g						
	00051-00003	500g						
	00051-00004	1000g						

SuperTandex Prep Grade Series

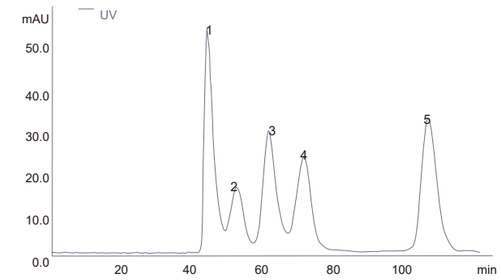
SuperTandex series gel filtration medium is based on highly cross-linked agarose and filled with dextran. It has both high selectivity of dextran and physical property of agarose so that SuperTandex Prep Grade can obtain high resolution even at high flow rate, making it a good choice for fine purification stage.

Technical parameters

Name	SuperTandex 30 pg	SuperTandex 70 pg	SuperTandex 200 pg
Property	Gel filtration media (highly cross-linked media)	Gel filtration media (highly cross-linked media)	Gel filtration media (highly cross-linked media)
Bead structure	Agarose and dextran	Agarose and dextran	Agarose and dextran
Mean particle size (dry)	34μm (24-44 μm)	34μm (24-44 μm)	34μm (24-45 μm)
Exclusion range (linear molecule, Mr)	400-7,000	500-30,000	1,000-100,000
Exclusion range (globulin, Mr)	<10,000	3,000-70,000	10,000-600,000
Flow Rate	30-50cm/h (TXK26/70, h-60cm)	30-50cm/h (TXK26/70, h-60cm)	30-50cm/h (TXK26/70, h-60cm)
Sterilization	In water at 121℃ for 20 min	In water at 121℃ for 20 min	In water at 121℃ for 20 min
pH stability	2-12 (long term), 2-14 (short term)	2-12 (long term), 2-14 (short term)	2-12 (long term), 2-14 (short term)
Chemical stability	2M NaOH, 70% EtOH, 30% IPA, 30% ACN,1% SDS, 6M guanidine hydrochlorid, 8M urea	2M NaOH, 70% EtOH, 30% IPA, 30% ACN,1% SDS, 6M guanidine hydrochlorid, 8M urea	2M NaOH, 70% EtOH, 30% IPA, 30% ACN,1% SDS, 6M guanidine hydrochlorid, 8M urea
Storage solvent and temperature	20% ethanol, 4-30℃	20% ethanol, 4-30℃	20% ethanol, 4-30℃

Application

Name: PreLoad 16/60 SuperTandex 75pg
Flow rate: 1ml/min
Sample volume: 1ml
Buffer: 0.15M NaCl, 20mM PB, pH7.0
Sample: 1. IgG (Mr160 000), 2.5mg/ml
2. Ovalbumin (Mr43 000), 2.5mg/ml
3. Chymotrypsinogen A (25 000), 1.5mg/ml
4. RNase A (Mr13 700), 5.0mg/ml
5. Vitamin B12 (Mr1 355), 0.3mg/ml



Ordering information

Product	P/N	Specification	Picture
SuperTandex 30 pg	00055-10001	25ml	
	00055-10002	150ml	
	00055-10003	750ml	
	00055-10004	1L	
SuperTandex 75 pg	00055-20001	25ml	
	00055-20002	150ml	
	00055-20003	750ml	
	00055-20004	1L	
SuperTandex 200 pg	00055-30001	25ml	
	00055-30002	150ml	
	00055-30003	750ml	
	00055-30004	1L	

Tanrose Fast Flow Series

Tanrose 4FF and Tanrose 6FF are gel filtration medium formed by emulsifying, rinsing and sieving from 4% and 6% agarose, respectively. The medium has good physical and chemical stability and can be sterilized by sodium hydroxide or high-pressure steam, suitable for separation and purification of polysaccharides, nucleic acids, viruses, superhelix DNA and macromolecular complexes.

Tanrose 4B and Tanrose 6B's structures are only fixed by hydrogen bond, so they are relatively soft and can't resist high temperature and high pressure.

Technical parameters

Name	Tanrose 4FF	Tanrose 6FF
Property	Gel filtration media (highly cross-linked medium)	Gel filtration media (highly cross-linked medium)
Bead structure	4% agarose	6% agarose
Mean particle size (dry)	90μm (45-165μm)	90μm (45-165μm)
Exclusion range (linear molecule, Mr)	30,000-5,000,000	10,000-1,000,000
Exclusion range(globulin, Mr)	60,000-20,000,000	10,000-4,000,000
Sterilization	In water at 121℃ for 20min	In water at 121℃ for 20min
pH stability	2-12 (long term), 2-14 (short term)	2-12 (long term), 2-14 (short term)
Flow rate	150-250cm/h (Column height 10cm, diameter 5cm, 0.1MPa, 25℃)	200-400cm/h (Column height 10cm, diameter 5cm, 0.1MPa, 25℃)
Chemical stability	2M NaOH, 70% EtOH, 30% IPA, 30% ACN, 1% SDS, 6M guanidine hydrochlorid, 8M urea	2M NaOH, 70% EtOH, 30% IPA, 30% ACN, 1% SDS, 6M guanidine hydrochlorid, 8M urea
Storage solvent and temperature	20% ethanol, 4-30℃	20% ethanol, 4-30℃

Ordering information

Product	P/N	Specification	Picture
Tanrose 4FF	00052-20001	25ml	
	00052-20002	100ml	
	00052-20003	500ml	
	00052-20004	1L	
Tanrose 6FF	00053-20001	25ml	
	00053-20002	100ml	
	00053-20003	500ml	
	00053-20004	1L	

Tanrose/Tanrose CL Series

Tanrose CL-4B and Tanrose CL-6B are further cross-linked by Tanrose 4B and Tanrose 6B with better physical and chemical stability and stronger rigidity. They offer the same selectivity with Tanrose 4B/6B, but have faster flow rate. The Tanrose CL series is resistant to organic solvents, thus it is suitable for the separation containing organic solvents.

Tanrose 4B / 6B and Tanrose CL-4B / CL-6B have larger pore size so that they are suitable for separation of large molecular weight.

Technical parameters

Name	Tanrose 4B	Tanrose 6B	Tanrose CL-4B	Tanrose CL-6B
Property	Gel filtration medium (soft media fixed by hydrogen bond)	Gel filtration medium (soft media fixed by hydrogen bond)	Gel filtration medium (soft media fixed by hydrogen bond)	Gel filtration medium (soft media fixed by hydrogen bond)
Bead structure	4% agarose	6% agarose	4% agarose	6% agarose
Mean particle size (dry)	90μm (45-165μm)	90μm (45-165μm)	90μm (45-165μm)	90μm (45-165μm)
Exclusion range (linear molecule, Mr)	30,000-5,000,000	10,000-1,000,000	30,000-5,000,000	10,000-1,000,000
Exclusion range (globulin, Mr)	60,000-20,000,000	10,000-4,000,000	60,000-20,000 000	10,000-4,000,000
Sterilization	In water at 121℃ for 20min	In water at 121℃ for 20min	In water at 121℃ for 20min	In water at 121℃ for 20min
pH stability	2-12 (long term), 2-14 (short term)	2-12 (long term), 2-14 (short term)	2-12 (long term), 2-14 (short term)	2-12 (long term), 2-14 (short term)
Flow rate	70-140cm/h (Column height 10cm, diameter 5cm, 0.1 MPa, 25℃)	100-200cm/h (Column height 10cm, diameter 5cm, 0.1 MPa, 25℃)	80-150cm/h (Column height 10cm, diameter 5cm, 0.1 MPa, 25℃)	100-200cm/h (Column height 10cm, diameter 5cm, 0.1 MPa, 25℃)
Chemical stability	2 M NaOH, 70% EtOH, 30% IPA, 30% ACN, 1% SDS, 8M urea, 6M guanidine hydrochlorid	2 M NaOH, 70% EtOH, 30% IPA, 30% ACN, 1% SDS, 8M urea, 6M guanidine hydrochlorid	2 M NaOH, 70% EtOH, 30% IPA, 30% ACN, 1% SDS, 8M urea, 6M guanidine hydrochlorid	2M NaOH, 70% EtOH, 30% IPA, 30% ACN, 1% SDS, 8M urea, 6M guanidine hydrochlorid
Storage solvent and temperature	20% ethanol, 4-30℃	20% ethanol, 4-30℃	20% ethanol, 4-30℃	20% ethanol, 4-30℃

Ordering information

Product	P/N	Specification	Picture
Tanrose 4B	00052-00001	25ml	
	00052-00002	100ml	
	00052-00003	500ml	
	00052-00004	1L	
Tanrose CL-4B	00052-10001	25ml	
	00052-10002	100ml	
	00052-10003	500ml	
	00052-10004	1L	
Tanrose 6B	00053-00001	25ml	
	00053-00002	100ml	
	00053-00003	500ml	
	00053-00004	1L	
Tanrose CL-6B	00053-10001	25ml	
	00053-10002	100ml	
	00053-10003	500ml	
	00053-10004	1L	

ION-EXCHANGE CHROMATOGRAPHY MEDIUM

Introduction

The separation of proteins by ion exchange chromatography is carried out according to the different charges of proteins under a certain pH condition. Due to most biological molecules have acidic or alkaline groups, anion exchange media can bind with the negatively charged proteins whilst cation exchange medium can bind with the positively charged proteins. Through adjusting the pH of buffer, proteins with poor binding capacity will be eluted first, proteins with strong binding capacity will be eluted later.

