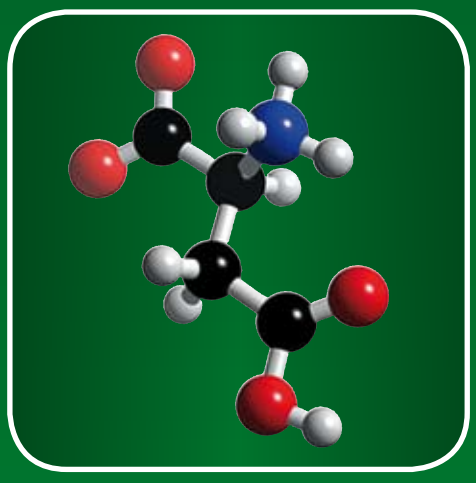
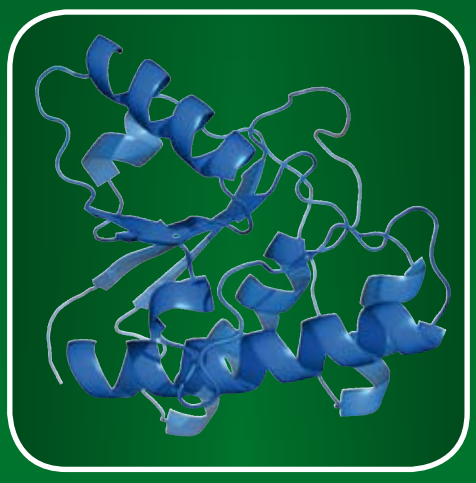
YMC
EUROPE GMBH

YMC Phases for Biochromatography





IEX
SEC
RP
NP/HILIC

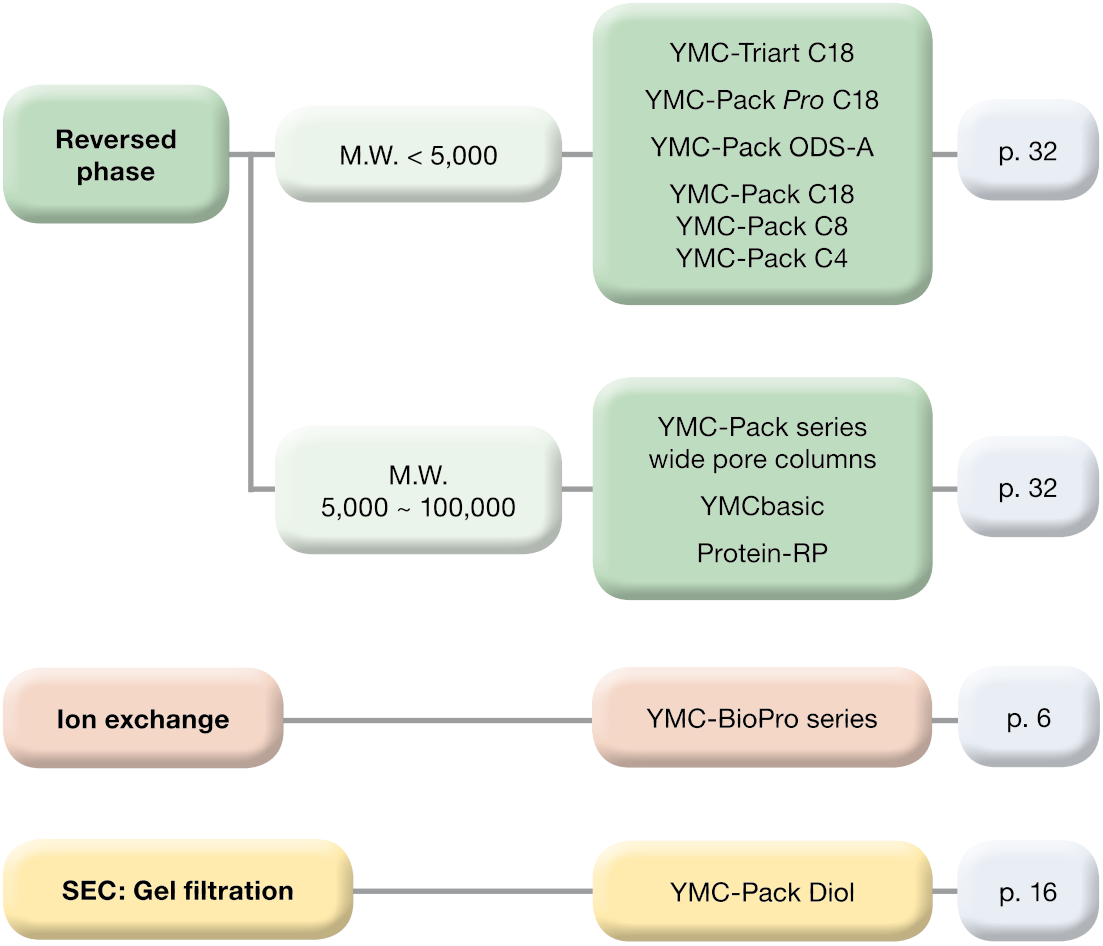
YMC Phases for Biochromatography

Historically, small molecules have played the major role in diagnosis and therapy. However with the recent developments in the fields of genomics, proteomics and metabolomics, biological molecules have become an important tool for the treatment of diseases or help understanding biological processes.

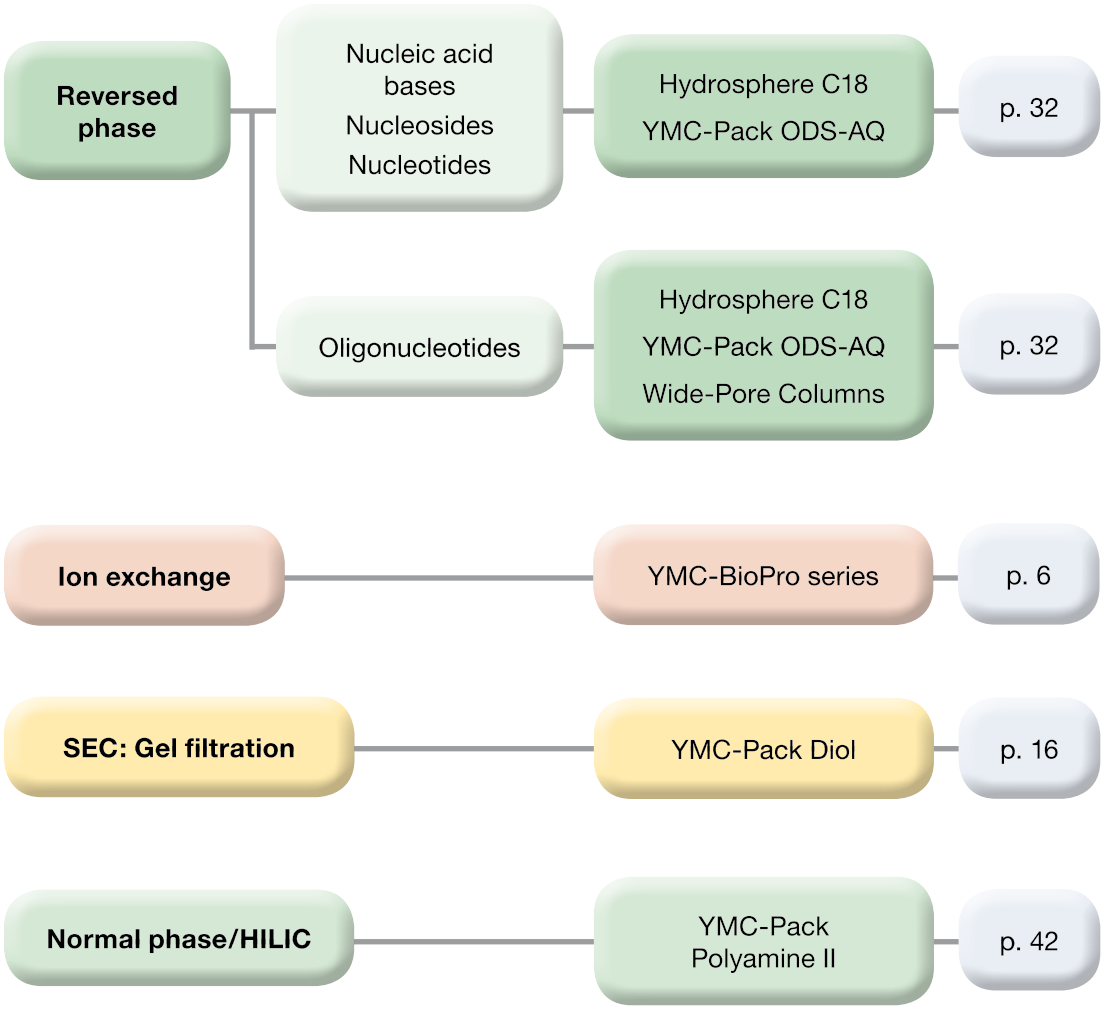
YMC has always played an important role in the provision of materials for bioseparations. With the constant driving force of innovation, the focus has always been on column design and stationary phase manufacturing. As a consequence, YMC offers state of the art reversed phase, ion-exchange, size exclusion and normal phase/HILIC columns and bulk materials.

Contents

Proteins, Peptides

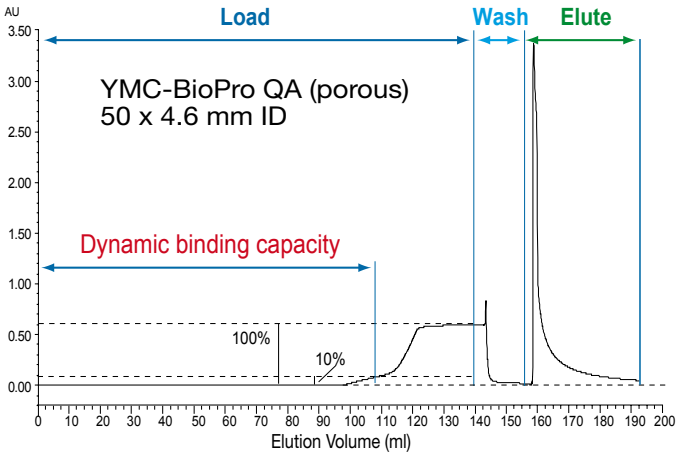


Nucleic acids



Polysaccharides

Determination of DBC*



* Application data by courtesy YMC Co., Ltd.

Before determination, equilibrate the column with equilibration buffer.

Step 1: Load

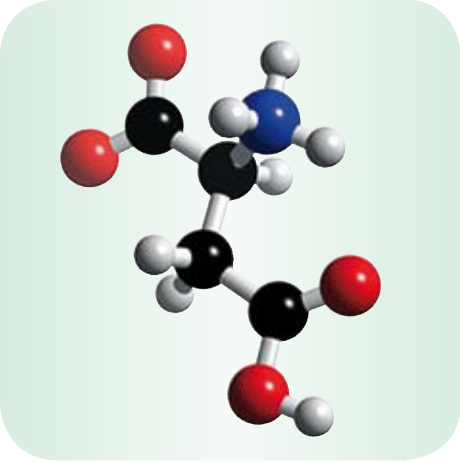
A protein solution of known concentration is continuously loaded at the desired flow rate and the absorbance of the eluate is monitored until full saturation is achieved (100% UV absorbance of the pure sample solutions).

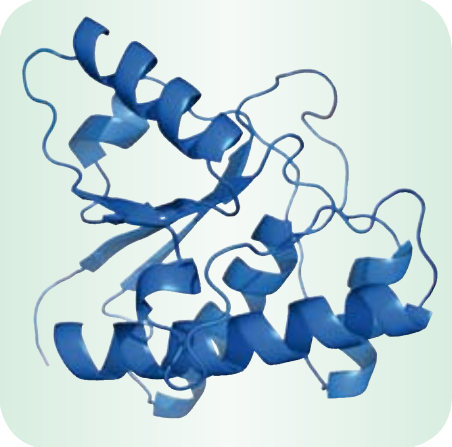
Step 2: Wash

Wash the column with equilibration buffer until no more protein elutes (0% UV ab-sorbance).

Step 3: Elute

The DBC of the medium is a measure of the volume of protein solution that has been applied up to a specific breakthrough point (usually 5 or 10%).





IEX

YMC-BioPro: IEX-Columns

Ion exchange chromatography (IEX) is widely used for analysis and purification of biomolecules. YMC-BioPro ion exchange columns are specifically designed for separation of proteins, peptides and nucleic acids.

YMC-BioPro IEX columns are based on 5 µm porous and non-porous hydrophilic polymer beads with low nonspecific adsorption.

They also show higher binding capacity and higher recovery of biomolecules compared to conventional IEX-columns.

The completely spherical, monodisperse beads, together with optimal packing technology, provide high theoretical plate numbers and symmetrical peak shapes!

High binding capacity and high recovery for porous type

The porous version of YMC-BioPro show high dynamic binding capacity and excellent recovery, making them useful for semi-preparative separations of proteins and antibodies.

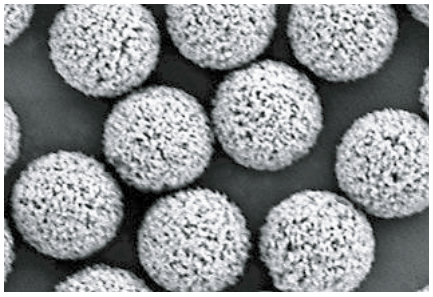
Comparison of dynamic binding capacity (DBC) for BSA

	Dynamic binding capacity (mg/ml-gel, 10% breakthrough)	Eluted amount (mg/ml-gel)	Recovery* (%)
YMC-BioPro QA	126	120	95
Mono Q (GE Healthcare)	100	35	35
BioAssist Q (Tosoh Bioscience)	73	58	79

* Recovery: (Eluted amount/Dynamic binding capacity) x 100

High recovery rates for YMC-BioPro

Compared with conventional porous polymer anion exchange columns, YMC-BioPro QA gives higher DBC and recovery rates. This indicates that YMC-BioPro has a much lower nonspecific adsorption compared to conventional columns.



Porous polymer beads

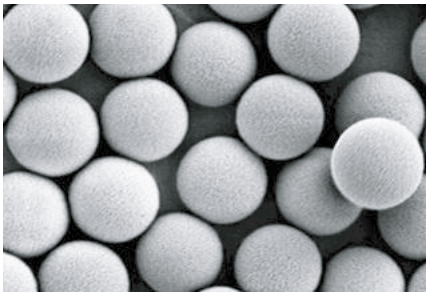
YMC-BioPro QA / YMC-BioPro SP

Pore size / nm: 100
Particle size / µm: 5
Charged group: $-CH_2N^+(CH_3)_3$ / $-CH_2CH_2CH_2CH_2SO_3$
Counter ion: Cl^- / Na^+
pH range: 2.0 - 12.0

Also available in 30 µm and 75 µm for preparative scale

YMC-BioPro QA-F / YMC-BioPro SP-F

Pore size / nm: non-porous
Particle size / µm: 5
Charged group: $-CH_2N^+(CH_3)_3$ / $-CH_2CH_2CH_2SO_3$
Counter ion: Cl^- / Na^+
pH range: 2.0 - 12.0

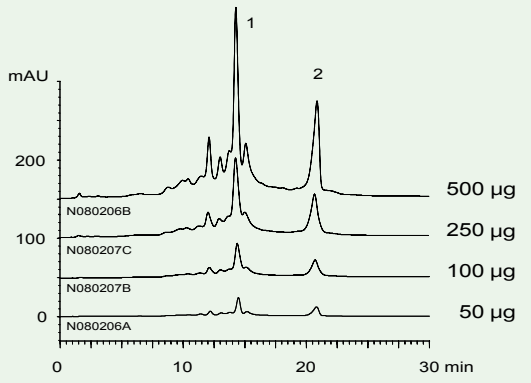


Nonporous polymer beads

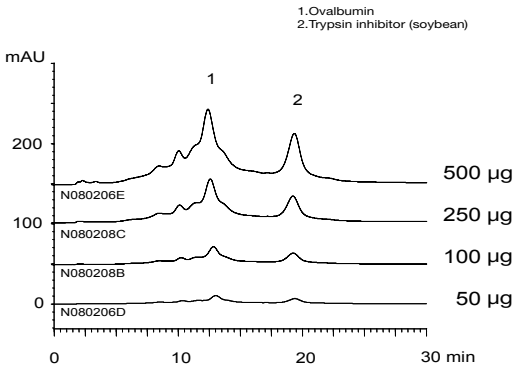
Applications for porous YMC-BioPro

Loading study for YMC-BioPro QA (porous) – Proteins*

YMC-BioPro QA
5 µm, 100 nm (50 x 4.6 mm ID)



GE Healthcare (Mono Q)
10 µm (50 x 5.0 mm ID)

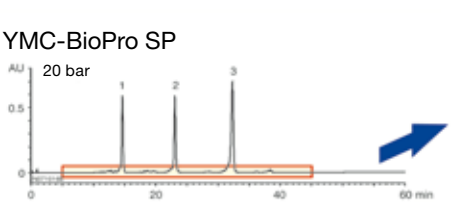


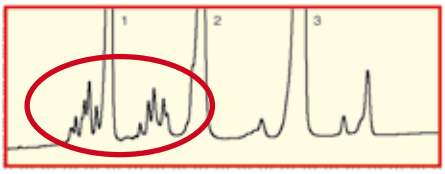
Eluent:	A) 20 mM Tris-HCl (pH 8.1) B) 20 mM Tris-HCl (pH 8.1) containing 0.5 M NaCl	Flow rate:	0.5 ml/min
Gradient:	10-80%B (0-30 min)	Temperature:	25°C
		Detection:	UV at 280 nm
		Injection:	100 µl

Superior resolution

Comparison of standard protein separation on YMC-BioPro SP and commercial SP or S type products*

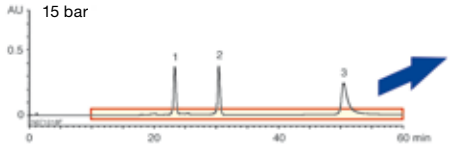
YMC-BioPro SP

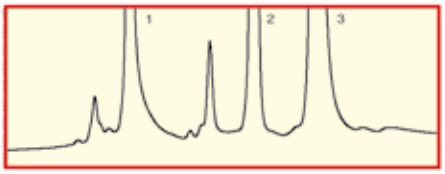




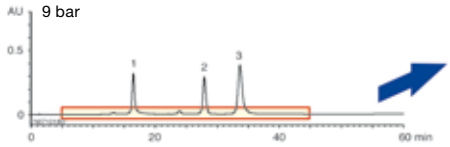
Superior resolution

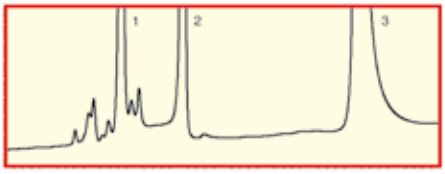
TSKgel BioAssist S, 10 µm





GE Healthcare Mono S





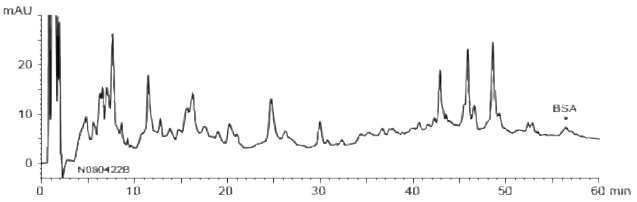
Eluent:	A) 20 mM KH_2PO_4-K_2HPO_4 (pH 6.8) B) 20 mM KH_2PO_4-K_2HPO_4 (pH 6.8) containing 0.5 M NaCl	Sample:	1. Ribonuclease A (0.5 mg/ml) 2. Cytochrome c (0.5 mg/ml) 3. Lysozyme (0.5 mg/ml)
Gradient:	0-100%B (0-60 min)		
Flow rate:	YMC-BioPro SP, TSKgel BioAssist S 0.5 ml/min GE Healthcare Mono S 0.59 ml/min		
Temperature:	25°C		
Detection:	UV at 220 nm		
Injection:	YMC-BioPro SP, TSKgel BioAssist S 20 µl GE Healthcare Mono S 23.6 µl		

* Application data by courtesy YMC Co., Ltd.

Applications for porous YMC-BioPro

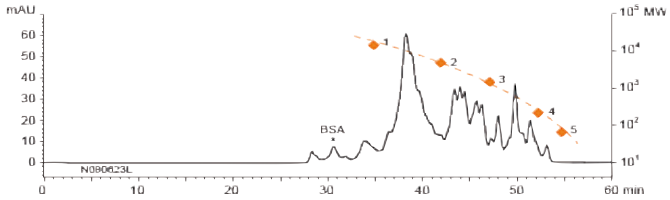
Peptide mapping*

IEX: YMC-BioPro QA 5 µm, 50 x 4.6 mm ID



Eluent: A) 20 mM Tris-HCl (pH 8.6)
B) 20 mM Tris-HCl (pH 8.6)
+ 0,5 M NaCl
0-15% B (0-30 min), 15-60% B (30-60 min)
Flow rate: 0.5 ml/min
Temperature: 25 °C
Detection: UV at 220 nm
Injection: 20 µl

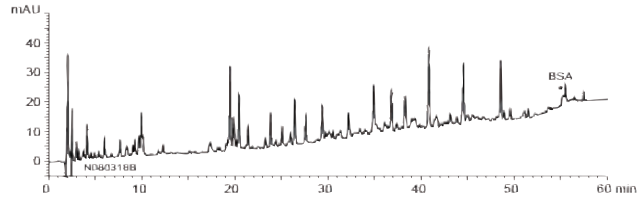
SEC: YMC-Pack Diol-120 x Diol-60 5 µm, 500 x 8.0 mm ID x 2



Calibration curve of proteins and peptides
1. Myoglobin (MW 17,000)
2. Insulin (Bovine) (MW 5,700)
3. Neurotensine (MW 1,672)
4. Tetraglyzine (MW 246)
5. Glyzine (MW 75)

Eluent: 0.1 M KH_2PO_4-K_2HPO_4 (pH 7.0)
+ 0.2 M NaCl/Acetonitrile (70/30)
Flow rate: 0.7 ml/min
Temperature: 25 °C
Detection: UV at 220 nm
Injection: 5 µl

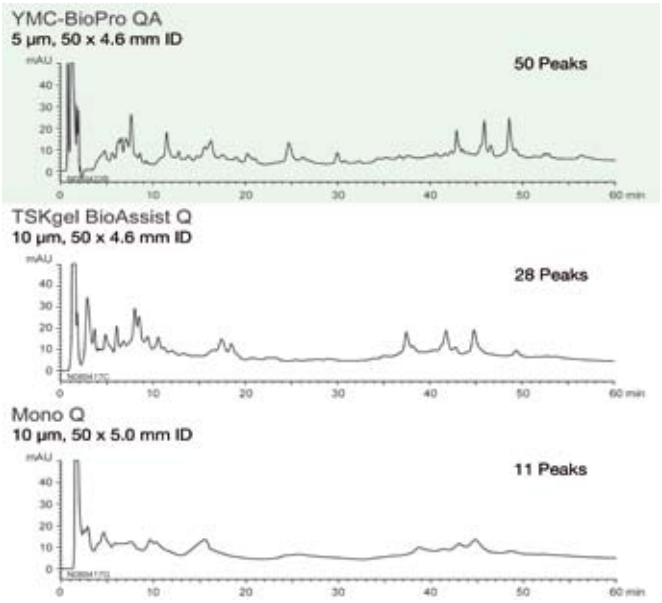
RP: YMCbasic 5 µm, 150 x 2.0 mm ID



Eluent: A) Water/TFA (100/0.1)
B) Acetonitrile/TFA (100/0.1)
5-35% B (0-50 min), 35-45% B (50-55 min)
45% B (55-60 min)
Flow rate: 0.2 ml/min
Temperature: 37 °C
Detection: UV at 220 nm
Injection: 1 µl

Tryptic digest of BSA (MW: 66,000)

Peptide mapping of tryptic digest of BSA*



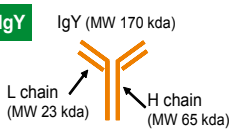
Eluent: A) 20 mM Tris-HCl (pH 8.6)
B) 20 mM Tris-HCl (pH 8.6)
containing 0.5 M NaCl
Gradient: 0-15%B (0-30 min), 15-60%B (30-60 min)
Flow rate: 0.5 ml/min
Temperature: 25°C
Detection: UV at 220 nm
Injection: 20 µl
Sample: Tryptic digest of BSA

Capture purification by ion-exchange chromatography (IEX)

Two step purification of IgY to produce reference standard material from crude egg yolk extract*

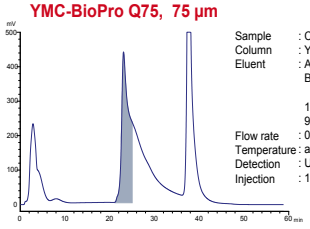
Crude extract from egg yolk containing IgY

Crude extract is the supernatant after precipitation of the lipids and lipoproteins from egg yolk.



Step 1: Capture purification by ion-exchange chromatography (IEX)

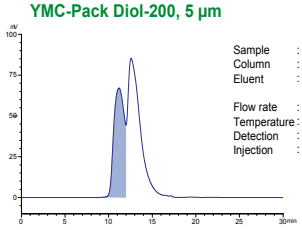
YMC-BioPro Q75, 75 µm



Sample : Crude extract from egg yolk
Column : YMC-BioPro Q75, 75 µm, 50 X 4.6 mm ID
Eluent : A) 20 mM Tris-HCl (pH 8.1)
B) 20 mM Tris-HCl (pH 8.1) containing 0.5 M NaCl
10% B (0-15 min), 30% B (15-30 min), 90% B (30-40 min)
Flow rate : 0.5 ml/min (180 cm/hr)
Temperature : ambient
Detection : UV at 280 nm
Injection : 1 ml (approx. 20 mg protein)

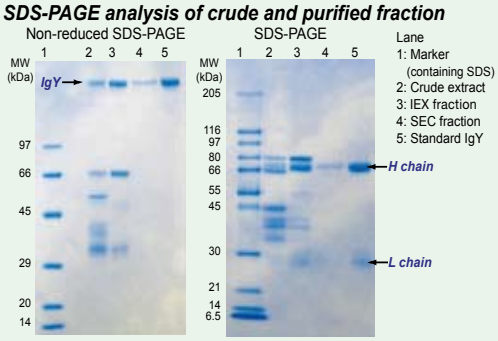
Step 2: Final purification by size-exclusion chromatography (SEC)

YMC-Pack Diol-200, 5 µm

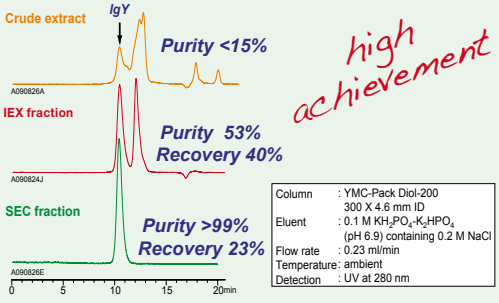


Sample : Fraction from capture purification by IEC
Column : YMC-Pack Diol-200, 5 µm, 300 X 8.0 mm ID
Eluent : 0.1 M KH_2PO_4-K_2HPO_4 (pH 6.9) containing 0.2 M NaCl
Flow rate : 0.7 ml/min (180 cm/hr)
Temperature : ambient
Detection : UV at 280 nm
Injection : 1 ml (approx. 0.45 mg IgY)

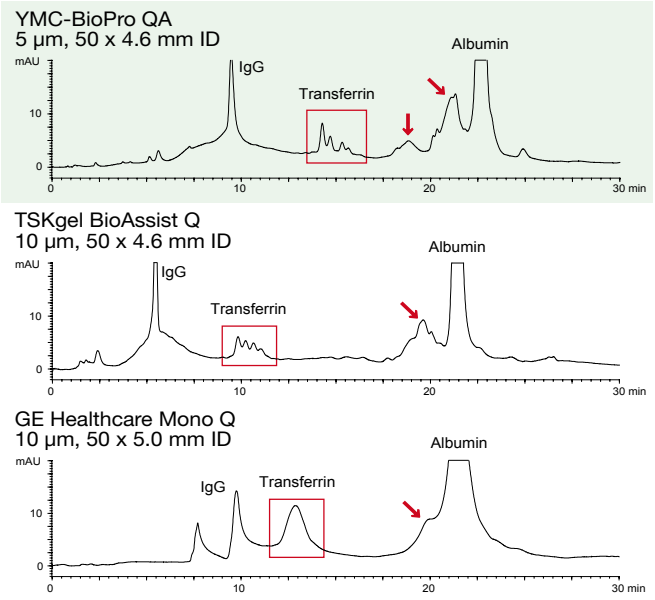
SDS-PAGE analysis of crude and purified fraction



SEC analysis of crude and purified fraction



Separation of proteins in human serum on YMC-BioPro QA and commercial Q type products*



For high resolution YMC-BioPro QA/SP, porous IEX material, is recommended!