Advantages

* Good maneuverability
* Fast flow rate, high productivity
* Moderate bead, good resolution
* Good physical and chemical stability, suitable for the initial capture or moderate purification of various sizes of biomolecules
* High purification technique, can be used in combination with hydrophobic chromatography

Classification and features

Ion-exchange medium consist of bead structure and functional group. It can be divided into cation exchange and anion exchange according to the charged property of the functional group. It also can be divided into strong ion-exchange groups and weak ion-exchange groups in line with ionization conditions in solution. Commonly used ion-exchange groups include the following:

Group	SP	S	CM	Q	DEAE
Classification	Strong cation	Strong cation	Weak cation	Strong anion	Weak anion

Q/SP/DEAE/CM Tanrose FF Ion-exchange Medium

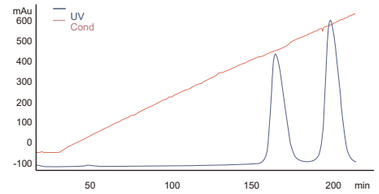
Medium which takes 6% cross-linked agarose as matrix with an average bead size of 90 μm has fast flow rate and wide range of application. It is the preferred choice for separation and purification of large-scale biomolecules.

Technical parameters

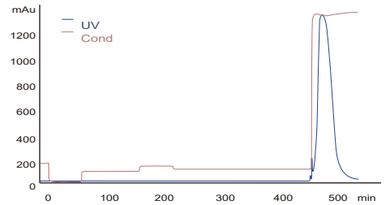
Name	Q Tanrose 6FF	SP Tanrose 6FF	DEAE Tanrose 6FF	CM Tanrose 6FF
Type	Strong anion exchange	Strong cation exchange	Weak anion exchange	Weak cation exchange
Bead structure	6% agarose	6% agarose	6% agarose	6% agarose
Mean particle size and range	90μm (45-165 μm)	90μm (45-165μm)	90μm (45-165μm)	90μm (45-165μm)
Ligand density	180-250μmol Cl^-/ml	180-250μmol H^+/ml	110-1600μmol Cl^-/ml	90-130μmol H^+/ml
Protein adsorption capacity	120mg HSA/mL	70mg ribonuclease A/mL	110mg HSA/mL	50mg ribonuclease A/mL
Functional group	Quaternary amino	Sulfopropyl	Diethylaminoethyl	Carboxymethyl
Flow rate	50-300cm/h	50-300cm/h	50-300cm/h	50-300cm/h
pH stability	2-12 (long term), 2-14 (short term)	4-13 (long term), 2-14 (short term)	2-9 (short term)	6-10 (short term)
Chemical stability	2M NaOH, 70% EtOH, 30% IPA, 30% ACN, 1% SDS, 6M guanidine hydrochloride, 8 M urea			
Storage solution and temperature	20% ethanol, 4-30℃	20% ethanol, 0.2 M sodium acetate, 4-30℃	20% ethanol, 4-30℃	20% ethanol, 4-30℃

Application

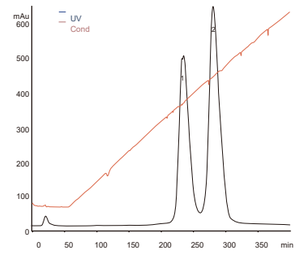
1) Q Tanrose 6FF, separation of β-lactoglobulin:
Sample: 10 mg / ml β-lactoglobulin
Binding buffer: 20 mM piperazine, pH = 6.5
Eluting buffer: 0.1 M NaCl, 20 mM piperazine, pH = 6.5
0.3 M NaCl, 20 mM piperazine, pH = 6.5
Elution method: gradient elution
Elution peaks:1. β-lactoglobulin B, 2. β-lactoglobulin A



2) SP Tanrose 6FF, purification of Lysozyme:
Column: PreLoad 50/20 SP 6FF
Binding buffer: 20mM NaAc, pH4.75
Eluting buffer: 0.15M NaCl, 20mM PB, pH 7.5



3) DEAE Tanrose 6FF, separation of β-lactoglobulin
Sample:10mg/ml β-lactoglobulin
Binding buffer: 20 mM piperazine, pH = 6.5
Eluting buffer:0.1 M NaCl, 20mM piperazine, pH = 6.5
0.3 M NaCl, 20mM piperazine, pH = 6.5
Elution method: gradient elution
Elution peaks: 1. β-lactoglobulin B, 2. β-lactoglobulin A



Ordering information

Product	P/N	Specification	Product	P/N	Specification	Picture
Q Tanrose 6FF	00062-23001	25ml	DEAE Tanrose 6FF	00062-13001	25ml	
	00062-23002	100ml		00062-13002	100ml	
	00062-23003	500ml		00062-13003	500ml	
	00062-23004	1L		00062-13004	1L	
SP Tanrose 6FF	00062-33001	25ml	CM Tanrose 6FF	00062-53001	25ml	
	00062-33002	100ml		00062-53002	100ml	
	00062-33003	500ml		00062-53003	500ml	
	00062-33004	1L		00062-53004	1L	

Q / SP Tanrose HP Ion-Exchange Medium

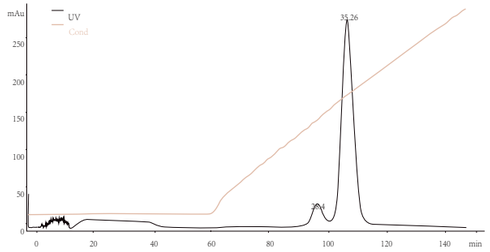
This series of medium adopt 6% agarose with an average bead size of 34μm, suitable for the moderate and fine purification stages of biomolecules.

Technical parameters

Name	Q Tanrose 6HP	SP Tanrose 6HP
Type	Strong anion exchange	Strong cation exchange
Bead structure	6% agarose	6% agarose
Mean particle size and range	34μm (25-45μm)	34μm (25-45μm)
Ligand density	140-200μmol Cl^-/ml	150-250μmol H^+/ml
Protein adsorption capacity	70mg BSA/mL	55mg ribonuclease A/mL
Functional group	Quaternary amino	Sulfopropyl
pH stability	60-120cm/h	60-120cm/h
Flow rate	2-12 (long term), 2-14 (short term)	4-13 (long term), 2-14 (short term)
Chemical stability	2M NaOH, 70% EtOH, 30% IPA, 30% ACN, 1% SDS, 6M guanidine hydrochloride, 8M urea	
Storage solvent and temperature	20% ethanol, 4-30℃	20% ethanol, 0.2 M sodium acetate, 4-30℃

Application

Q Tanrose 6HP, separation of biological samples provided by customer
Column: PreLoad 16/10 Q 6HP
Sample: biological sample provided by customer
Binding buffer: 50mM Tris. pH 8.0
Eluting buffer: 1M NaCl, 50mM Tris



Ordering information

Product	P/N	Specification	Picture
Q Tanrose 6HP	00062-22001	25ml	
	00062-22002	100ml	
	00062-22003	500ml	
	00062-22004	1L	
SP Tanrose 6HP	00062-32001	25ml	
	00062-32002	100ml	
	00062-32003	500ml	
	00062-32004	1L	

Q / SP Tanrose XL Ion-Exchange Medium

This resin uses 6% agarose as the base and dextran as the spacer, increasing functional group density and reducing steric hindrance between biomolecules to improve binding capacity. It can process samples at high flow rates and is typically used for the initial capture and enrichment of target proteins, with fast flow rates and high loading capacity allowing for rapid capture from solution.

Technical parameters

Name	Q Tanrose XL	SP Tanrose XL
Type	Strong anion exchange	Strong cation exchange
Bead structure	6% agarose with dextran chain	6% agarose with dextran chain
Mean particle size and range	90μm(45-165μm)	90μm(45-165μm)
Ligand density	180-260μmol Cl^-/ml	180-250μmol H^+/ml
Protein adsorption capacity	130mg BSA/mL	160mg lysozyme/mL
Functional group	Quaternary amino	Sulfopropyl
pH stability	300-500cm/h	300-500cm/h
Flow rate	2-12 (long term), 2-14 (short term)	4-13 (long term), 2-14 (short term)
Chemical stability	2M NaOH, 70% EtOH, 30% IPA, 30% ACN, 1% SDS, 6M guanidine hydrochloride, 8M urea	
Storage solvent and temperature	20% ethanol, 4-30℃	20% ethanol, 0.2 M sodium acetate, 4-30℃

Ordering information

Product	P/N	Specification	Picture
Q Tanrose XL	00062-21001	25ml	
	00062-21002	100ml	
	00062-21003	500ml	
	00062-21004	1L	
SP Tanrose XL	00062-31001	25ml	
	00062-31002	100ml	
	00062-31003	500ml	
	00062-31004	1L	

Q / SP Tanrose BB Ion-Exchange Medium

This series of medium adopt 6% agarose with its average bead size of 200μm, suitable for the capture and large-scale industrial production of strong viscosity samples.

Technical parameters

Name	Q Tanrose 6BB	SP Tanrose 6BB
Type	Strong anion exchange	Strong cation exchange
Bead structure	6% agarose	6% agarose
Mean particle size and range	200μm (100-300μm)	200μm (100-300μm)
Ligand density	180-250μmol Cl^-/ml	180-250μmol H^+/ml
Functional group	Quaternary amino	Sulfopropyl
Flow rate	200-600cm/h	200-600cm/h
pH stability	2-12 (long term), 2-14 (short term)	4-13 (long term), 2-14 (short term)
Chemical stability	2M NaOH, 70% EtOH, 30% IPA, 30% ACN, 1% SDS, 6M guanidine hydrochloride, 8M urea	
Storage solution and temperature	20% ethanol, 4-30℃	20% ethanol, 0.2M sodium acetate, 4-30℃

Ordering information

Product	P/N	Specification	Picture
Q Tanrose 6BB	00062-24001	25mL	
	00062-24002	100mL	
	00062-24003	500mL	
	00062-24004	1L	
SP Tanrose 6BB	00062-34001	25mL	
	00062-34002	100mL	
	00062-34003	500mL	
	00062-34004	1L	

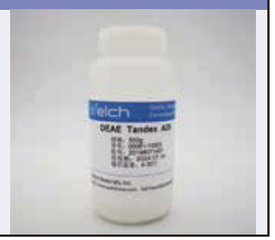
DEAE / CM Tandex Ion-Exchange Medium

CM Tandex C-25 is a weak cation exchange medium, which is formed by coupling carboxymethyl groups to Tandex G-25.
DEAE Tanrose A-25 is a weak anion exchange medium, which is formed by coupling diethyl aminoethyl to Tandex G-25.