Eluent : A) 20 mM Tris-HCl (pH 8.6)
B) 20 mM Tris-HCl (pH 8.6) containing 0.5 M NaCl
Gradient : 0-30%B (0-15 min), 30-100%B (15-30 min)
Flow rate : 0.5 ml/min
Temperature : 25 °C
Detection : UV at 280 nm
Injection : 20 µl
Sample : Human serum (100 ml/ml)

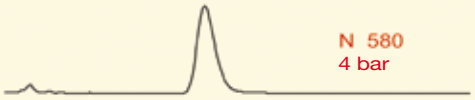
* Application data by courtesy YMC Co., Ltd.

Applications for non-porous YMC-BioPro: High Throughput IEX

High efficiency with a lower column pressure with non-porous type*

Anion exchange column

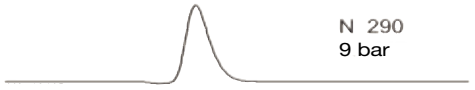
YMC-BioPro QA-F
5 µm, 30 x 4.6 mm i.d.



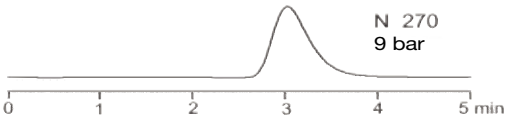
Cation exchange column

YMC-BioPro SP-F
5 µm, 30 x 4.6 mm i.d.

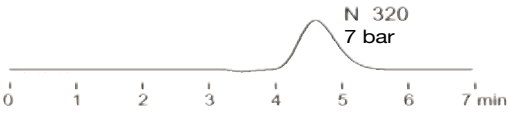
TSKgel DEAE-NPR
2.5 µm, 35 x 4.6 mm i.d.



TSKgel SP-NPR
2.5 µm, 35 x 4.6 mm i.d.



Mini Q 4.6/50 PE
3 µm, 50 x 4.6 mm i.d.

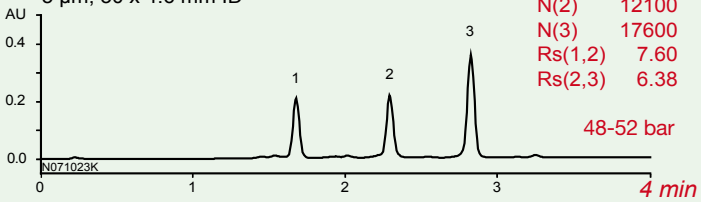


Eluent:	20 mM Tris-HCl (pH 8.1) (for anion exchange columns) 20 mM KH_2PO_4-K_2HPO_4 (pH 6.8) (for cation exchange columns)
Flow rate:	0.12 ml/min
Temperature:	25 °C
Detection:	UV at 220 nm
Injection:	20 µl
Sample:	Formamide (2 µl/ml)

Compared to the competitors' columns, YMC-BioPro QA-F and SP-F show higher theoretical plate counts, excellent peak shapes, and lower backpressure. This makes YMC-BioPro QA-F and SP-F most suitable for high-throughput analysis.

Comparison of standard protein separation on YMC-BioPro SP-F and a commercial SP-type product*

YMC-BioPro SP-F
5 µm, 30 x 4.6 mm ID



N(1)	7100
N(2)	12100
N(3)	17600
Rs(1,2)	7.60
Rs(2,3)	6.38

48-52 bar

TSKgel SP-NPR
2.5 µm, 35 x 4.6 mm ID

N(1)	4400
N(2)	2600
N(3)	11400
Rs(1,2)	4.50
Rs(2,3)	4.50

119-121 bar

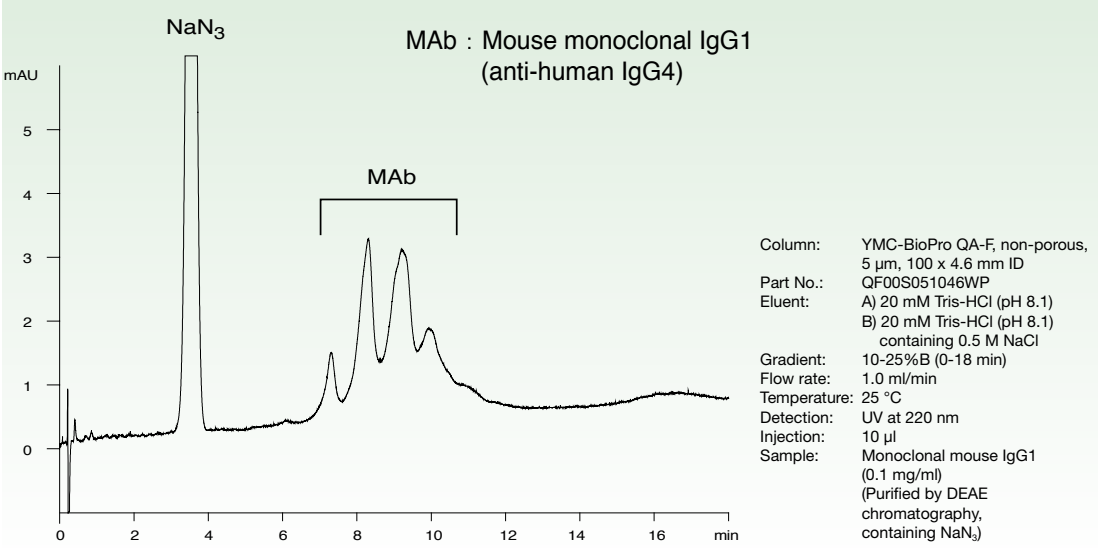
Eluent:	A) 20 mM KH_2PO_4-K_2HPO_4 (pH 6.8) B) 20 mM KH_2PO_4-K_2HPO_4 (pH 6.8) containing 0.5 M NaCl
Gradient:	YMC-BioPro SP-F 0-100%B (0-4 min) TSKgel SP-NPR 0-100%B (0-4.67 min)
Flow rate:	1.5 ml/min
Temperature:	25°C
Detection:	UV at 220 nm
Injection:	20 µl
Sample:	1. Ribonuclease A (0.1 mg/ml) 2. Cytochrome c (0.1 mg/ml) 3. Lysozyme (0.1 mg/ml)

YMC-BioPro SP-F elutes the proteins as sharper peaks without peak-tailing than TSKgel SP-NPR.

Despite the larger particle size, the theoretical plate count for YMC-BioPro SP-F is higher than that for TSKgel SP-NPR.

Applications for non-porous YMC-BioPro

Analysis of monoclonal antibody (MAb) against human IgG4*



Column:	YMC-BioPro QA-F, non-porous, 5 µm, 100 x 4.6 mm ID
Part No.:	QF00S051046WP
Eluent:	A) 20 mM Tris-HCl (pH 8.1) B) 20 mM Tris-HCl (pH 8.1) containing 0.5 M NaCl
Gradient:	10-25%B (0-18 min)
Flow rate:	1.0 ml/min
Temperature:	25 °C
Detection:	UV at 220 nm
Injection:	10 µl
Sample:	Monoclonal mouse IgG1 (0.1 mg/ml) (Purified by DEAE chromatography, containing NaN_3)

The optimum package!

YMC-BioPro IEX + ECO/ECO^{PLUS} Glass Columns

YMC's ECO/ECO^{PLUS} Glass Columns

- **biocompatible**
- **easy to use**
- **compatible with any LC systems**

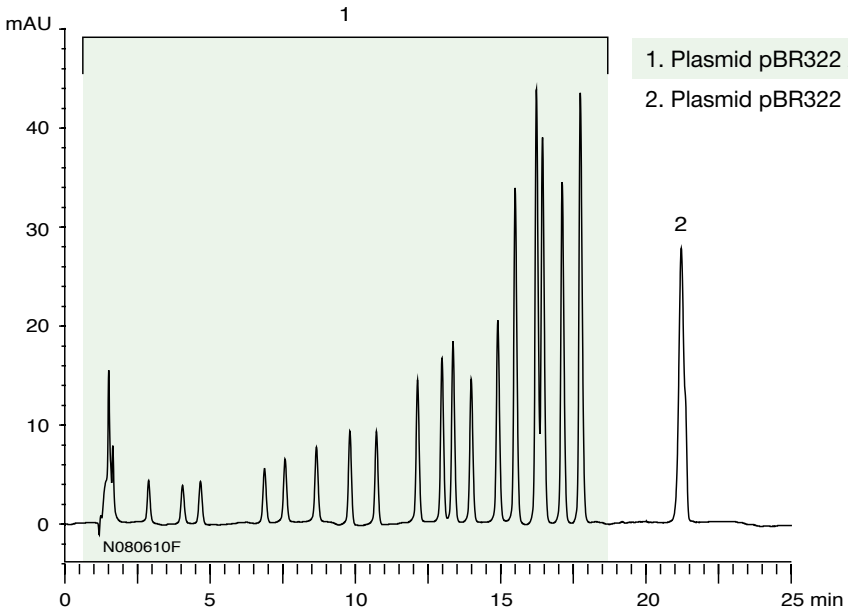
- **solvent resistant version (optional)**

—> Find more at page 47!

* Application data by courtesy YMC Co., Ltd.

Applications for non-porous YMC-BioPro: High Throughput IEX

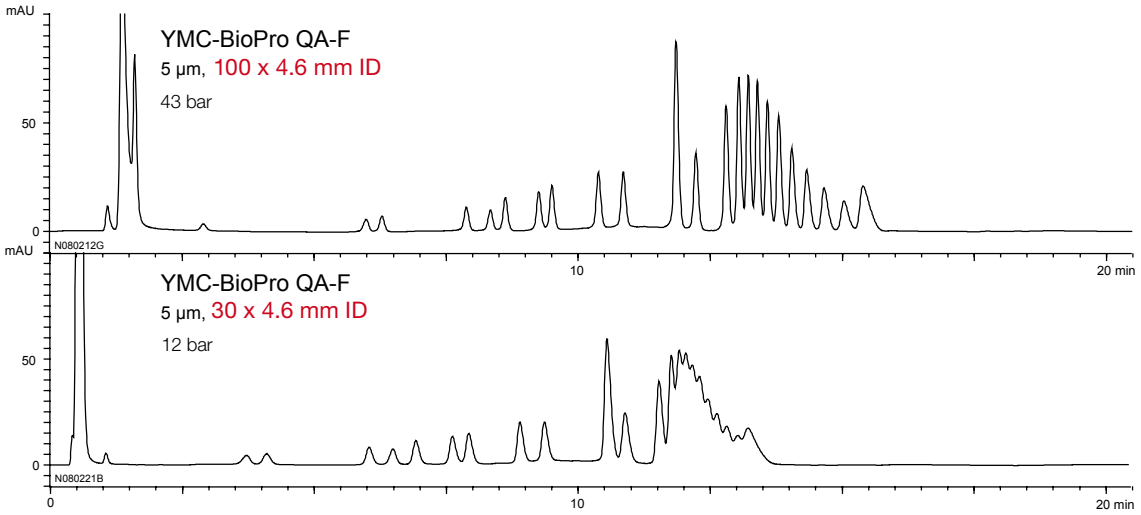
Fast analysis on non-porous YMC-BioPro QA-F*



1. Plasmid pBR322 *Hae* III digest (8-587 bp)
2. Plasmid pBR322 (4,361 bp)

Column:	YMC-BioPro QA-F, 5 µm, 100 x 4.6 mm ID	Temperature:	35°C
Part No.:	QF00S051046WP	Detection:	UV at 260 nm
Eluent:	A) 20 mM Tris-HCl (pH 8.1)	Injection:	10 µl
	B) 20 mM Tris-HCl (pH 8.1) containing 1.0 M NaCl	Sample:	Plasmid pBR322 Hae III digest (0.13 mg/ml)
Gradient:	70-85%B (0-20 min), 85%B (20-25 min)		Plasmid pBR322 (0.03 mg/ml)
Flow rate:	0.5 ml/min		

Excellent resolution in analysis of complex mixtures*

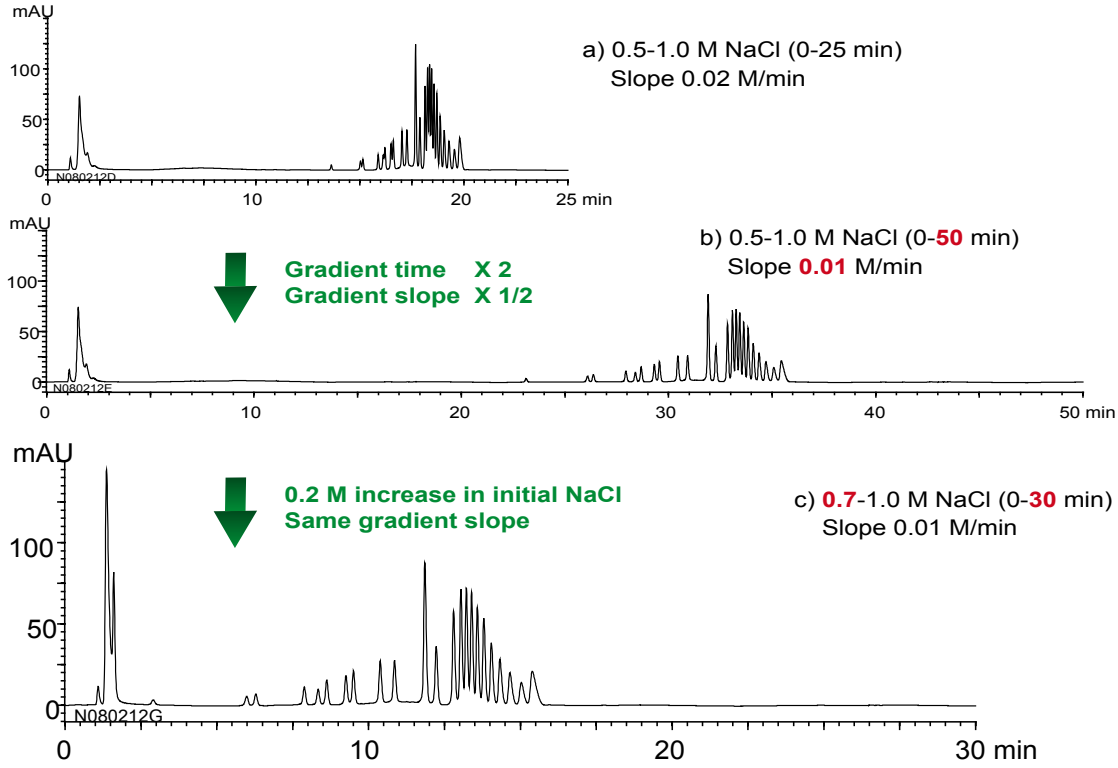


Eluent	: A) 20 mM Tris-HCl (pH 8.1) containing 0.5 M NaCl	Temperature	: 25°C
	B) 20 mM Tris-HCl (pH 8.1) containing 1.0 M NaCl	Detection	: UV at 260 nm
Gradient	: 40-100%B (0-30 min)	Injection	: 20 µl
Flow rate	: 0.5 ml/min	Sample	: 1 kb DNA Ladder (0.25 mg/ml)

Comparison of DNA fragment separation on 100 mm and 30 mm length YMC-BioPro QA-F columns.