Technical parameters

Name	CM Tandex C-25	DEAE Tandex A-25
Type	Weak cation exchange	Weak anion exchange
Bead structure	Dextran	
Ligand density	4-5mmol/g	3-4mmol/g
Bead size	40-120μm	40-120μm
pH stability	2-12 (long term), 2-13 (short term)	2-12 (long term), 2-14 (short term)
Chemical stability	Common aqueous solution: 30% isopropanol, 70% ethanol, 6 M guanidine hydrochloride	
Storage solvent and temperature	20% ethanol, 4-30℃	

Ordering information

Product	P/N	Specification	Picture
CM Tandex C-25	00061-50001	25g	
	00061-50002	100g	
	00061-50003	500g	
	00061-50004	1000g	
DEAE Tandex A25	00061-10001	25g	
	00061-10002	100g	
	00061-10003	500g	
	00061-10004	1000g	

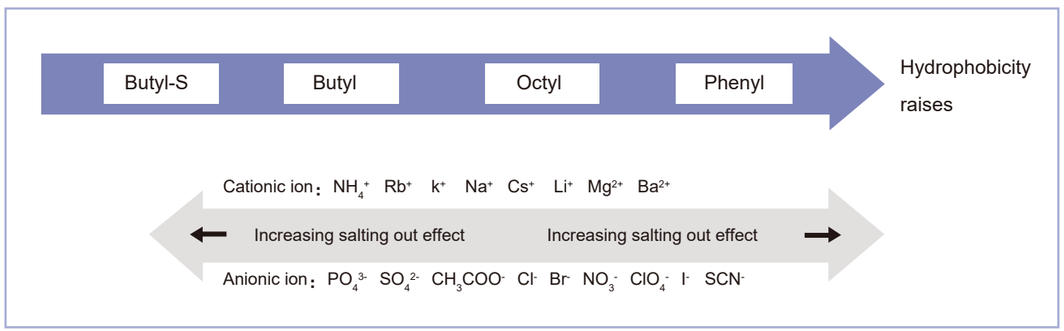
HYDROPHOBIC CHROMATOGRAPHY MEIDIUM

Hydrophobic chromatography is a method to separate biological macromolecules according to their surface hydrophobicity. Some hydrophobic groups are often exposed to the surface of biological macromolecules (such as proteins and peptides). Hydrophobic groups can bind with hydrophobic chromatography medium by hydrophobic interaction. Due to the different hydrophobicity of various molecules, the hydrophobic effect between molecules and media is different. Hydrophobic chromatography separates and purifies biological macromolecules according to this principle.
The key to choosing the hydrophobic chromatography medium is to select ligand with appropriate hydrophobic effect. Proteins with strong hydrophobicity need to match medium with weak hydrophobicity, and vice versa. In order to enhance the combination of protein and hydrophobic medium, a certain amount of salts (usually ammonium sulfate) need to be added in the buffer. If protein itself has strong hydrophobicity, there is no need to add too much salt. For the purpose of improving the resolution, the hydrophobic medium with smaller beads can be selected.

Factors influencing hydrophobic chromatography

*The hydrophobicity of a protein depends on the distribution of hydrophobic groups on its surface.

*Some ions in the buffer contribute stability to the conformation of proteins. For example, SO_4^{2-} can improve the stability of protein structure, reduce the solubility of proteins, have salting-out effect on proteins, and enhance the hydrophobic effect between proteins and ligands. Some ions contribute instability to the conformation of proteins, for instance, Cl^-, Ca^{2+} can increase the solubility of protein, and these ions usually have strong elution ability. The characteristics of salting out and salt solution can be used as the basis for choosing the equilibrium and elution conditions of hydrophobic media.



*In the process of hydrophobic chromatography, the higher the temperature, the stronger the hydrophobic effect, which helps improve separation degree of chromatography columns. However, for bioactive substances, high temperature will lead to denaturation and inactivation. Therefore, it is recommended to keep room temperature or low temperature during the process of hydrophobic chromatography.
*Neutral phosphate buffer is usually used as the mobile phase of hydrophobic chromatography. With the increase of pH, the interaction between proteins and hydrophobic groups will decrease, because charge of acidic groups of proteins and hydrophilicity of proteins increases as pH increases. However, method that changing the pH of the solution is rarely adopted to change hydrophobicity of proteins in hydrophobic chromatography.

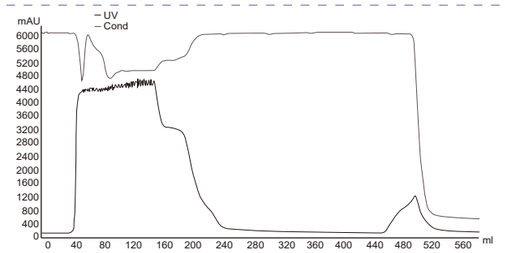
PHENYL/BUTYL/OCTYL/BUTYL-S TANROSE FF FAST FLOW HIC MEDIUM

Phenyl, Butyl, Octyl, and Butyl-Tanrose are different hydrophobic chromatography medium that remove various impurities, such as lipids, lipoproteins, and pigments, under different purification conditions. Phenyl Tanrose has the strongest hydrophobicity, while Butyl-Tanrose has the weakest. Butyl-Tanrose plays a crucial role in purifying hepatitis B vaccine during yeast recombinant expression.

Technical parameters

Name	Phenyl Tanrose 6FF (Low Sub)	Phenyl Tanrose 6FF (High Sub)	Butyl-S Tanrose 6FF	Octyl Tanrose 4FF	Butyl Tanrose 4FF
Bead structure	6% highly cross-linked agarose			4% highly cross-linked agarose	
Mean particle size and range	90μm (45-165μm)	90μm (45-165μm)	90μm (45-165μm)	90μm (45-165μm)	90μm (45-165μm)
Ligand density	20μmol/ml	40μmol/ml	10μmol/ml	5μmol/ml	40μmol/ml
Protein adsorption capacity	24mg HSA/mL	36mg HSA/mL	/	7mg HSA/mL	26mg HSA/mL
Functional group	Phenyl	Phenyl	Butyl-S	Octyl	Butyl
Flow rate	250-400cm/h			≥150cm/h	
Operating pressure	0.3MPa				
pH stability	3-12 (long term), 2-14 (short term)				
Chemical stability	1 M NaOH, 70% EtOH, 30% IPA, 30% ACN, 1% SDS, 6 M guanidine hydrochloride, 8 M urea				
Storage solvent and temperature	20% ethanol, 4-30℃				

Application



Butyl-S Tanrose 6FF Purified yeast expressed recombinant hepatitis B vaccine

Ordering information

Product	P/N	Specification	Product	P/N	Specification
Phenyl Tanrose 6FF(LS)	00071-41001	25mL	Phenyl Tanrose 6FF(HS)	00071-42001	25mL
	00071-41002	100mL		00071-42002	100mL
	00071-41003	500mL		00071-42003	500mL
	00071-41004	1L		00071-42004	1L
Butyl-S Tanrose 6FF	00071-14001	25mL	Butyl Tanrose 4FF	00071-24001	25mL
	00071-14002	100mL		00071-24002	100mL
	00071-14003	500mL		00071-24003	500mL
	00071-14004	1L		00071-24004	1L
Octyl Tanrose 4FF	00071-34001	25mL			
	00071-34002	100mL			
	00071-34003	500mL			
	00071-34004	1L			

PHENYL/OCTYL/BUTYL TANROSE HP HIGH PERFORMANCE HYDROPHOBIC CHROMATOGRAPHY MEDIUM

Hydrophobic interaction chromatography (HIC) Tanrose HP series medium retain the hydrophilicity and pore structure of natural polysaccharides, having good compatibility with biological macromolecules, especially suitable for the separation and purification of proteins, enzymes, nucleic acids, etc.

Technical parameters

Name	Phenyl Tanrose 6HP	Octyl Tanrose 6HP	Butyl Tanrose 6HP
Bead structure	6% highly cross-linked agarose		
Mean particle size and range	34μm (25-45μm)		
Ligand density	25μmol/ml	50μmol/ml	50μmol/ml
Functional group	Phenyl	Octyl	Butyl
Max. flow rate	200cm/h		
Max. operating pressure	0.3MPa		
pH stability	3-12 (long term), 2-14 (short term)		
Chemical stability	1 M NaOH, 70% EtOH, 30% IPA, 30% ACN, 1% SDS, 6 M guanidine hydrochloride, 8 M urea		
Storage solvent and temperature	20% ethanol, 4-30℃		

Application

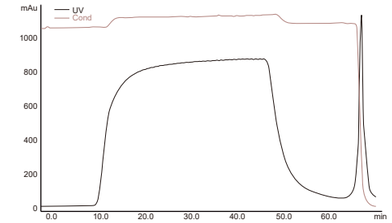
Column: PreLoad 50/20 Phenyl 6HP

Medium type: Phenyl Tanrose High Performance

Sample: 200 ml of sample made after rudimentary purification of recombinant protein

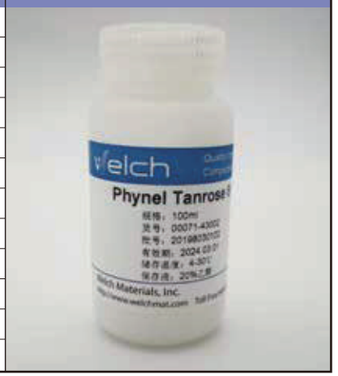
Equilibrium buffer: 20 mM PB, 1 M NaCl, pH 7.0

Eluting buffer: 20 mM PB, pH 7.0



Phenyl Tanrose High Performance for purification of recombinant protein with yeast expression(Remove small molecules in flow through mode)

Ordering information

Product	P/N	Specification	Picture
Phenyl Tanrose 6HP	00071-43001	25mL	
	00071-43002	100mL	
	00071-43003	500mL	
	00071-43004	1L	
Octyl Tanrose 6HP	00071-33001	25mL	
	00071-33002	100mL	
	00071-33003	500mL	
	00071-33004	1L	
Butyl Tanrose 6HP	00071-23001	25mL	
	00071-23002	100mL	
	00071-23003	500mL	
	00071-23004	1L	

AFFINITY CHROMATOGRAPHY MEDIUM

Introduction

Affinity chromatography is a method to separate biomolecules based on the characteristics of specific recognition and reversible binding between biomolecules and some corresponding specific molecules. Affinity chromatography is an very effective method to separate proteins, which usually takes one step to obtain proteins of high purity. Proteins are separated according to their specificity to specific ligands rather than their covalent binding capacity.

Features

*Efficient, fast and convenient

*Strong selectivity

*Usually take one step to obtain proteins of high purity

*High recovery rate

Composition of Affinity Medium

Structure: agarose, such as Tanrose FF, Solid Mustang, etc.

Ligand: a substance that interacts specifically with a target molecule.

Protein G 4FF Antibody Affinity Medium

Protein G Tanrose 4FF is an affinity medium made by cyanogen activation of Protein G immobilized on the Tanrose 4FF matrix. It is used as an affinity chromatography medium for the separation and purification of IgG, often used to isolate and purify antibodies or antibody fragments from cell culture. Recombinant protein G contains high affinity binding sites, reducing non-specific adsorption. Protein G has different IgG binding characteristics compared to Protein A. Compared to Protein A, Protein G has stronger binding affinity for multi-clonal antibodies from cows, sheep, horses, etc. It can also bind to rat IgG, human IgG3, and mouse IgG1, which do not bind well to Protein A.

Technical parameters

Name	Protein G Tanrose 4FF
Bead structure	4% highly cross-linked agarose
Bead size range	45-165μm
Mean particle size	90μm
Binding capacity	~20mg (human IgG)/ml (medium)
pH stability	3-9 (long term), 2-10 (short term)
Chemical stability	40°C, 1 week: 1M sodium hydroxide, 6M guanidine hydrochloride, 70% ethanol.
Max. flow rate	300cm/h
Operating pressure	≤0.3MPa
Storage solvent	20% ethanol
Storage temperature	4-8℃

Application

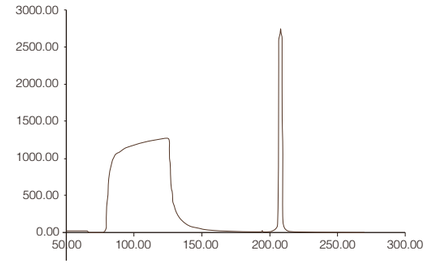
Chromatography column: PreCot Protein G 4FF 1mL

Medium type: Protein G Tanrose 4FF

Equilibration buffer solution: 10mM PBS, pH 7.2

Elution buffer solution: 0.1M glycine, pH 3.0

Sample: Human plasma.



Ordering information

Product	P/N	Specification	Picture
Protein G Tanrose 4FF	00081-12001	5 mL	
	00081-12002	25 mL	
	00081-12003	200 mL	
	00081-12004	1 L	

Ni Tanrose 6FF(NTA/IDA)/Ni Tanrose 6HP(NTA)/Ni Tanrose 4FF(NTA/IDA) Metal Chelating Affinity Medium

Ni Tanrose 6FF(NTA) / Ni Tanrose 6HP(NTA)/ Ni Tanrose 4FF(NTA) An affinity medium is a type of affinity chromatography medium that binds metal ions, such as $Ni2^{+}$, to a gel made of agarose with nitrilotriacetic acid (NTA) as the ligand. This creates a metal chelating affinity layer that is more stable than the one formed by iminodiacetic acid (IDA) binding to Ni ions. Metal chelating affinity media are widely used in the separation and purification of proteins and peptides in downstream processes of biopharmaceuticals and biotechnology due to their high adsorption capacity, good selectivity, ease of regeneration, and low cost. They are particularly efficient in purifying histidine-tagged proteins.

Ni Tanrose 6FF(IDA)/ Ni Tanrose 4FF(IDA) Affinity medium is a type of affinity chromatography medium that binds metal ions, such as $Ni2^{+}$, to a gel made of agarose with iminodiacetic acid (IDA) as the ligand. It is a well-established Ni affinity resin, but due to the relatively low number of chelating bonds between Ni ions and the ligand, it is vulnerable to attack by small molecules, making it easy for Ni to detach. However, it has a relatively high loading capacity.

Technical parameters

Name	Ni Tanrose 6HP(NTA)	Ni Tanrose 6FF(NTA)	Ni Tanrose 6FF(IDA)
Matrix	Highly cross-linked 6% agarose		
Particle size range	25-45μm		45-165μm
Average particle size	34μm		90μm
Binding capacity	40mg(His tag protein)/mL(medium)		45mg(His tag protein)/mL(medium)
pH stability*	3-12 (long term), 2-14 (short term)		3-12 (long term), 2-14 (short term)
Chemical stability*	0.01M hydrochloric acid, 0.01M Hydrogen Oxygen sodium chloride (1 week) 1M sodium hydroxide, 70% Ethanol (12 hours) 2%SDS(1h) 30% Isopropanol (0.5 hours)		All common aqueous solutions and buffers avoid the use of chelating agents (such as EDTAEGTA) and reducing agents (such as DTT and DTE)
Flow rate	300cm/h		600cm/h
Operating pressure	≤0.3MPa		
Storage solution	20% ethanol		
Storage temperature	4-30℃		

Name	Ni Tanrose 4FF(NTA)	Ni Tanrose 4FF(IDA)
Matrix	Highly cross-linked 6% agarose	
Particle size range	45-165μm	
Average particle size	90μm	
Binding capacity	40mg(His tag protein)/mL(medium)	40mg(His tag protein)/mL(medium)
pH stability*	3-12(long term) 2-14(short term)	3-12(long term) 2-14(short term)
Chemical stability*	0.01M hydrochloric acid, 0.01M sodium hydroxide (one week) 1M sodium hydroxide, 70% ethanol (12 hours) 2% SDS (1 hour) 30% isopropanol (0.5 hours)	All common aqueous solutions and buffers avoid the use of chelating agents (e.g. EDTA, EGTA) and reducing agents (e.g. DTT and DTE)
Flow rate	150-250cm/h	
Operating pressure	≤0.1MPa	
Storage solution	20% ethanol	
Storage temperature	4-30℃	

Co Tanrose 6FF (NTA) Metal-Chelated Affinity Medium

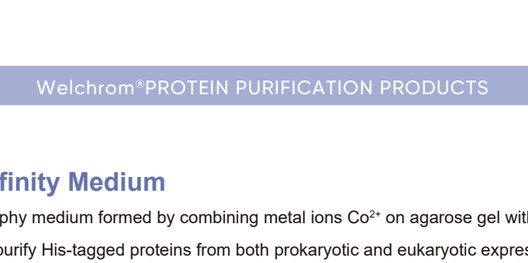
Co Tanrose 6FF (NTA) affinity medium is an affinity chromatography medium formed by combining metal ions Co^{2+} on agarose gel with nitrilotriacetic acid (NTA) as a ligand. CoTanrose 6FF(NTA) can purify His-tagged proteins from both prokaryotic and eukaryotic expression systems in a single step. Co Tanrose 6FF (NTA) has higher selectivity for His-tagged proteins than Ni Tanrose 6FF (NTA).

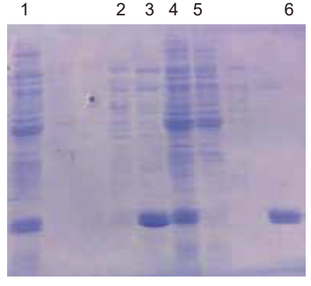
Technical parameters

Name	Co Tanrose 6FF(NTA)
Matrix	Highly cross-linked 6% agarose
Particle size range	45-165μm
Average particle size	90μm
Binding capacity	20mg(His tag protein)/mL(medium)
Operating pressure	≤0.3MPa
Storage solution	20% ethanol
Storage temperature	4-30℃

Application

Chromatographic column: PreCot Ni 6FF (NTA) 1mL
Binding buffer A: 50mM Tris-HCl, 0.5M NaCl, 20mM imidazole, pH8.0
Elution buffer B: 50mM Tris-HCl, 0.5M NaCl, 0.5M imidazole, pH8.0
Sample: Escherichia coli expressing recombinant protein with histidine (His) tag
Flow rate: Equilibrium, elution-1.0mL/min
Sample Loading-0.5mL/min



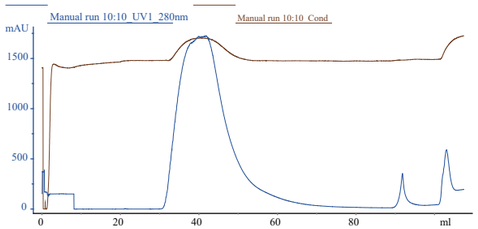


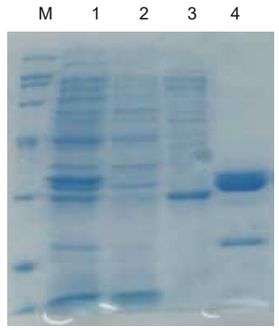
1: stock solution
2: flow through
3: elution (100%B)
4: stock solution
5: flow through
6: elution (100%B)