Applications for non-porous YMC-BioPro: High Throughput IEX

Method development for DNA-fragments*



Column:	YMC-BioPro QA-F, 5 µm, 100 x 4.6 mm ID	Temperature:	25 °C
Part No.:	QF00S051046WP	Detection:	UV at 260 nm
Eluent:	A) 20 mM Tris HCl (pH 8.1) containing 0.5 M NaCl B) 20 mM Tris HCl (pH 8.1) containing 1.0 M NaCl	Injection:	20 µl
		Sample:	1 Kb DNA Ladder (0.25 mg/ml)
Flow rate:	0.5 ml/min		

Elution of DNA fragments is optimised on 100 mm columns. The sensitivity is improved by reducing the gradient development time by half. In addition, the analysis time is reduced by increasing the buffer concentration, while maintaining excellent resolution.

Ordering information

5 µm analytical columns

	Column dimension		
Phase	**30 x 4.6 mm ID**	**50 x 4.6 mm ID**	**100 x 4.6 mm ID**
YMC-BioPro QA	—	QAA0S050546WP	—
YMC-BioPro SP	—	SPA0S050546WP	—
YMC-BioPro QA-F	QF00S0510346WP	—	QF00S052046WP
YMC-BioPro SP-F	SF00S050346WP	—	SF00S051046WP

Olther dimensions on demand

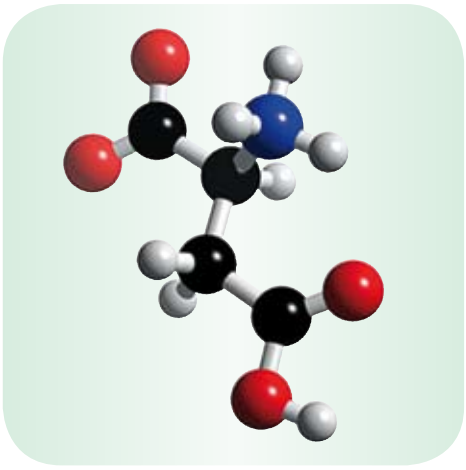
Preparative grade YMC-BioPro also available as bulk media! (See next page!)

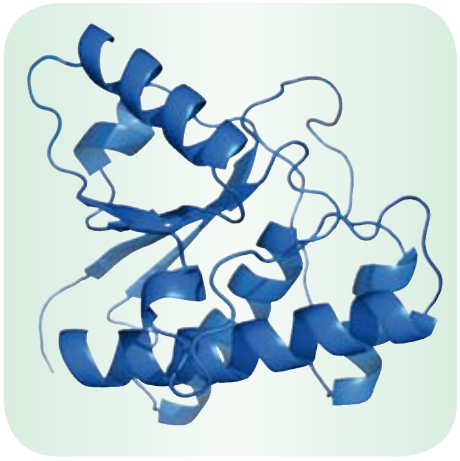
* Application data by courtesy YMC Co., Ltd.

Ordering information

Bulk media

Phase	Particle Size	Part-No.
YMC-BioPro Q30	30 µm	QAA0S30
YMC-BioPro S30	30 µm	SPA0S30
YMC-BioPro Q75	75 µm	QAA0S75
YMC-BioPro S75	75 µm	SPA0S75





SEC

YMC Column for SEC: YMC-Pack Diol

Size Exclusion Chromatography (SEC) also referred to as Gel Permeation Chromatography (GPC) is a mode of liquid chromatography in which the components of a mixture are separated according to differences in their size. It is an important tool for the analysis and separation of natural and synthetic biopolymers. The column packing for SEC is a rigid, totally porous silica gel that is derivatised with 1,2-dihydroxypropylsilane and has pores of known size. The variety of available pore sizes allows the analysis of compounds over a broad range of molecular weights, starting from about 1000 g/mol for oligomers and going up to 1,000,000 g/mol.

What is special about YMC SEC columns?

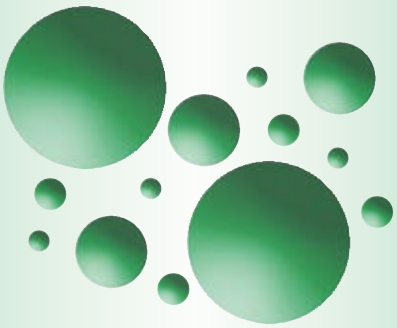
- Method development
- Scaleability
- Reproducibility
- Cost-efficiency

YMC-Pack Diol is available in four porosities and is, therefore, suitable for separation and molecular weight determination of a wide range of peptides, proteins, oligonucleotides, carbohydrates and other biopolymers with molecular weights of 10,000 to several hundred thousand.

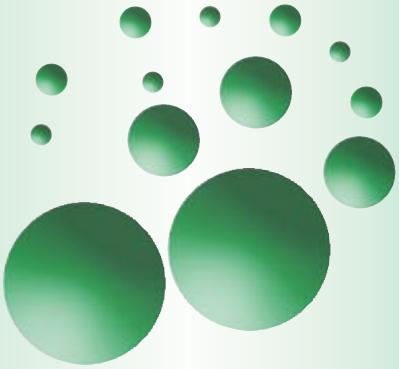
Furthermore, YMC offers a wide range of column dimensions suitable for analytical determinations to preparative separations.

YMC-Pack Diol Columns

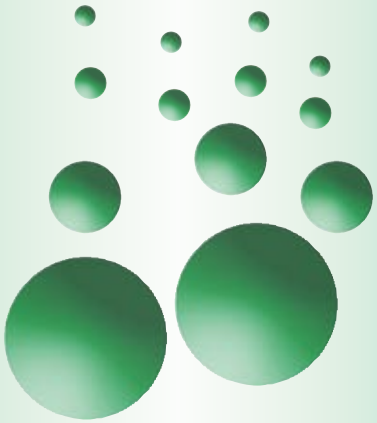
YMC-Pack Diol	for peptides and small proteins	for intermediate proteins	for large proteins	for very large proteins
pore size / nm	6	12	20	30
particle size / µm	5	5	5	5
surface area / m^2g^{-1}	650	330	175	100
recommended pH range	5.0 - 7.5	5.0 - 7.5	5.0 - 7.5	5.0 - 7.5



1. Injection



2. Separation

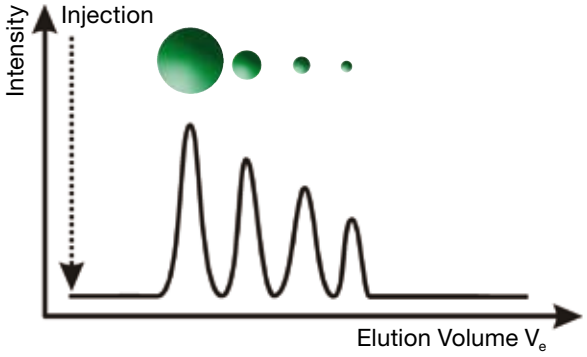


3. Elution of Fraction

Principles of separation

Molecules with shapes such as rigid rods, random chains and spheres but with the same molecular weight behave differently in SEC. The principle of separation is based on differences in the hydrodynamic radius of the molecules in solution. Molecules with a larger radius elute earlier and those with the smallest radius are retained longer.

The separation limit is such that only those compounds which differ by more than 10% in MW can be separated by SEC.



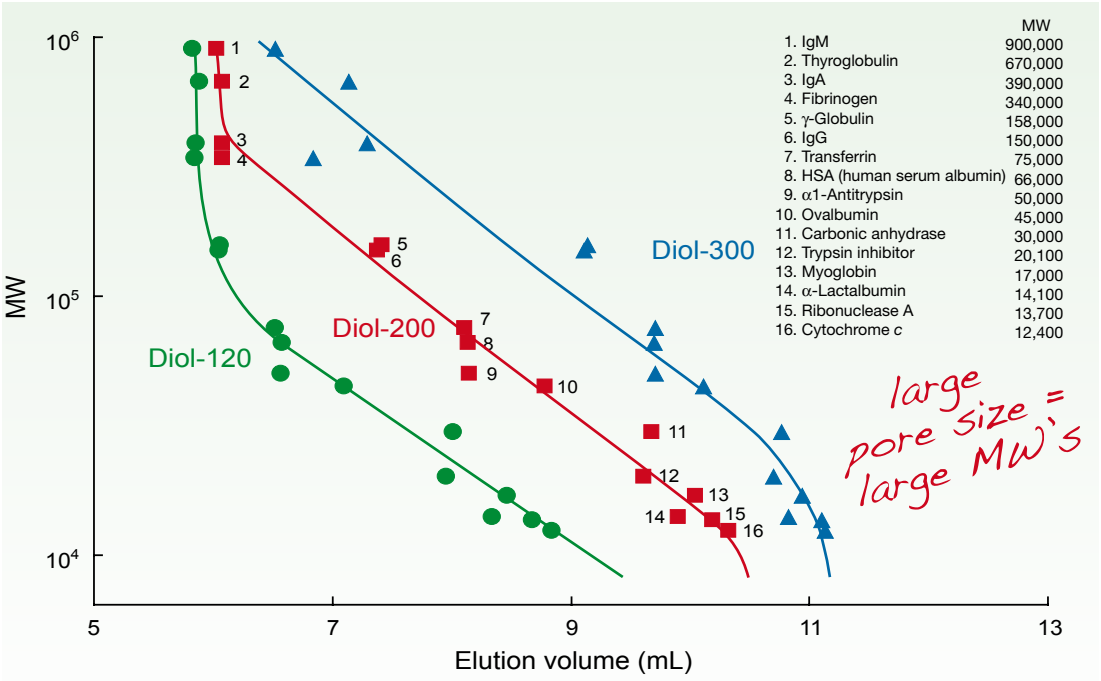
small molecules = long retention time
bigger molecules = short retention time

Large molecules exit the column more rapidly as they cannot permeate the porous structure of stationary phase. Smaller ones with the lowest hydrodynamic volume elute with longer retention times because they are able to penetrate some or all of the pores of the stationary phase. Molecules of intermediate size elute in an intermediate position.

* Application data by courtesy YMC Co., Ltd.

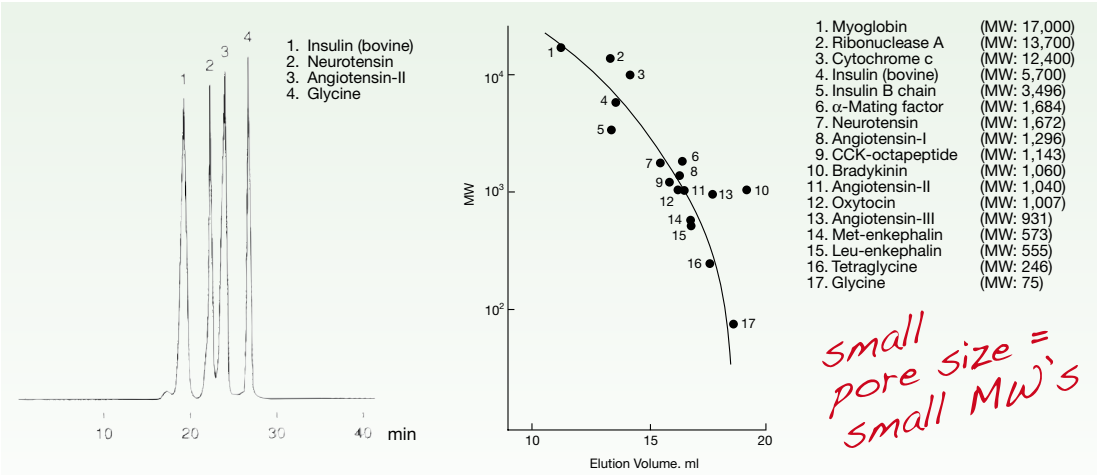
SEC Applications for YMC-Pack Diol

For separation of proteins with molecular weights from 10.000 to several 100.000



Column:	YMC-Pack Diol, 300 x 8.0 mm ID	Flow rate:	0.5 ml/min
Part No.:	DL20S053008WT	Temperature:	25 °C
Eluent:	0.1 M KH_2PO_4-K_2HPO_4 (pH 7.0) containing 0.2 M NaCl	Detection:	UV at 280 nm

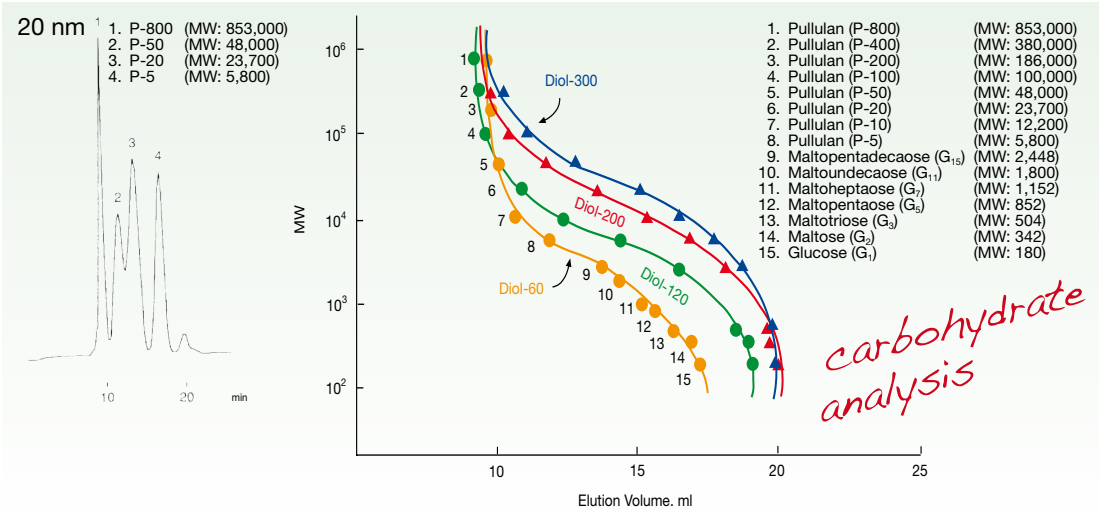
For separation of proteins with molecular weights below 10.000



Column:	YMC-Pack Diol (6 nm) 500 x 8.0 mm ID
Part No.:	DL06S055008WT
Eluent:	0.1 M KH_2PO_4-K_2HPO_4 (pH 7) containing 0.2 M NaCl / acetonitrile (70/30)
Flow rate:	0.7 ml/min
Temperature:	ambient
Detection:	UV at 215 nm

SEC Applications for YMC-Pack Diol

For molecular weight determination of oligosaccharides and polysaccharides



Column: YMC-Pack Diol (20 nm) 500 x 8.0 mm ID
Part No.: DL20S055008WT
Eluent: water
Flow rate: 1.0 ml/min
Temperature: ambient
Detection: RI