Remarks: 1-3 (the sample and the balance solution do not contain mime); 4-6 (the sample and the balance solution contain 20mM mime)

Applications

Chromatographic column: PreCot Ni 6FF(IDA)1mL
Binding buffer sol A: 50mMTris-HCl, 0.5M NaC, pH7.0
Elution buffer B: 50mM Trs-HC 0.5M NaCl 0.5M imidazole pH7.0
Sample: Escherichia coli expresses a recombinant protein with histidine (His) tag
Elution program: Equilibrate with equilibrium solvent A
Wash with 4% eluent B
Eluet with 100% eluent B
Flow rate:Equilibrium,elution-1.0mL/min
Sample Loading-0.5mL/min





1: stock solution
2: flow through
3: washing
4: elution

Ordering information

Product	P/N	Specification	Product	P/N	Specification	Picture
Ni Tanrose 6FF (NTA)	00082-03001	25mL	Ni Tanrose 6HP (NTA)	00082-09001	25mL	
	00082-03002	100mL		00082-09002	100mL	
	00082-03003	500mL		00082-09003	500mL	
	00082-03004	1L		00082-09004	1L	
Ni Tanrose 6FF (IDA)	00082-06001	25mL	Co Tanrose 6FF (NTA)	00082-07001	25mL	
	00082-06002	100mL		00082-07002	100mL	
	00082-06003	500mL		00082-07003	500mL	
	00082-06004	1L		00082-07004	1L	
Ni Tanrose 4FF (NTA)	00081-04001	25mL	Ni Tanrose 4FF (IDA)	00081-05001	25mL	
	00081-04002	100mL		00081-05002	100mL	
	00081-04003	500mL		00081-05003	500mL	
	00081-04004	1L		00081-05004	1L	

IMAC Tanrose 6FF/Chelating Tanrose 6FF Metal-Chelated Affinity Medium

IMAC Tanrose 6FF/Chelating Tanrose 6FF are composed by that 6% highly cross-linked agarose beads modified with a novel chelating ligand immobilized to the base matrix. They are supplied free of metal ions, equivalent to Ni Tanrose 6FF (NTA) and Ni Tanrose 6FF (IDA) which are not chelated to Ni ions. They can be widely used in the separation and purification of proteins and peptides. The principle is to use the side chains of histidine, cysteine, and tryptophan of proteins to interact with various transition metal ions such as Cu^{2+}, Zn^{2+}, Ni^{2+}, Co^{2+}, and Fe^{2+} to achieve the purpose of separation and purification.

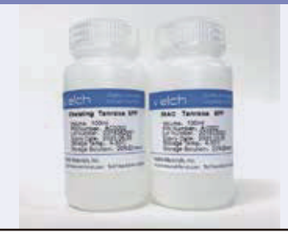
IMAC Tanrose 6FF is formed by coupling aminotriacetic acid (NTA) to agarose. It can chelate four valences of metal ions, which makes chelated metal ions more stable and withstand higher reducing agents with good physical and chemical stability. It has characteristics of great specificity and fast flow rate.

Chelating Tanrose 6FF is formed by coupling iminodiacetic acid (IDA) to agarose. The ligands of Chelating Tanrose 6FF media can provide 3 coordination sites to chelate with metal ions, and simultaneously provide three ionic bond sites with high affinity to purify the target protein. IMAC Tanrose 6FF medium can provide four coordination sites to chelate with metal ions and two ionic bond binding sites to purify the target protein, which means that Chelating Tanrose 6FF medium has stronger affinity than IMAC Tanrose 6FF under the same ligand density and metal ion conditions. All samples that cannot be adsorbed in IMAC Tanrose 6FF medium can choose to bind with Chelating Tanrose 6FF.

Technical parameters

Name	IMAC Tanrose 6FF	Chelating Tanrose 6FF
Bead structure	6% highly cross-linked agarose	
Bead size range	45-165μm	
Mean particle size	90μm	
Binding capacity	25μmol Cu^{2+} /ml (medium) 15μmol Ni^{2+} /Zn^{2+} ml (medium)	34μmol Cu^{2+} /ml (medium)
pH stability	3-12 (long term), 2-14 (short term)	3-13 (long term), 2-14 (short term)
Chemical stability	0.01M HCl, 0.1M NaOH, 8M urea, 6M guanidine hydrochloride (one week) 1M sodium hydroxide, 70% acetic acid (12 hours)	Stable in common aqueous solutions, 1M NaOH, 8M urea, 6M guanidine hydrochloride
Flow rate	600cm/h	
Operating pressure	≤0.3MPa	
Avoid using	EDTA, EGTA, citrate, histidine	EDTA, EGTA, citrate, histidine, β-mercaptoethanol, DTT
Storage solvent and temperature	20% ethanol, 4-30℃	20% ethanol, 4-30℃

Ordering information

Product	P/N	Specification	Picture
IMAC Tanrose 6FF	00082-01001	25ml	
	00082-01002	100ml	
	00082-01003	500ml	
	00082-01004	1L	
Chelating Tanrose 6FF	00082-02001	25ml	
	00082-02002	100ml	
	00082-02003	500ml	
	00082-02004	1L	

Benzamidine Tanrose 4FF Benzamidine Affinity Medium

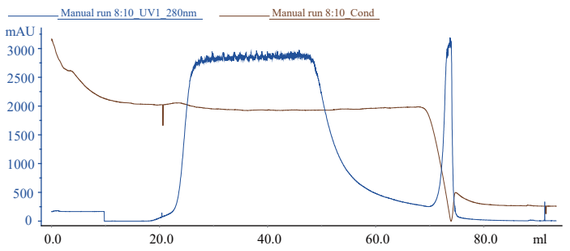
Benzamidine Tanrose 4FF is an affinity chromatography medium formed by coupling p-aminobenzidine to agarose gel Tanrose 4FF. It is commonly used for the separation and purification of serine protease or the removal of serine protease from biological samples. The benzamidine substance is a broad-spectrum inhibitor of serine protease (such as trypsin, thrombin, urokinase, kallikrein, prokinin, etc.), so this medium can purify such substances.

Technical parameters

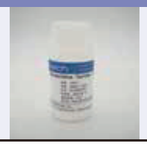
Name	Benzamidine Tanrose 4FF
Bead structure	4% highly cross-linked agarose
Bead size range	45-165μm
Mean particle size	90μm
Ligand	P-aminophenamidine
Binding capacity	35mg (trypsin)/ml (medium)
pH stability	1-9 (short term), 2-8 (long term)
Chemical stability	All commonly used buffer solutions, 8M urea, 6M guanidine hydrochloride
Flow rate	300cm/h
Operating pressure	≤0.3MPa
Storage solvent	0.05M acetate buffer, 20% ethanol, pH 4.0
Storage temperature	4-8℃

Application

Column: PreCot 5ml Benzamidine 4FF
Sample: trypsin mixture
Binding buffer: 50mM PB, 50mM NaCl pH7.0
Eluting buffer: 0.1M Gly pH2.7
(200μl of 1M Tris-HCl, pH9.0 should be added to the eluent collection tube in advance)
Flow rate: 0.7ml/min



Ordering information

Product	P/N	Specification	Picture
Benzamidine Tanrose 4FF	00081-11001	25 mL	
	00081-11002	100 mL	
	00081-11003	500 mL	
	00081-11004	1 L	

GST Tanrose 4FF Glutathione Affinity Medium

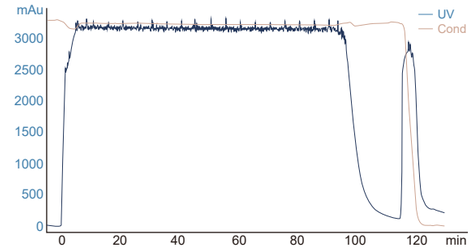
GST Tanrose 4FF is formed by coupling glutathione to agarose. It is specifically used for the specific purification of Glutathione S-Transferase (GST) and GST fusion proteins. The GST tag is a commonly used tag in modern genetic engineering to express fusion proteins, which is conducive to the soluble expression and maintenance of activity of proteins. The purification principle is to fuse and express the glutathione transferase with the target protein. Through the interaction of glutathione transferase and glutathione ligand, the protein fused with GST tag can be purified.

Technical parameters

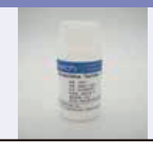
Name	GST Tanrose 4FF
Bead structure	4% highly cross-linked agrose
Bead size range	45-165μm
Mean particle size	90μm
Binding capacity	10mg (GST tag protein)/ml (medium)
pH stability	3-12
Chemical stability	All commonly used aqueous solutions, such as 1M acetate, pH4.0, 0.1M NaOH, 70% ethanol, 8 Murea, 6M guanidine hydrochloride (room temperature, 1 hour)
Flow rate	≤450cm/h
Operating pressure	≤0.3MPa
Storage solvent	20% ethanol
Storage temperature	4-30 C

Application

Column: PreCot 5ml GST 4FF
Sample: recombinant expression of GST tag protein
Binding buffer: 20mM PB, 150mM NaCl pH7.4
Eluting buffer: 15mM reduced glutathione, 50mM Tris pH8.0



Ordering information

Product	P/N	Specification	Picture
GST Tanrose 4FF	00081-10001	25 mL	
	00081-10001	100 mL	
	00081-10003	500 mL	
	00081-10004	1 L	

Heparin Tanrose 6FF / Heparin Tanrose 6HP Affinity Medium

Heparin Tanrose 6FF medium is composed of 6% highly cross-linked agarose which takes heparin as ligand. It has characteristics of physical and chemical stability, hard to loss, long life and wide range of application.

Heparin is a kind of sulfated acidic polysaccharide, which can bind with anticoagulation factor III, thrombin, thrombin-like, human coagulation factors IX, XI and VIII. In addition, Heparin can also bind with human interleukin and human prostate growth factor, recombinant human vascular endothelial growth factor, cartilage growth factor, basic fibroblast growth factor, recombinant human acidic fibroblast growth factor, recombinant hepatocyte growth factor, recombinant mouse heparin cofactor II, recombinant human platelet fourth factor, recombinant human endostatin, recombinant human keratinocyte growth factor and other biological macromolecules which are expressed by E. coli, so heparin agarose gel can be used for the purification of such substances.

Technical parameters

Name	Heparin Tanrose 6FF	Heparin Tanrose 6HP
Matrix	Highly cross-linked 6% agarose	Highly cross-linked 6% agarose
Particle size range	45-165um, 90μm	25-45um, 34μm
Functional group	Heparin Sodium	Heparin Sodium
Ligand density	4mg/mL medium	10mg/mL medium
pH stability	3-12	3-12
Chemical stability	All commonly used aqueous solutions, such as: 50mM acetate (pH4.0) 0.1M NaOH (20°C, one week), 70% ethanol 8M urea, 6M quatrine hydrochloride.	All common aqueous solutions such as: 50mM acetate (pH4.0) 0.1M NaOH (0°C, one week), 70%% ethanol, 8M urea, 6M melon hydrochloride
Maximum flow rate	600cm/h	300cm/h
Operating pressure	≤0.3MPa	≤0.3MPa
Storage solution	0.05M sodium acetate + 20% ethanol	0.05M sodium acetate + 20% ethanol
Storage temperature	4-30℃	4-30℃

Ordering information

Product	P/N	Specification	Picture
Heparin Tanrose 6FF	00082-18001	25mL	
	00082-18002	100mL	
	00082-18003	500ml	
	00082-18004	1L	
Heparin Tanrose 6HP	00082-17001	25mL	
	00082-17002	100mL	
	00082-17003	500ml	
	00082-17004	1L	

Endotoxin rem Tanrose 4FF Affinity Medium

Endotoxin rem Tanrose 4FF affinity medium takes self-made agarose gel as the matrix and polymyxin B as the ligand. It can be used to remove the endotoxin in biogenic protein products such as peptide, antibody, polysaccharide, etc. This product has good chemical and physical stability and good biocompatibility. Moreover, the ligands are stable and can be reused.

Technical parameters

Name	Endotoxin rem Tanrose 4FF
Bead structure	4% cross-linked agarose gel
Ligand	Polybacterin B
Shape	Spherical
Mean particle size	90μm (45-165 μm)
Ligand density	5mg/ml (medium)
Binding capacity	5,000-10,000EU / ml medium
Max. flow rate	300cm/h
Ideal flow rate(25℃)	100cm/h
Max. operating pressure	0.3MPa (3 bar)
pH stability	3-10 (long term), 2-13 (short term)
Chemical stability	30% isopropanol, 8M urea, 6M guanidine hydrochloride
Storage condition	4-8℃, 20% ethanol

Ordering information

Product	P/N	Specification	Picture
Endotoxin rem Tanrose 4FF	00081-16001	10mL	
	00081-16002	25mL	
	00081-16003	100mL	
	00081-16004	500mL	
	00081-16005	1L	

NHS-activated Tanrose 4FF/CNBr-activated Tanrose 4FF Pre-Activated Affinity Resins

NHS-activated Tanrose 4FF is a N-hydroxysuccinimide-activated agarose gel, based on the high flow rate agarose matrix Tanrose 4FF

*It is easy for proteins to form covalent bonds, and it has strong chemical stability.

*Ligand coupling is flexible, greatly improving the specificity of purification.

*With a 10-carbon arm, it reduces steric hindrance of ligand on agarose surfaces.

*The operation is simple, avoiding the use of highly toxic materials.

CNBr-activated Tanrose 4FF is a cyanogen bromide-activated agarose medium, suitable for coupling amino-containing biomolecules such as proteins, polysaccharides, and nucleic acids.

*The reaction conditions with proteins and other large molecules are mild.

*It can directly couple biomolecules without the need for a spacer arm.

*The ligand and matrix can form multi-point coupling, making the medium more stable.

*Ligand coupling is flexible, greatly improving the specificity of purification.

Technical parameters

Name	NHS-activiated Tanrose 4FF	CNBr-activiated Tanrose 4FF
Bead structure	4% highly cross-linked agarose	
Activated group	N-hydroxysuccinimide	cyanogen bromide
Ligand density	16-23μmol/mL (medium)	13-26mg α- Chymotrypsinogen /mL Medium
Coupling functional group	$-NH_2$	

Name	NHS-activiated Tanrose 4FF	CNBr-Activiated Tanrose 4FF
Mean particle size	90 μm (45~165 μm)	
Max. operating pressure	0.3 MPa (3 bar)	
Ideal flow rate	150 cm/h	
Chemical stability	30% isopropanol, 8 M urea, 6 M guanidine hydrochloride.	
pH stability	3-13 (long term), 2-13 (short term)	3-13 (long term), 2-11 (short term)
Condition	4~8℃ (20% ethanol)	4~8℃ (100% isopropanol)

Ordering information

Product	P/N	Specification	Product	P/N	Specification	Picture
NHS-activiated Tanrose 4FF	00081-00101	25mL	CNBr-activiated Tanrose 4FF	00081-00201	25mL	
	00081-00102	100mL		00081-00202	100mL	
	00081-00103	500mL		00081-00203	500mL	
	00081-00104	1L		00081-00204	1L	

EMPTY COLUMNS

Welch Materials, Inc. provides empty columns with diameters from 0.7cm to 45cm to meet the demand of various scales and applications.

WelCot Empty Columns

WelCot columns body is made of high-purity medical grade polypropylene. The frit is processed with pure high-molecular-weight polyethylene, which can withstand acid, alkali and general organic solvents and has a wide range of biological compatibility. After packing, proteins can be purified by gravity flow.

Technical parameters

Composition	One upper and one lower cover, tube, two frits
Frit material	Polyethylene
Tube material	Polypropylene

Column volume	12mL/60mL
Pore size of frit	10μm
pH stability	1-14
Chemical stability	Stable in common aqueous solutions

Ordering information

Product	P/N	Specification	Picture
WelCot 10 empty columns	00057-00001	1-12mL	
WelCot 60 empty columns	00057-00002	1-60mL	

PreCot Empty Column

PreCot empty columns are available in two specifications, 1ml and 5ml. Columns are made of bio-resistant polypropylene. The upper and lower frits are composed of porous polyethylene. The column is equipped with 1/16 port and can be used with syringe, pump and AKTA system.

Technical parameters

Composition	One upper and one lower cover, tube, two frits
Frit material	Polyethylene
Tube material	Polypropylene

Column volume	1mL/5mL
Pore size of frit	10μm
pH stability	1-14
Chemical stability	Stable in common aqueous solutions

Ordering information

Product	P/N	Specification	Picture
PreCot 1ml empty column	00055-0001	1mL	
PreCot 5ml empty column	00055-0002	5mL	

TXK EMPTY COLUMN FOR LABORATORY

Laboratory-type empty columns use glass column with diameter from 1.6cm to 5cm, length from 20cm to 100cm, and packing medium from 3ml-2L.

Features

* Jacket can maintain certain operating temperature
* Good chemical resistance
* Specific column packer guarantees good column efficiency
* Quick-locked adapter ensures average flow rate

Technical parameters

Product	Diameter(mm)	Height(cm)	Packing volume	Operating pressure	Temperature	Mesh size
TXK16/20	16	20	5-35mL	≤ 5bar	4-60℃	10μm
TXK16/40	16	40	45-75mL	≤ 5bar		
TXK16/70	16	70	105-135mL	≤ 5bar		
TXK16/100	16	100	165-190mL	≤ 5bar		
TXK26/20	26	20	5-90mL	≤ 5bar		
TXK26/40	26	40	115-190mL	≤ 5bar		
TXK26/70	26	70	265-340mL	≤ 5bar		
TXK26/100	26	100	415-450mL	≤ 5bar		
TXK50/20	50	20	5-350mL	≤ 3bar		
TXK50/30	50	30	270-550mL	≤ 3bar		
TXK50/70	50	70	1020-1300mL	≤ 3bar		
TXK50/100	50	100	1650-1950mL	≤ 3bar		

Ordering information

Product	P/N	Product	P/N	Product	P/N	Picture
TXK16/20	00055-00020	TXK26/70	00055-00026	16 Packing equipment	00055-00037	
TXK16/40	00055-00021	TXK26/100	00055-00027	26 Packing equipment	00055-00038	
TXK16/70	00055-00022	TXK50/20	00055-00028	50 Packing equipment	00055-00039	
TXK16/100	00055-00023	TXK50/30	00055-00029	16 Piston head	00055-00040	
TXK26/20	00055-00024	TXK50/70	00055-00030	26 Piston head	00055-00041	
TXK26/40	00055-00025	TXK50/100	00055-00031	50 Piston head	00055-00042	

TXK EMPTY COLUMN FOR PRODUCTION

TXK series manual chromatography column has a simple way to pack with less tools, and can provide a fast packing method for a variety of chromatography packing materials, which is conducive to saving time and reducing the operator's work intensity with accurate and highly repeatable loading effect.