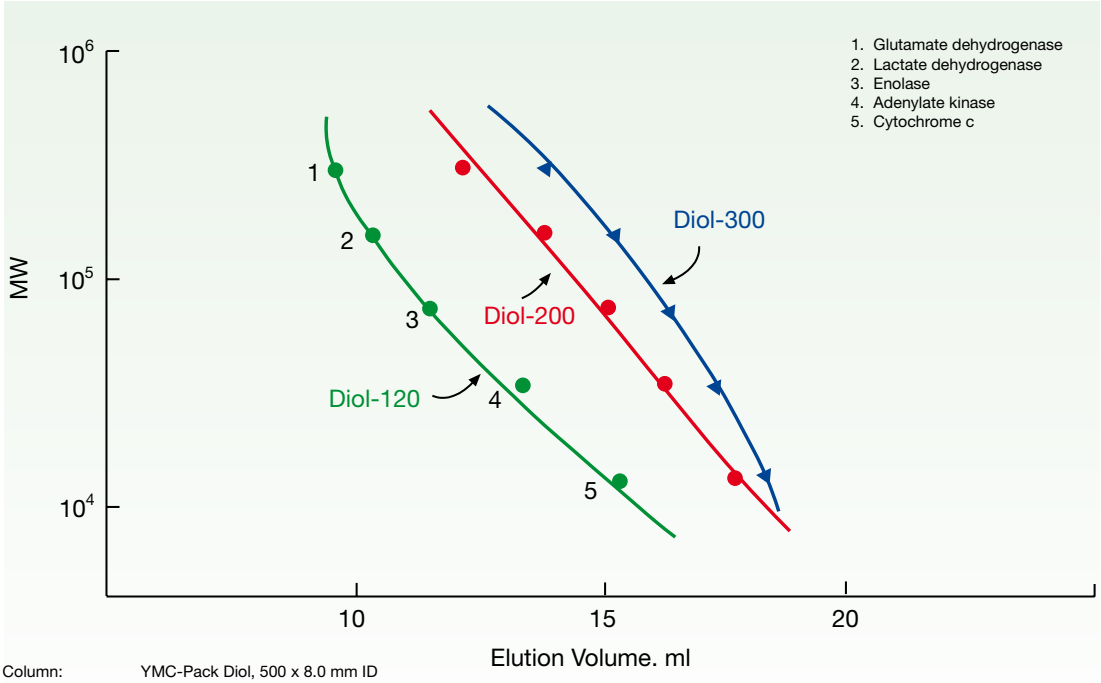
Column Selection Tool

YMC-Pack Diol-60	**for MW < 10.000**
YMC-Pack Diol-120	**for MW 5.000 to 100.000**
YMC-Pack Diol-200	**for MW 10.000 to several 100.000**
YMC-Pack Diol-300	**for MW several 10.000 to 1.000.000**

* Application data by courtesy YMC Co., Ltd.

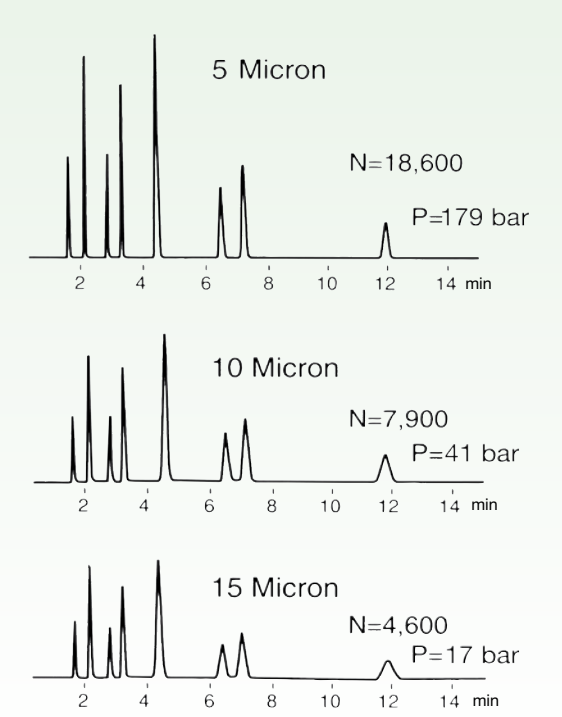
High flexibility

Proteins and Peptides*



Column:	YMC-Pack Diol, 500 x 8.0 mm ID
Part No.:	DL20S055008WT
Eluent:	0.1M KH_2PO_4-K_2HPO_4 (pH 7.0) containing 0.2M NaCl
Flow rate:	0.7 ml/min
Temperature:	ambient
Detection:	UV at 280 nm

Scalability

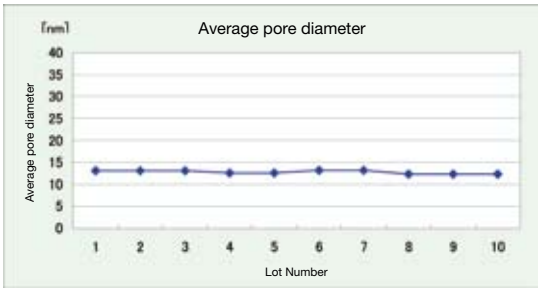


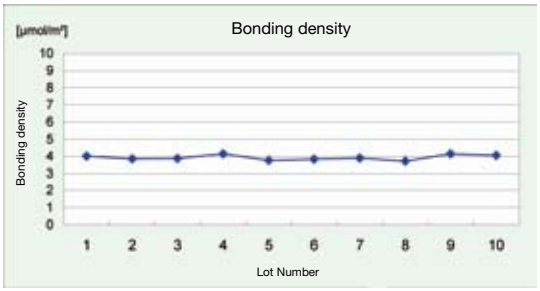
YMC guarantees a seamless, reproducible scale up through all particle sizes for all stationary phases

Reproducibility

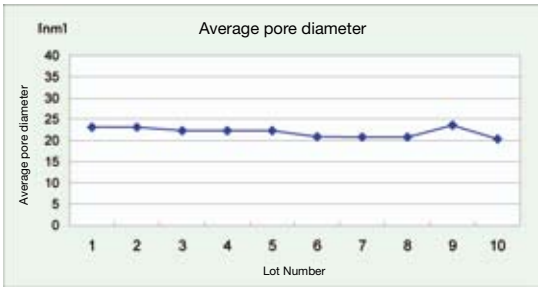
YMC-Pack Diol columns have the reputation, not only for their high versatility and excellent cost/performance ratio, but also for their high degree of lot-to-lot reproducibility.

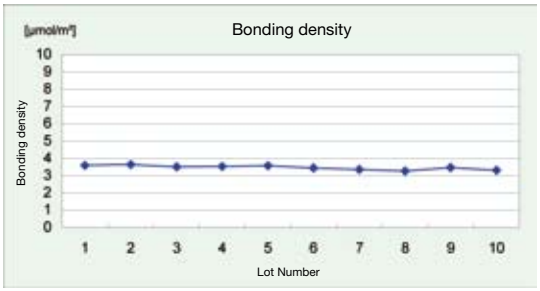
YMC-Pack Diol-120



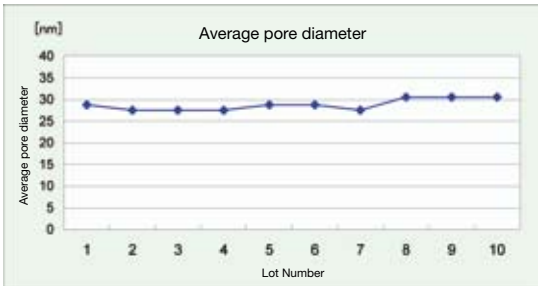


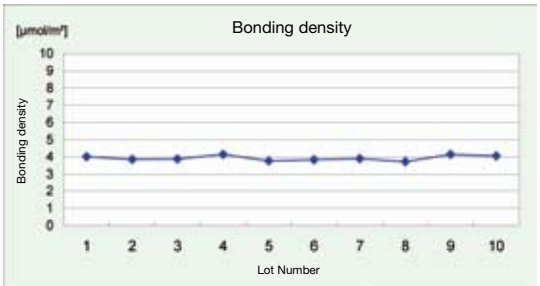
YMC-Pack Diol-200





YMC-Pack Diol-300

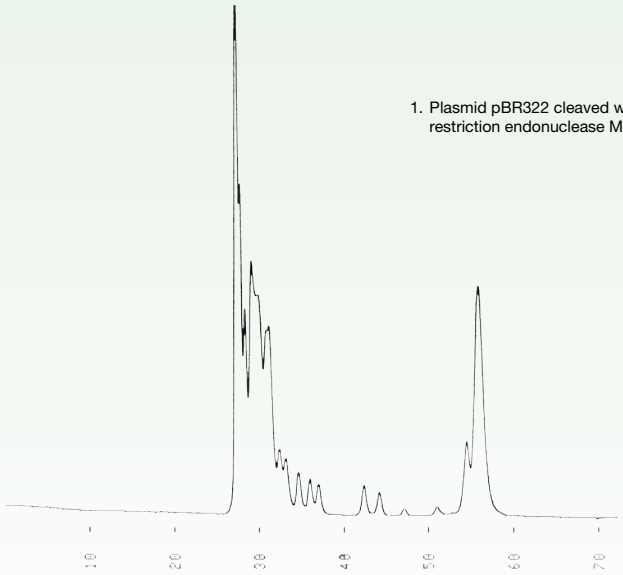




* Application data by courtesy YMC Co., Ltd.

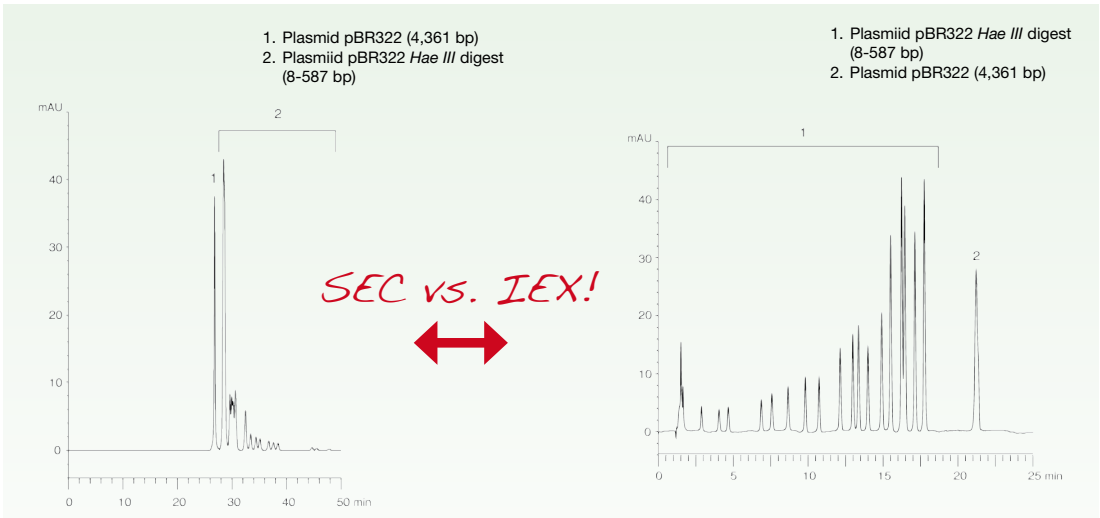
SEC Applications for YMC-Pack Diol

Plasmid pBR322 restriction fragment



Column:	YMC-Pack Diol-300 + Diol-200, 500 x 8.0 mm ID x 2	Detection:	UV at 260 nm, 0.01 AUFS
Part No.:	DL30S055008WT + DL20S055008WT	Injection:	3 µl (0.49 mg/ml)
Eluent:	0.1M KH_2PO_4-K_2HPO_4 (pH 7.0) containing 0.2M NaCl	Sample:	Plasmid pBR322 cleaved with restriction endonuclease Msp I
Flow rate:	0.7 ml/min		
Temperature:	ambient (26 °C)		

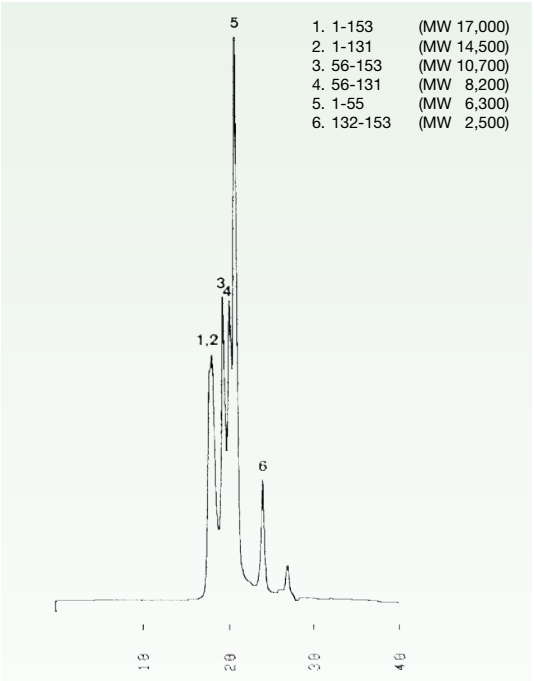
Plasmid pBR322 restriction and pBR322 *Hae III* restriction fragment



Column:	YMC-Pack Diol-300 + Diol-200, 500 x 8.0 mm ID x 2	Column:	YMC-BioPro QA-F (5 µm), 100 x 4.6 mm ID
Part No.:	DL30S055008WT + DL20S055008WT	Part No.:	QF00S051046WT
Eluent:	0.1 M KH_2PO_4-K_2HPO_4 (pH 7.0) containing 0.2 M NaCl	Eluent:	A) 20 mM Tris-HCl (pH 8.1) B) 20 mM Tris-HCl (pH 8.1) containing 0.1 M NaCl
Flow rate:	0.7 ml/min	Gradient:	70-85% B (0-20 min), 85% B (20-25 min)
Temperature:	ambient (25 °C)	Flow rate:	0.5 ml/min
Detection:	UV at 260 nm	Temperature:	35 °C
Injection:	10 µl	Detection:	UV at 260 nm
		Injection:	10 µl

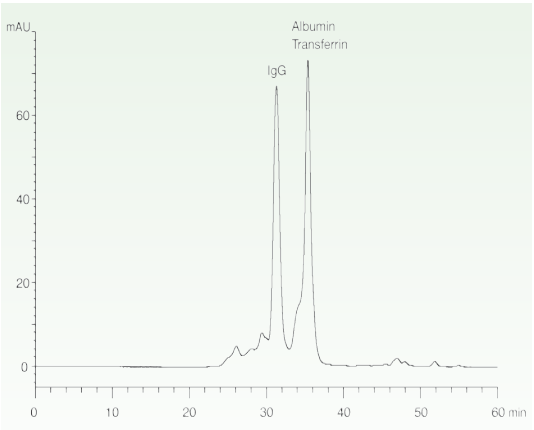
SEC Applications for YMC-Pack Diol

Peptide fragments from myoglobin



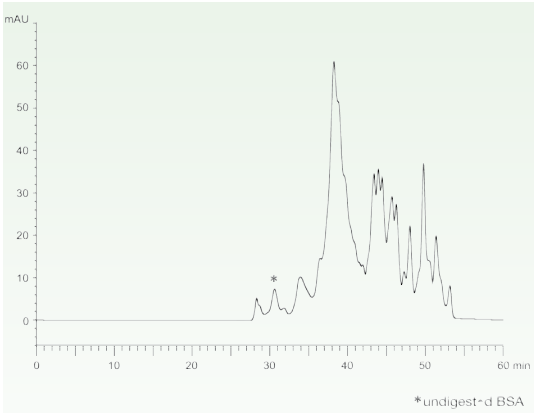
Column: YMC-Pack Diol-120, 500 x 8.0 mm ID
Part No.: DL12S055008WT
Eluent: 0.1 M KH_2PO_4-K_2HPO_4 (pH 7.0) containing 0.2 M NaCl/ acetonitrile (70/30)
Flow rate: 0.7 ml/min
Temperature: ambient (25 °C)
Detection: UV at 215 nm, 0.32 AUFS
Injection: 20 µl (2.0 mg/ml)
Sample: Cyanogen bromide cleavages of horse heart myoglobim. Molecular Weight Marker for proteins, manufactured by Fluka Chemie AG.