Features

* The column steel structure of the column is made of 316L stainless steel
* Column glass adopts high-precision medical glass
* Upper and lower frits are resistant to various acid and alkali solutions and organic solvents
* O-ring has better sealing effect and is more durable
* With adaptor for adjusting bed height
* Chromatography columns with different specifications are available for customers.

Technical parameters

Product	Diameter (mm)	Height(cm)	Packing volume	Max. pressure (bar)	Temperature
TXK100/500	100	50	0.5-3 L	8	4-60 ℃
TXK100/750	100	75	2-5 L	8	
TXK100/950	100	95	4-7 L	8	
TXK140/500	140	50	0.5-6 L	6	
TXK140/750	140	75	4-10 L	6	
TXK140/950	140	95	7-13 L	6	
TXK200/500	200	50	1-13 L	6	
TXK200/750	200	75	8-20 L	6	
TXK200/950	200	95	15-28 L	6	
TXK300/500	296	50	2-27 L	4	
TXK300/750	296	75	19-45 L	4	
TXK300/950	296	95	32-58 L	4	
TXK450/500	446	50	5-65 L	2.5	
TXK450/750	446	75	35-90 L	2.5	
TXK450/950	446	95	74-130 L	2.5	

Ordering information

Product	P/N	Product	P/N	Picture
TXK100/500	00055-00050	TXK200/950	00055-00058	
TXK100/750	00055-00051	TXK300/500	00055-00059	
TXK100/950	00055-00052	TXK300/750	00055-00060	
TXK140/500	00055-00053	TXK300/950	00055-00061	
TXK140/750	00055-00054	TXK450/500	00055-00062	
TXK140/950	00055-00055	TXK450/750	00055-00063	
TXK200/500	00055-00056	TXK450/950	00055-00064	
TXK200/750	00055-00057			

GEL FILTRATION PREPACKED COLUMNS

G series

Desalting prepacked columns are often used for buffer exchange, desalting, removal of small molecules, and small amount of sample preparation for biological samples.

*Filling medium: Tandex G25F and Tandex G25M

*Loading volume: up to 30% column volume for one-time loading

*Fast desalting, buffer replacement, separation of biomolecules.

Technical parameters

	BC-10 desalting column	PreCot G25F	PreLoad Desalting Columns	
			PreLoad 16/10 Desalting Column	PreLoad 26/10 Desalting Column
Column bed volume ml	8.3	5	19-21	50-56
Inner diameter*column bed height mm	14.5*50	16*25	16*100(±5)	26*100(±5)
Medium	Tandex G25F (particle size can be changed according to customer needs)			
Maximum sample volume	2mL	1.3mL	5mL	13mL
Molecular Exclusion Range (Da)	Globulin 5000			
Suggested flow rate(cm/h)	Gravity flow	<150	<300	<300
Maximum back pressure (MPa)		0.3	0.3	0.3
Chemical stability	Temperature in all common buffers			
pH stability	2-13 long term			

Ordering information

Product	P/N	Specification	Picture
PreCot G-25 Fine，5mL	00051-33012	1Pcs	
PreCot G-25 Medium，5mL	00051-32012	1Pcs	
BC-10 Desalting Column, 8.3mL	00051-32022	1Pcs	
BC-10 Desalting Column, 8.3mL	00051-32023	10Pcs	
PreLoad 16/10 Desalting Column	00051-32020	1Pcs	
PreLoad 26/10 Desalting Column	00051-32021	1Pcs	

Super Tandex Prep Grade Series

*PreLoad prepacked column is filled with filler in TXK chromatography column tube, which is used for the rapid preparation and purification of proteins, DNA fragments and small molecules. It has the advantages of high flow rate, high resolution, stable physical and chemical properties, and easy scale-up.

*SuperTandex30 prep grade: polypeptides, small biomolecules

*SuperTandex75 prep grade: recombinant protein, cytochrome

*SuperTandex200 prep grade: monoclonal antibody, macromolecular protein

Technical parameters

Product	PreLoad 16/60 SuperTandex 30pg	PreLoad 26/60 SuperTandex 30pg	PreLoad 16/60 SuperTandex 75pg	PreLoad 26/60 SuperTandex 75pg	PreLoad 16/60 SuperTandex 200pg	PreLoad 26/60 SuperTandex 200pg
Preloaded media	SuperTandex 30pg		SuperTandex 75pg		SuperTandex 200pg	
Separation range (Da)	＜10,000		3,000-70,000		10,000-600,000	
Average particle size (μm)	34μm					
Column bed height (±2cm)	60	60	60	60	60	60
Pressure(Mpa)	0.3					
Recommended flow rate (ml/min)	0.5-1.5	2-4	0.5-1.5	2-4	0.5-1.5	2-4
Preservation solution	20% ethanol					
Chemical stability	All common water-soluble buffers, 1M NaOH, 8M urea, 6M HCl, 70% ethanol					
pH stability	3-12 long term, 2-14 short term					

Ordering information

Product	P/N	Specification	Picture
PreLoad 16/60 SuperTandex 30pg	00055-10020	1Pcs	
PreLoad 26/60 SuperTandex 30pg	00055-10021	1Pcs	
PreLoad 16/60 SuperTandex 75pg	00055-20020	1Pcs	
PreLoad 26/60 SuperTandex 75pg	00055-20021	1Pcs	
PreLoad 16/60 SuperTandex 200pg	00055-30020	1Pcs	
PreLoad 26/60 SuperTandex 200pg	00055-30021	1Pcs	

HYDROPHOBIC CHROMATOGRAPHY PREPACKED COLUMNS

*PreCot hydrophobic interaction chromatography prepacked column is used for the purification of a small amount of samples. In addition to being used in conjunction with the chromatography system, it can also be equipped with a syringe loading connector and use a syringe for simple purification.

*Packing medium: hydrophobic interaction chromatography medium

Technical parameters

		PreCot Series	PreCot Series	PreCot 16/10 Series	PreCot 26/10Series
Column volume (mL)		1	5	20	50
Internal diameter and bed height (mm)		7*25	16*25	16*100	26*100
Recommended flow rate (mlL/min)	6FF framework	0.2-2	1-10	2.0-10.0	5.0-26.5
	4FF framework	0.2-2.0	1-10	3-6	7-16
	HP framework	0.2-1.0	0.7-4.0	2.0-5.0	4.0-11.0
Maximum pressure the column bed can withstand during operation (MPa)		FF, HP base frame 0.3MP (3bar)			

Ordering information

Product	P/N	Specification	Product	P/N	Specification	Picture
PreCot Phenyl 6FF (NTA)	00071-41020	1mL/Pcs	PreCot Butyl 6HP	00071-23020	1mL/Pcs	
	00071-41021	5mL/Pcs		00071-23021	5mL/Pcs	
PreCot Phenyl 6FF(HS)	00071-42020	1mL/Pcs	PreCot Octyl 6HP	00071-33020	1mL/Pcs	
	00071-42021	5mL/Pcs		00071-33021	5mL/Pcs	
PreCot Phenyl 6HP	00071-43020	1mL/Pcs	PreCot Butyl 4FF	00071-24020	1mL/Pcs	
	00071-43021	5mL/Pcs		00071-24021	5mL/Pcs	
PreCot Butyl-S 6FF	00071-14020	1mL/Pcs	PreCot Octyl 4FF	00071-34020	1mL/Pcs	
	00071-14021	5mL/Pcs		00071-34021	5mL/Pcs	

ION EXCHANGE CHROMATOGRAPHY PRE-PACKED COLUMNS

*PreCot ion exchange chromatography pre-packed columns are used for medium screening, purification condition exploration, and purification of small sample volumes. In addition to being used with chromatography systems, they can also be used with injection ports to perform simple purifications using an injector.

*PreLoad ion exchange chromatography pre-packed columns can be used for separation and preparation of small-scale samples in laboratory and pilot-scale experiments.

*Packing media: ion exchange chromatography medium.

Technical parameters

		PreCot Series	PreCot Series	PreCot 16/10 Series	PreCot 26/10Series
Column volume (mL)		1	5	20	50
Internal diameter and bed height (mm)		7*25	16*25	16*100	26*100
Recommended flow rate (mlL/min)	FF framework	0.2-2	1-10	2.0-10.0	5.0-26.5
	HP framework	0.2-1.0	0.7-4.0	2.0-5.0	4.0-11.0
Maximum pressure the column bed can withstand during operation (MPa)		FF、HP framework 0.3MP(3bar) Solid、Mustang framework 0.5Mpa(5ba)			

Ordering information

Product	P/N	Specification	Product	P/N	Specification	Picture
PreCot SP 6FF	00062-33011	1mL/Pcs	PreCot Q 6FF	00071-23020	1mL/Pcs	
	00062-33012	5mL/Pcs		00071-23021	5mL/Pcs	
PreCot SP 6BB	00062-34011	1mL/Pcs	PreCot Q 6HP	00071-33020	1mL/Pcs	
	00062-34012	5mL/Pcs		00071-33021	5mL/Pcs	
PreCot SP 6HP	00062-32011	1mL/Pcs	PreCot Q 6XL	00071-24020	1mL/Pcs	
	00062-32012	5mL/Pcs		00071-24021	5mL/Pcs	
PreCot SP 6XL	00062-31011	1mL/Pcs	PreCot CM C-25	00071-34020	1mL/Pcs	
	00062-31012	5mL/Pcs		00071-34021	5mL/Pcs	
PreCot CM 6FF	00062-53011	1mL/Pcs	PreCot DEAE 6FF	00062-13011	1mL/Pcs	
	00062-53012	5mL/Pcs		00062-13012	5mL/Pcs	
PreCot Q 6BB	00062-24011	1mL/Pcs				
	00062-24012	5mL/Pcs				
PreLoad 16/10 DEAE FF	00062-13020	1Pcs	PreLoad 16/10 CM FF	00062-53020	1Pcs	
PreLoad 26/10 DEAE FF	00062-13021	1Pcs	PreLoad 26/10 CM FF	00062-53021	1Pcs	
PreLoad 26/50 SP FF	00062-33020	1Pcs	PreLoad 16/10 SP FF	00062-33022	1Pcs	
PreLoad 26/10 SP FF	00062-33021	1Pcs				