Proteins in mouse ascites fluid



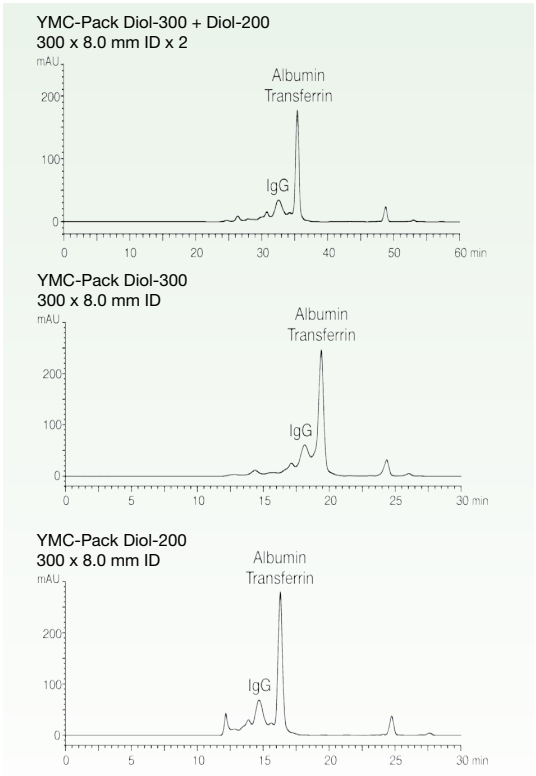
Column: YMC-Pack Diol-300 + Diol-200, 300 x 4.6 mm ID x 2
Part No.: DL30S053046WT + DL20S053046WT
Eluent: 0.1 M KH_2PO_4-K_2HPO_4 (pH 7.0)
Flow rate: 0.17 ml/min
Temperature: ambient (25 °C)
Detection: UV at 220 nm
Injection: 10 µl (60 times dilution with water)

Peptide mapping



Column: YMC-Pack Diol-120 + Diol-60, 500 x 8.0 mm ID x 2
Part No.: DL12S055008WT + DL06S055008WT
Eluent: 0.1 M KH_2PO_4-K_2HPO_4 (pH 7.0) containing 0.2 M NaCl/ acetonitrile (70/30)
Flow rate: 0.7 ml/min
Temperature: ambient (25 °C)
Detection: UV at 220 nm
Injection: 5 µl
Sample: Tryptic digest of BSA

Proteins in human serum

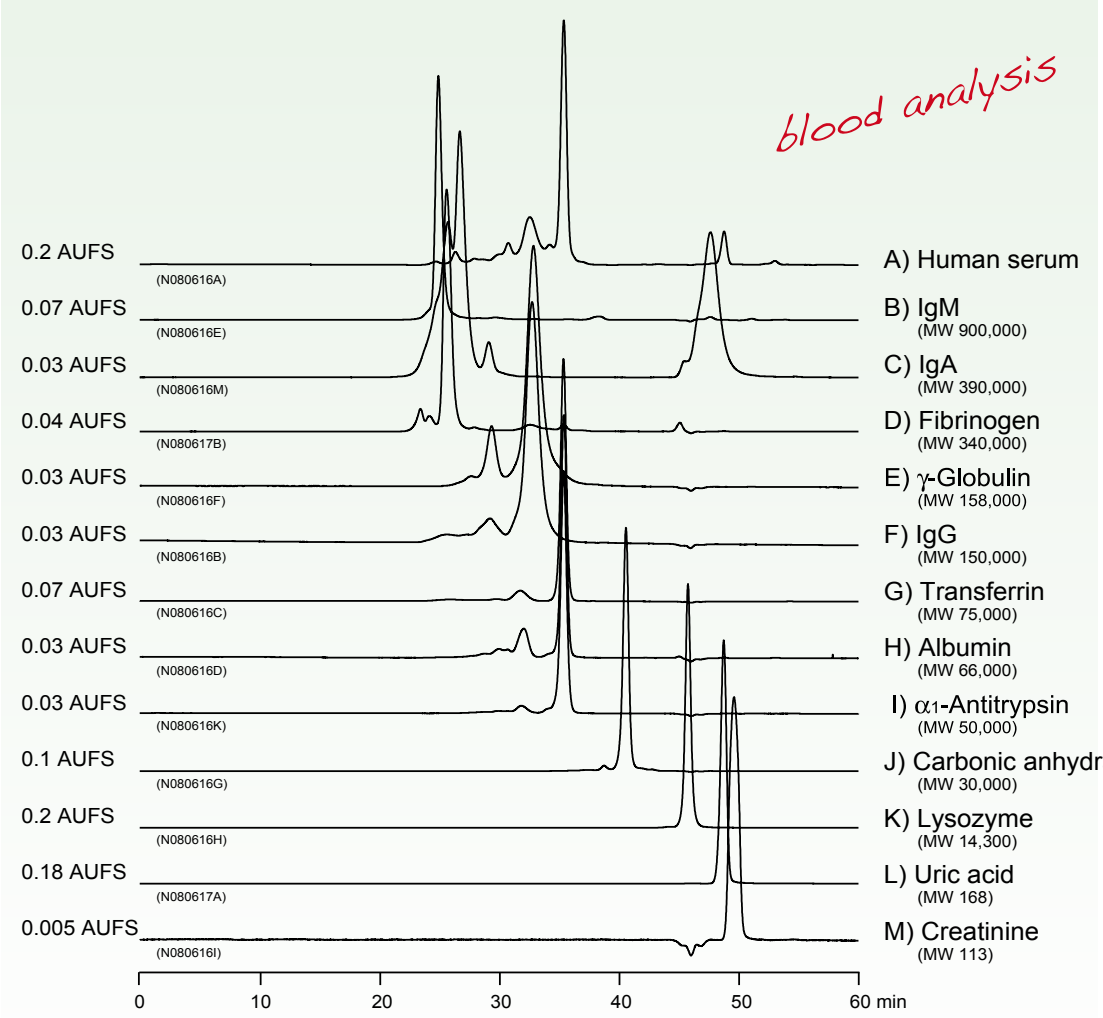


Eluent: 0.1 M KH_2PO_4-K_2HPO_4 (pH 7.0) containing 0.2 M NaCl
Flow rate: 0.5 ml/min
Temperature: ambient (25 °C)
Detection: UV at 280 nm
Injection: 20 µl
Sample: Human serum (100 µl/ml)

* Application data by courtesy YMC Co., Ltd.

SEC Applications for YMC-Pack Diol

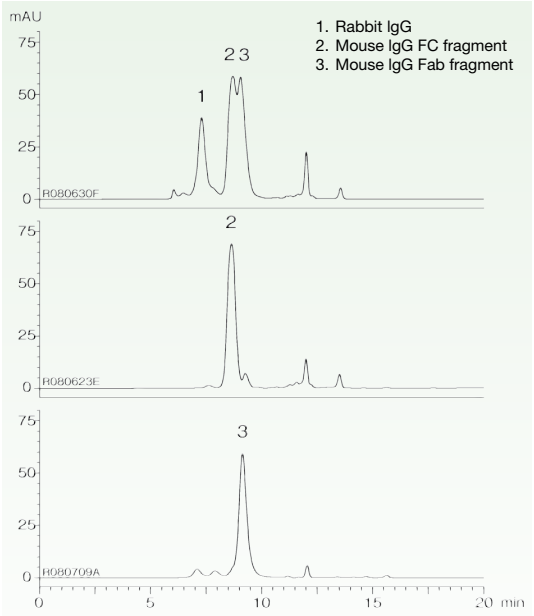
Plasma constituents



Column:	YMC-Pack Diol-300 + Diol-200, 300 x 8.0 mm ID x 2	Temperature:	ambient (25 °C)
Part No.:	DL30S053008WT + DL20S053008WT	Detection:	UV at 280 nm
Eluent:	0.1 M $KH_2PO_4K_2HPO_4$ (pH 7.0) containing 0.2 M NaCl	Injection:	20 µl (L: 1 µl)
Flow rate:	0.5 ml/min	Sample:	A) 100 µl/ml; B-M) 1.0 mg/ml

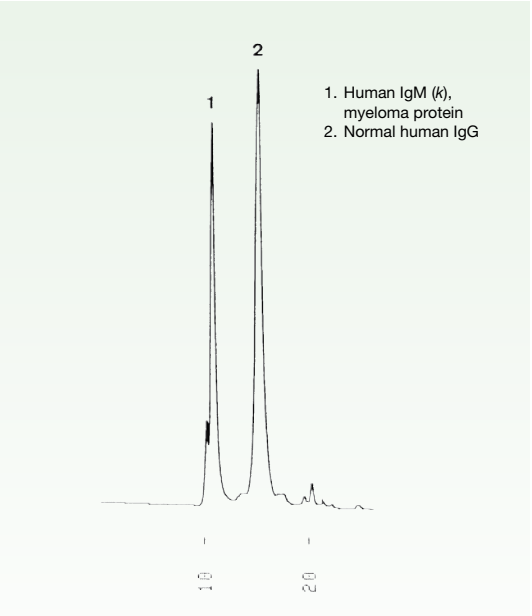
SEC Applications for YMC-Pack Diol

IgG, Fab and Fc fragments



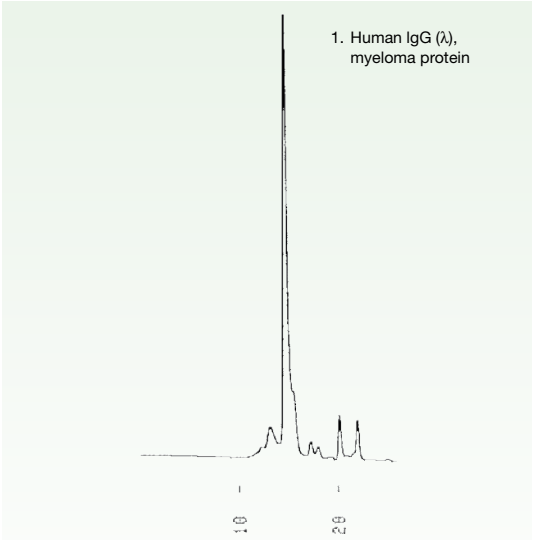
Column: YMC-Pack Diol-200, 300 x 8.0 mm ID
Part No.: DL20S053008WT
Eluent: 0.1 M KH_2PO_4-K_2HPO_4 (pH 6.9) containing 0.2 M NaCl
Flow rate: 1.0 ml/min
Temperature: ambient (27 °C)
Detection: UV at 220 nm
Injection: 5 µl (0.4, 0.5 mg/ml)

Human Immunglobulin



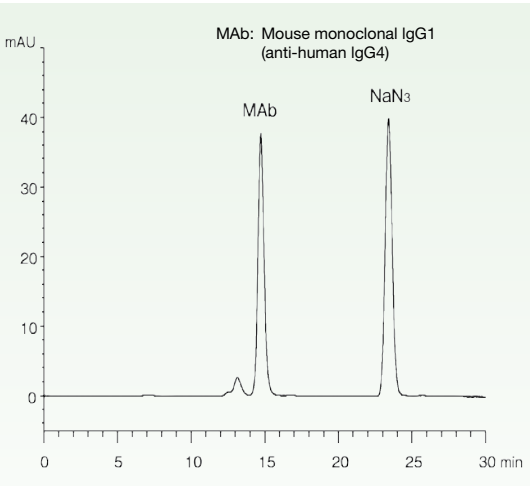
Column: YMC-Pack Diol-300, 500 x 8.0 mm ID
Part No.: DL30S055008WT
Eluent: 0.1M NaH_2PO_4-Na_2HPO_4 (pH 6.8) containing 0.1M Na_2SO_4
Flow rate: 1.0 ml/min
Temperature: ambient (24 °C)
Detection: UV at 280 nm, 0.04 AUFS
Injection: 40 µl (0.5 mg/ml)

Human IgG (λ), myeloma protein



Column: YMC-Pack Diol-300 + Diol-200, 500 x 8.0 mm ID x 2
Part No.: DL30S055008WT + DL20S055008WT
Eluent: 0.1 M KH_2PO_4-K_2HPO_4 (pH 7.0) containing 0.2 M NaCl
Flow rate: 0.7 ml/min
Temperature: ambient (25 °C)
Detection: UV at 260 nm
Injection: 10 µl

Monoclonal antibody (MAb)

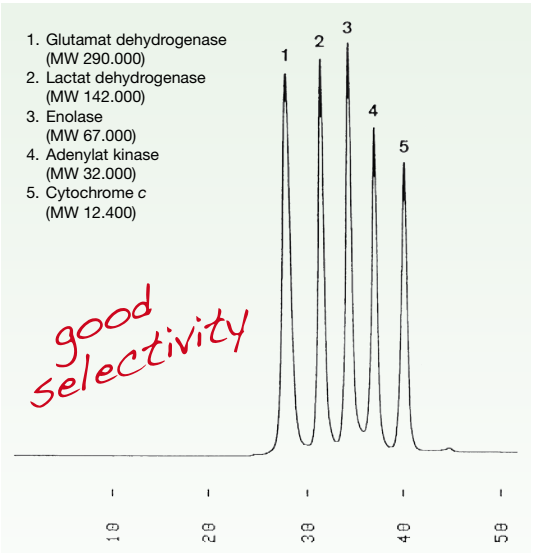


Column: YMC-Pack Diol-200, 300 x 4.6 mm ID
Part No.: DL20S053046WT
Eluent: 0.1 M KH_2PO_4-K_2HPO_4 (pH 7.0)
Flow rate: 0.17 ml/min
Temperature: ambient (25 °C)
Detection: UV at 220 nm
Injection: 10 µl
Sample: a commercially available mouse monoclonal IgG1 (0.05 mg/ml) (purified by DEAE chromatography, containing NaN_3)

* Application data by courtesy YMC Co., Ltd.

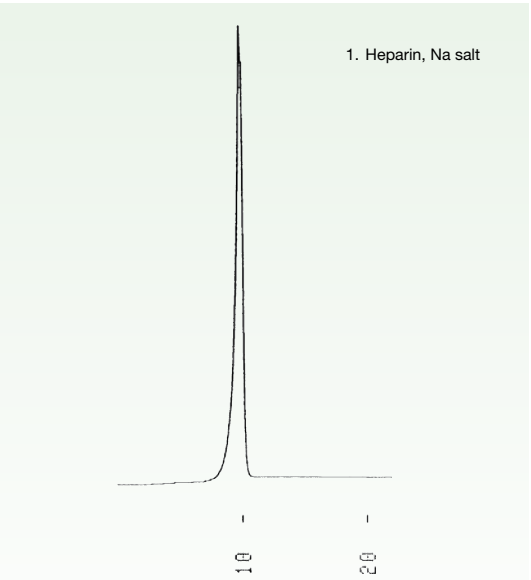
SEC Applications for YMC-Pack Diol

Proteins for molecular weight markers



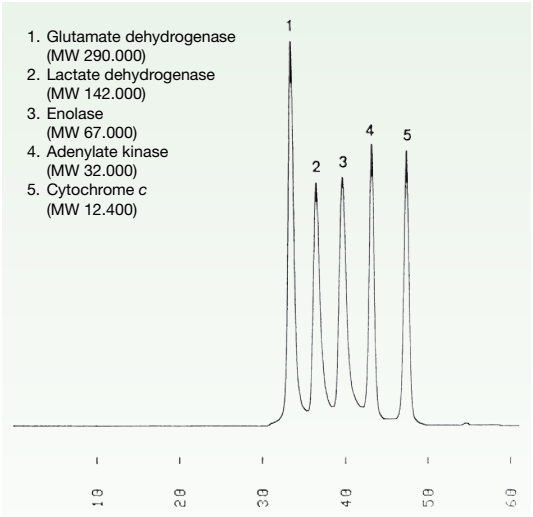
Column:	YMC-Pack Diol-200, 500 x 8.0 mm ID + 300 x 8.0 mm ID
Part No.:	DL20S055008WT + DL20S053008WT
Eluent:	0.1M KH_2PO_4-K_2HPO_4 (pH 7.0) containing 0.2M NaCl
Flow rate:	0.7 ml/min
Temperature:	ambient (26 °C)
Detection:	UV at 280 nm, 0.08 AUFS
Injection:	15 µl (100 µl/1 vial)
Sample:	MW-Marker (HPLC) manufactured by ORIENTAL YEAST CO., LTD.

Heparin



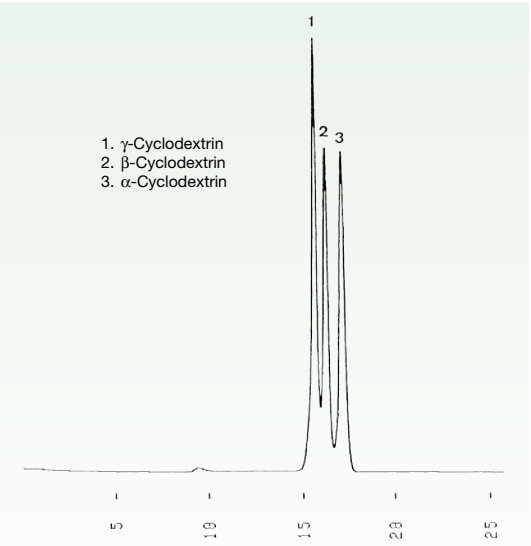
Column:	YMC-Pack Diol-300, 500 x 8.0 mm ID
Ordering-No.:	DL30S055008WT
Eluent:	water
Flow rate:	1.0 ml/min
Temperature:	ambient (24 °C)
Detection:	RI, 32 x 10^{-6} RIU/FS
Injection:	20 µl (5.0 mg/ml)

Proteins for molecular weight markers



Column:	YMC-Pack Diol-120 + Diol-300, 500 x 8.0 mm ID x 2
Part No.:	DL12S055008WT + DL30S055008WT
Eluent:	0.1M KH_2PO_4-K_2HPO_4 (pH 7.0) containing 0.2M NaCl
Flow rate:	0.7 ml/min
Temperature:	ambient (26 °C)
Detection:	UV at 280 nm, 0.08 AUFS
Injection:	15 µl (100 µl/1 vial)
Sample:	MW-Marker (HPLC) manufactured by ORIENTAL YEAST CO., LTD.

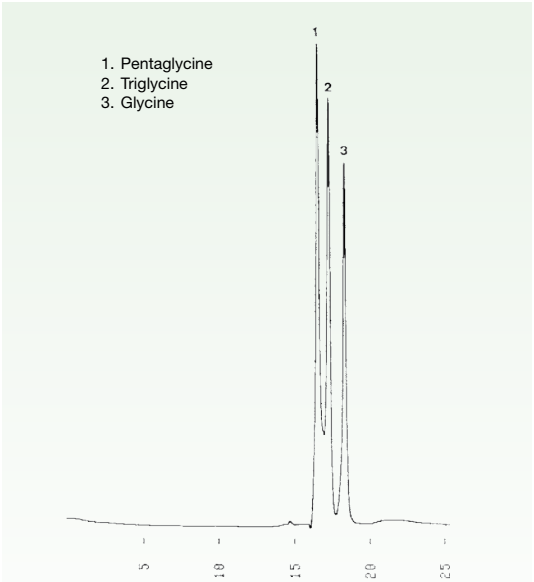
Cyclodextrins



Column:	YMC-Pack Diol 60, 500 x 8.0 mm ID
Ordering-No.:	DL06S055008WT
Eluent:	water
Flow rate:	1.0 ml/min
Temperature:	ambient (24 °C)
Detection:	RI 32 x 10-6 RIU/FS
Injection:	30 µl (1.67 mg/ml)

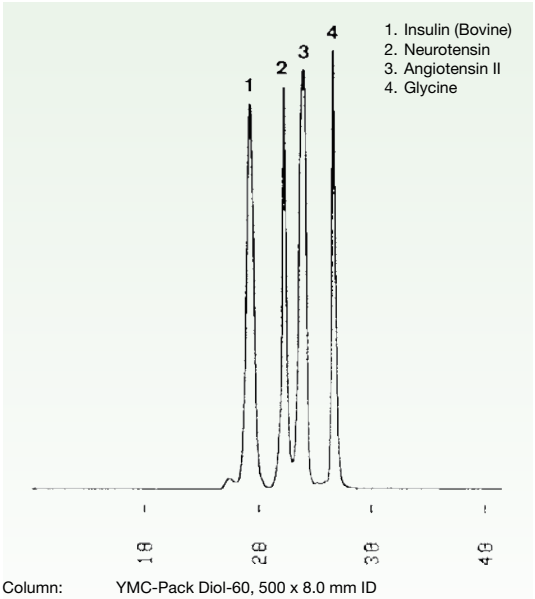
SEC Applications for YMC-Pack Diol

Glycine oligomers



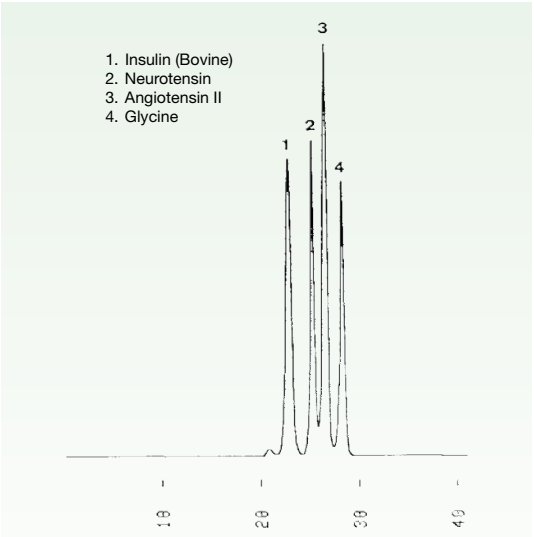
Column: YMC-Pack Diol-60, 500 x 8.0 mm ID
Ordering-No.: DL06S055008WT
Eluent: 0.1M KH_2PO_4-K_2HPO_4 (pH 7.0) / acetonitrile (70/30)
Flow rate: 1.0 ml/min
Temperature: ambient (24 °C)
Detection: UV at 215 nm, 0.08 AUFS
Injection: 20 µl (0.25 ~ 2.5 mg/ml)

Peptides



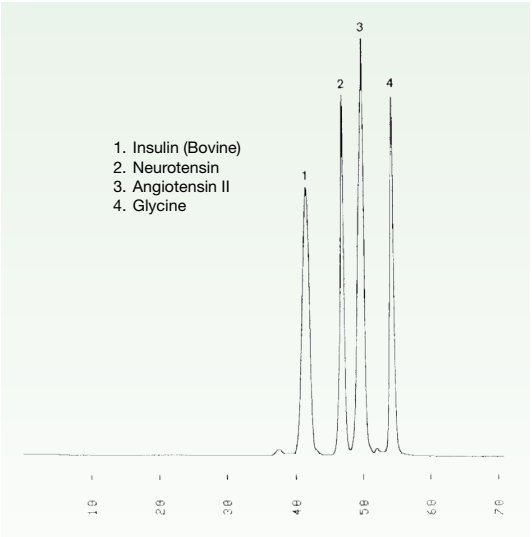
Column: YMC-Pack Diol-60, 500 x 8.0 mm ID
Ordering-No.: DL06S055008WT
Eluent: 0.1M KH_2PO_4-K_2HPO_4 (pH 7.0) / containing 0.2 M NaCl / acetonitrile (70/30)
Flow rate: 0.7 ml/min
Temperature: ambient (25 °C)
Detection: UV at 215 nm, 0.16 AUFS
Injection: 25 µl (0.07 ~ 5.3 mg/ml)

Peptides



Column: YMC-Pack Diol-120, 500 x 8.0 mm ID
Ordering-No.: DL12S055008WT
Eluent: 0.1M KH_2PO_4-K_2HPO_4 (pH 7.0) / containing 0.2 M NaCl / acetonitrile (70/30)
Flow rate: 0.7 ml/min
Temperature: ambient (25 °C)
Detection: UV at 215 nm, 0.16 AUFS
Injection: 25 µl (0.07 ~ 5.3 mg/ml)

Peptides



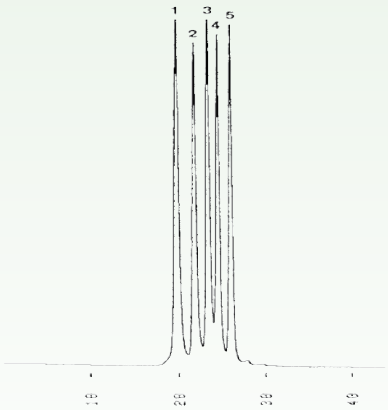
Column: YMC-Pack Diol-120 + 60, 500 x 8.0 mm ID x 2
Ordering-No.: DL12S055008WT + DL06S055008WT
Eluent: 0.1M KH_2PO_4-K_2HPO_4 (pH 7.0) / containing 0.2 M NaCl / acetonitrile (70/30)
Flow rate: 0.7 ml/min
Temperature: ambient (25 °C)
Detection: UV at 215 nm, 0.16 AUFS
Injection: 25 µl (0.07 ~ 5.3 mg/ml)

* Application data by courtesy YMC Co., Ltd.

SEC Applications for YMC-Pack Diol

Proteins for molecular weight markers

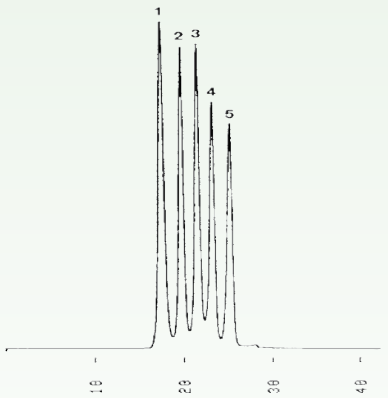
1. Glutamate dehydrogenase (MW 290,000)
2. Lactate dehydrogenase (MW 142,000)
3. Enolase (MW 67,000)
4. Adenylate kinase (MW 32,000)
5. Cytochrome c (MW 12,400)



Column:	YMC-Pack Diol-300, 500 x 8.0 mm ID
Part No.:	DL30S055008WT
Eluent:	0.1 M KH_2PO_4-K_2HPO_4 (pH 7.0) containing 0.2 M NaCl
Flow rate:	0.7 ml/min
Temperature:	ambient (26 °C)
Detection:	UV at 280 nm, 0.08 AUFS
Injection:	15 µl (100 µl / 1 vial)
Sample:	MW-Marker (HPLC), manufactured by ORIENTAL YEAST CO., LTD.

Proteins for molecular weight markers

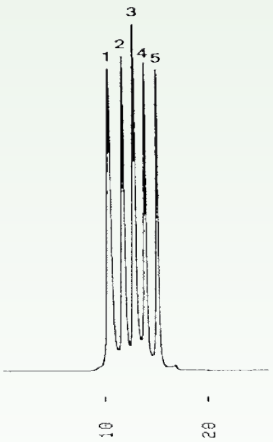
1. Glutamate dehydrogenase (MW 290,000)
2. Lactate dehydrogenase (MW 142,000)
3. Enolase (MW 67,000)
4. Adenylate kinase (MW 32,000)
5. Cytochrome c (MW 12,400)



Column:	YMC-Pack Diol-200, 500 x 8.0 mm ID
Part No.:	DL20S055008WT
Eluent:	0.1 M KH_2PO_4-K_2HPO_4 (pH 7.0) containing 0.2 M NaCl
Flow rate:	0.7 ml/min
Temperature:	ambient (26 °C)
Detection:	UV at 280 nm, 0.08 AUFS
Injection:	15 µl (100 µl / 1 vial)
Sample:	MW-Marker (HPLC), manufactured by ORIENTAL YEAST CO., LTD.