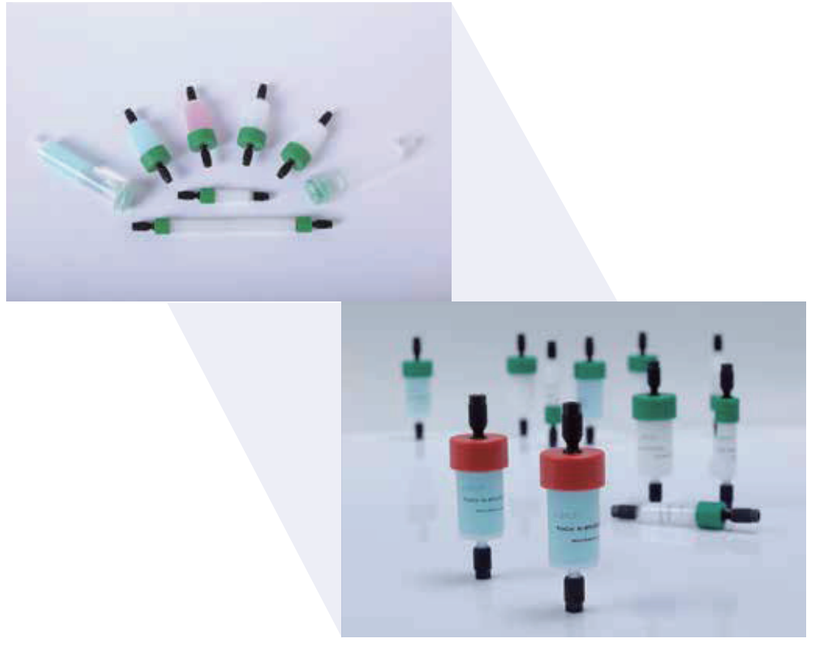
AFFINITY CHROMATOGRAPHY PREPACKED COLUMNS

*PreCot affinity chromatography prepacked column is used for the purification of a small amount of samples. In addition to being used in conjunction with the chromatography system, it can also be equipped with a syringe for simple purification using a syringe.

*Loading medium: affinity chromatography medium.

Ordering information

Product	P/N	Specification	Product	P/N	Specification
PreCot NHS 4FF	00081-00111	1mL/Pcs	PreCot GST 4FF	00081-10011	1mL/Pcs
	00081-00112	5mL/Pcs		00081-10012	5mL/Pcs
PreCot Ni 6FF(IDA)	00082-06011	1mL/Pcs	PreCot Benzamidine 4FF(HS)	00081-11011	1mL/Pcs
	00082-06012	5mL/Pcs		00081-11012	5mL/Pcs
PreCot Chelating 6FF	00082-02011	1mL/Pcs	PreCot Endotoxin rem 4FF	00081-16011	1mL/Pcs
	00082-02012	5mL/Pcs		00081-16012	5mL/Pcs
PreCot Ni 6FF(NTA)	00082-03011	1mL/Pcs	PreCot Ni 6HP (NTA)	00082-09011	1mL/Pcs
	00082-03012	5mL/Pcs		00082-09012	5mL/Pcs
PreCot IMAC 6FF	00082-01011	1mL/Pcs	PreCot Co 6FF（NTA）	00082-07011	1mL/Pcs
	00082-01012	5mL/Pcs		00082-07012	5mL/Pcs
PreCot Heparin FF	00082-18011	1mL/Pcs	Pre-packed gravity column Ni-NTA	00082-03031	5mL/Pcs
	00082-18012	5mL/Pcs	Pre-packed gravity column Co-NTA	00082-07031	5mL/Pcs
PreCot Protein G 4FF	00081-12011	1mL/Pcs	Pre-packed gravity column Ni-IDA	00082-06031	5mL/Pcs
	00081-12012	5mL/Pcs	PreCot Protein G HP,1mL	00082-19011	1mL/Pcs
PreCot Protein G HP,1mL	00082-19013	5Pcs/Box			



GUIDELINES FOR PROTEIN PURIFICATION

For protein purification, the inherent similarities and differences between various proteins should be applied to remove non-protein contamination and purify the target protein from other proteins. Each protein has differences in size, shape, charge, hydrophobicity, solubility, and biological activity. These differences can be used to extract proteins from mixtures such as E. coli lysates to obtain recombinant proteins.

BASIC STRATEGIES FOR PROTEIN PURIFICATION

1. Coarse extraction

Rudimentary purification of target protein from samples

Purpose: to rapidly concentrate (reduce volume) and stabilize the sample (remove protease).

Commonly used chromatography techniques: affinity, ion exchange, or hydrophobic chromatography.

Recommended products:

Tanrose BB series are available for complex pre-treatment of strong viscous samples.

Tanrose XL series media can be selected for the samples with high capacity.

Different specifications of pre-packed columns of all above media can be provided to the customer for facilitating the screening of coarse extraction conditions.

2. Moderate purification

Remove most impurities

Purpose: to concentrate and further purify

Commonly used chromatography techniques: affinity, ion or hydrophobic chromatography

Recommended products:

HP series Ion-exchange or hydrophobic media PreCot series prepacked column can be used for condition optimization.

3. Fine purification

Remove residual impurities

Purpose: to obtain the expected purity.

Commonly used chromatography techniques: affinity chromatography, gel filtration, ion exchange, hydrophobic chromatography and reversed chromatography.

Recommended products:

SuperTandex 75 pg or SuperTandex 200 pg are available for gel filtration. Ion-exchange and hydrophobic chromatography are generally based on high performance media, or we can customize products with smaller and more uniform beads.

Welchrom®PROTEIN PURIFICATION PRODUCTS

THE CHROMATOGRAPHIC COLUMN PACKING PROCESS

1. Packing material and packing solution

Empty chromatography column: TXK16/20 or TXK26/20

Column packing equipment: medium pressure chromatography system

Packing solution: 01M NaCl buffer

Note: The materials and solutions used should be consistent with the temperature of the chromatography operation:

Chromatographic column screen pore size: 23μm for Fast Flow series medium; 10μm for High Performance series medium;

Preparation of gel medium: accurately calculate the amount of medium required (this is especially important for chromatography columns with fixed column heights), and the amount of sedimentation medium required for L chromatography columns after filling is about 1.15L. use more than5 times the volume of column packing buffer to wash away the preservation solution, after the medium is cleaned, add an equal volume of column packing buffer for later use.

Note: Sedimentation medium: keep it still for more than one day, pour off the medium of the upper layer of preservation solution.

2. Column installation:

2.1. Check the chromatography column to ensure that all parts are complete and clean. After installing the lower column head and tightening the O-ring, fix the chromatography column vertically on the iron stand, and use a spirit level to check and adjust the well to keep the chromatography column horizontal.

2.2 Install the column packer on the top of the chromatography column.

2.3 Add an appropriate amount of packing solution to the chromatography column, and open the lower port for gravity flow to remove the air in the screen. Keep 1-2cm of solution in the column, and close the outlet at the lower end of the chromatography column.

3. Packing process

3.1 Drainage with a glass rod close to the inner wall of the column, and pour the gel suspension into the chromatography column continuously to reduce the generation of air bubbles. Quickly fill the column packer with column packing solution, and install the upper cover of the column packer (the bubbles in the column packer pipeline have been drained with column packing buffer)

3.2 Turn on the system pump, press the column with a flow rate of 30cm/h, and stop the first step of column pressing until the column bed interface is stable.

3.3 Seal the lower port, open the packing device, use the siphon method to remove the liquid in the packing device, remove the packing device, and seal the remaining space of the chromatography column with packing buffer.

3.4 Connect the upper column head to the low-pressure chromatography system, turn on the pump to discharge the residual air in the pipeline at a certain flow rate, stop the system, install the upper column head on the chromatography column, open the lower port, and the upper column head screen is about 0.5 away from the rubber surface -1cm, tighten the sealing ring, turn on the pump and press the column for more than 3CV at 70% of the maximum flow rate, until the volume of the column bed does not change, and mark the interface.

3.5 Turn off the system pump, block the outlet at the lower end, disconnect the upper end of the chromatography column from the pump, press down the adjusting rod until it stops at 0-0.5cm below the mark, block the upper port, and the column loading is completed.

Note: Conversion relationship between linear flow rate and volumetric flow rate

Linear flow rate (cm/h) = volumetric flow rate (mL/min) x60/cross-sectional area (cm^2)

Chromatographic column efficiency detection

In order to check the packing quality, the column efficiency should be tested immediately after the packing is completed. The performance of the packed D column is usually measured by terms such as the number of theoretical plates per meter N/m and the peak asymmetry factor As. The higher the column efficiency, the stronger the separation ability. For Tanrose Fast Flow medium (average particle size 90um), the column efficiency is better when N/m is 3000. The acceptable range of As is 0.8-1.5. For Tanrose High Performance media (average particle size 34um), N/m should be >10000. The acceptable range of As is 0.8-1.8. The Zeng path used for column efficiency detection should be as short as possible, and the inner diameter should be kept to a minimum so as not to cause excessive stress.

Detection conditions

Sample	1% acetone aqueous solution	0.8M-1M NaCl aqueous solution
Sample volume	1% column volume	1% column volume
Buffer	Water	0.1M-0.15M Nadl aqueous solution
Flow rate	20-30cm/h	20-30cm/h
Detection	UV280nm	Conductivity