Proteins for molecular weight markers

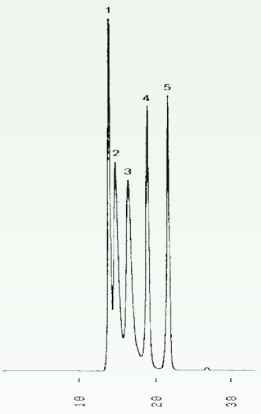
1. Glutamate dehydrogenase (MW 290,000)
2. Lactate dehydrogenase (MW 142,000)
3. Enolase (MW 67,000)
4. Adenylate kinase (MW 32,000)
5. Cytochrome c (MW 12,400)



Column:	YMC-Pack Diol-200, 300 x 8.0 mm ID
Part No.:	DL20S053008WT
Eluent:	0.1 M KH_2PO_4-K_2HPO_4 (pH 7.0) containing 0.2 M NaCl
Flow rate:	0.7 ml/min
Temperature:	ambient (26 °C)
Detection:	UV at 280 nm, 0.08 AUFS
Injection:	15 µl (100 µl / 1 vial)
Sample:	MW-Marker (HPLC), manufactured by ORIENTAL YEAST CO., LTD.

Proteins for molecular weight markers

1. Glutamate dehydrogenase (MW 290,000)
2. Lactate dehydrogenase (MW 142,000)
3. Enolase (MW 67,000)
4. Adenylate kinase (MW 32,000)
5. Cytochrome c (MW 12,400)



Column:	YMC-Pack Diol-120, 500 x 8.0 mm ID
Part No.:	DL12S055008WT
Eluent:	0.1 M KH_2PO_4-K_2HPO_4 (pH 7.0) containing 0.2 M NaCl
Flow rate:	0.7 ml/min
Temperature:	ambient (26 °C)
Detection:	UV at 280 nm, 0.08 AUFS
Injection:	15 µl (100 µl / 1 vial)
Sample:	MW-Marker (HPLC), manufactured by ORIENTAL YEAST CO., LTD.

Ordering Information

YMC-Pack Diol, 6 nm, 5 µm

	Column ID (mm)			
Column length	**4.6**	**6.0**	**8.0**	**10.0**
250 mm	DL06S052546WT	DL06S052506WT	n.a.	DL06S052510WT
300 mm	DL06S053046WT	DL06S053006WT	DL06S053008WT	DL06S053010WT
500 mm	n.a.	DL06S055006WT	DL06S055008WT	DL06S055010WT

YMC-Pack Diol, 12 nm, 5 µm

	Column ID (mm)			
Column length	**4.6**	**6.0**	**8.0**	**10.0**
250 mm	DL12S052546WT	DL12S052506WT	n.a.	DL12S052510WT
300 mm	DL12S053046WT	DL12S053006WT	DL12S053008WT	DL12S053010WT
500 mm	n.a.	DL12S055006WT	DL12S055008WT	DL12S055010WT

YMC-Pack Diol, 20 nm, 5 µm

	Column ID (mm)			
Column length	**4.6**	**6.0**	**8.0**	**10.0**
250 mm	DL20S052546WT	DL20S052506WT	n.a.	DL20S052510WT
300 mm	DL20S053046WT	DL20S053006WT	DL20S053008WT	DL20S053010WT
500 mm	n.a.	DL20S055006WT	DL20S055008WT	DL20S055010WT

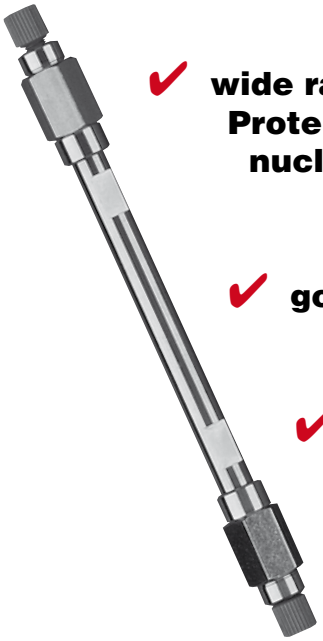
YMC-Pack Diol, 30 nm, 5 µm

	Column ID (mm)			
Column length	**4.6**	**6.0**	**8.0**	**10.0**
250 mm	DL30S052546WT	DL30S052506WT	n.a.	DL30S052510WT
300 mm	DL30S053046WT	DL30S053006WT	DL30S053008WT	DL30S053010WT
500 mm	n.a.	DL30S055006WT	DL30S055008WT	DL30S055010WT

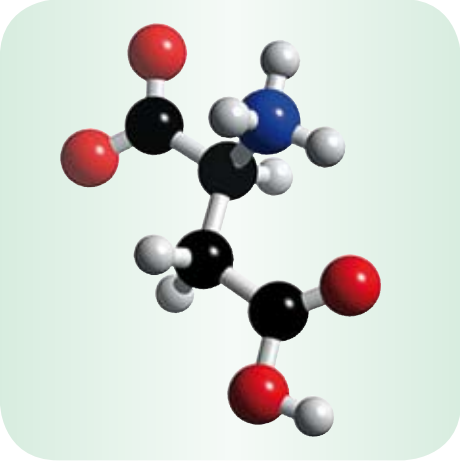
Guard Columns are available for the different column dimensions.
For more details please contact us: Phone 02064-427-0 or email info@ymc.de.

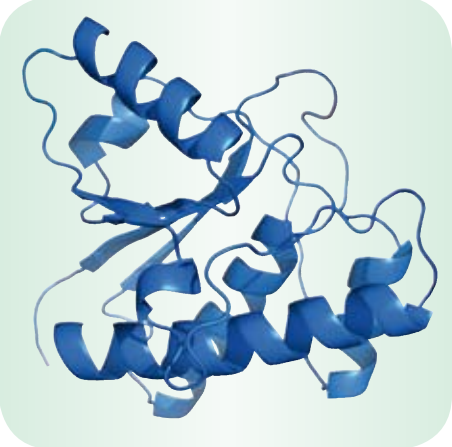
* Application data by courtesy YMC Co., Ltd.

YMC SEC columns provide:



- ✔ **wide range of applications: Proteins, peptides, carbohydrates and nucleic acid components**
- ✔ **good cost/performance ratio**
- ✔ **scalability: from 5 µm to 75 µm**
- ✔ **minimal secondary interactions**





RP

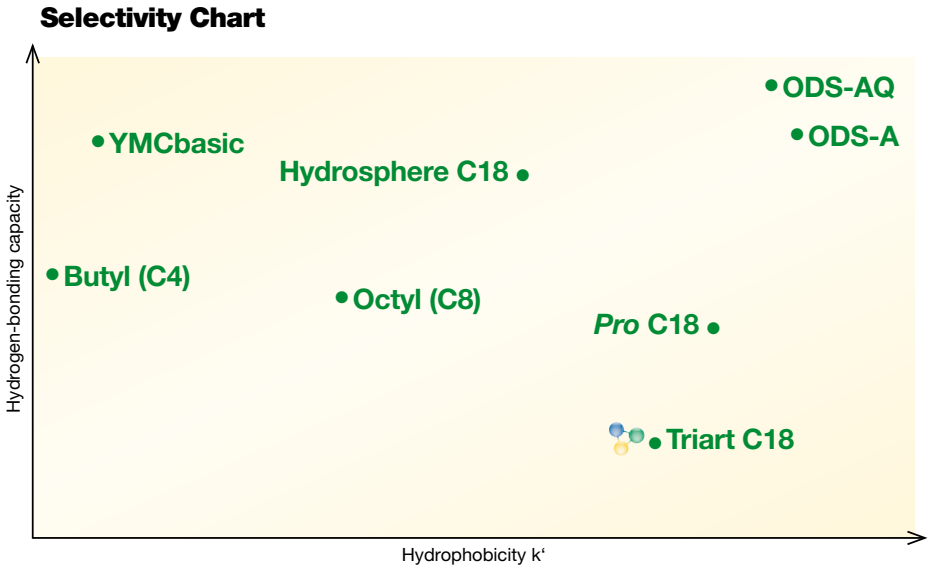
Bioseparation columns

C18-Selectivities for peptides

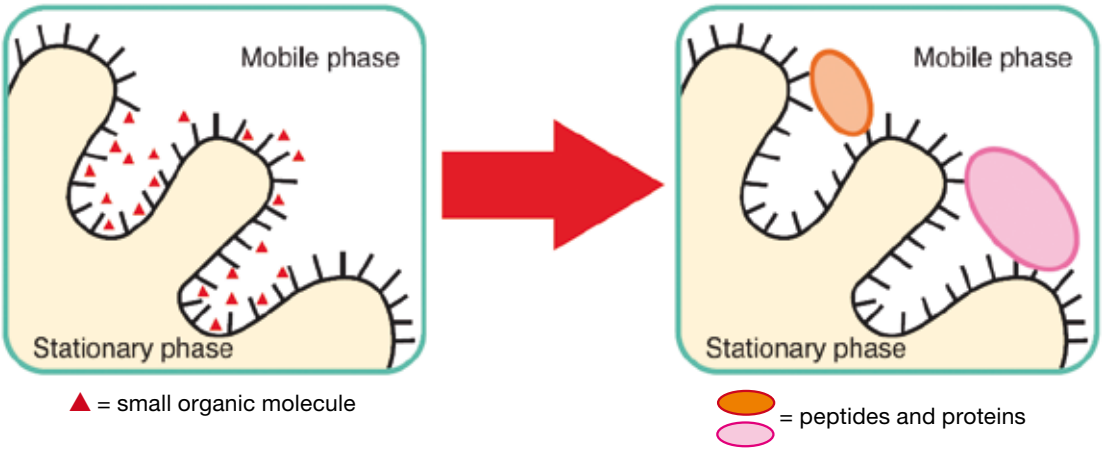
	YMC-Triart C18	YMC-Pack *Pro* C18	YMC-Pack ODS-A	YMC-Pack ODS-AQ	Hydrosphere C18
Particle size / µm	2; 3; 5	2; 3; 5	3; 5	3; 5	2; 3; 5
Pore size / nm	12	12	12; 20; 30	12; 20	12
Carbon content / %	20	17	17; 12; 7	14; 10	12
pH range	1.0 - 12.0	2.0 - 8.0	2.0 - 7.5	2.0 - 7.5	2.0 - 8.0

C8- and C4-Selectivities for peptides and proteins

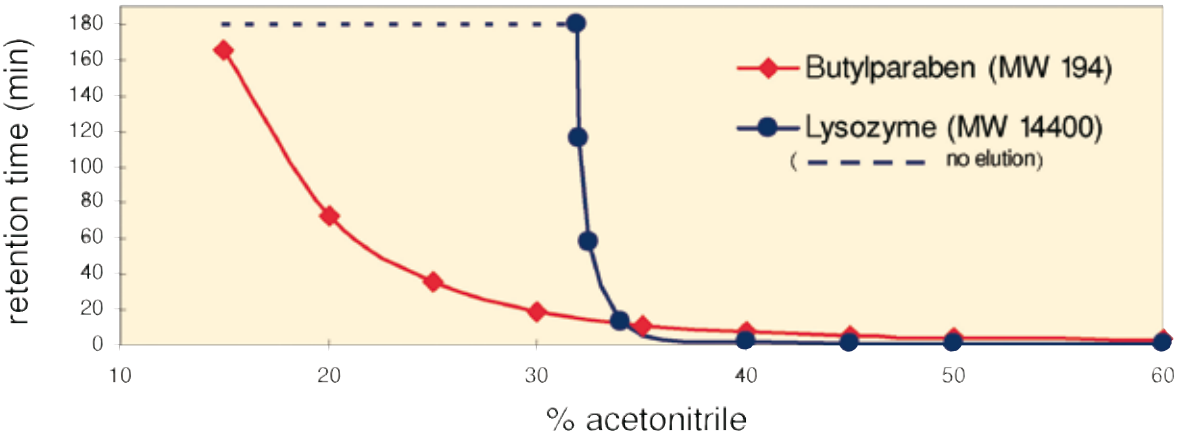
	YMC-Pack C8	YMCbasic	YMC-Pack C4	YMC-Pack Protein RP
Particle size / µm	3; 5	3; 5	3; 5	5
Pore size / nm	12; 20; 30	proprietary	12; 20; 30	proprietary
Carbon content / %	10; 7; 4	7	7; 5; 3	4
pH range	2.0 - 7.5	2.0 - 7.5	2.0 - 7.5	1.5 - 7.5



Retention mechanism for peptides and proteins



ON–OFF mechanism



By monitoring the dependency between the retention time of analytes and the percentage of organic solvent being used, an interesting difference in behaviour between small organic molecules and proteins is revealed.

Small organic molecules such as butylparaben are retained/eluted by a distribution mechanism as shown in the linear relationship between retention time and percentage of organic modifier. This is in sharp contrast to the retention behaviour of peptides and proteins, e.g. lysozyme. These are retained/eluted by an adsorption-desorption (on-off) mechanism and as a result the pore size has to be carefully considered.

* Application data by courtesy YMC Co., Ltd.

Chromatographers know the problems during method development: “Which phase is suitable and allows a simple and robust separation?”

In the field of biochromatography, phase selection is a key to success!

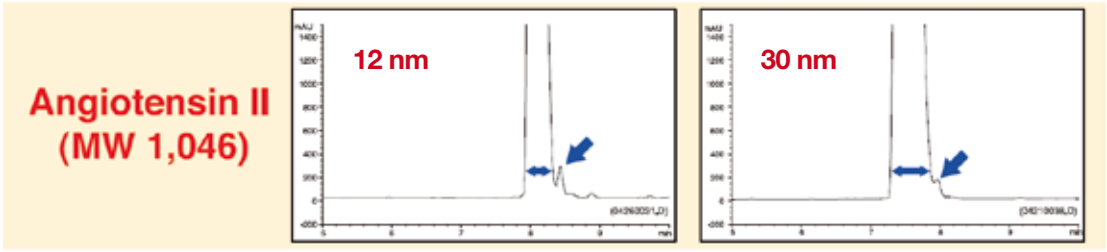
With the YMC’s ”Column Selection Tool“ for Bio-LC, stationary phase selection is almost too easy.

As shown in the table (below), the C18 column with 12 nm pore size is suitable for small peptides up to a MW 5000. The best efficiency for large peptides or small proteins can be obtained by employing a C8 phase characterised by a 20 nm pore size.

Furthermore, most proteins are eluted effectively by a C4 column with 30 nm.

However, the separation may also be influenced by the hydrophobicity of the peptide/protein and the nature of the column’s bonded phase. Therefore, for initial method development, it might be useful, in the first instance, to follow the arrow shown in the table for method optimisation.

Comparision of peaks on C4 with 12 nm and 30 nm pore sizes



For smaller peptides a small pore size is more successful. Larger molecules are separated much better with larger pore sizes!

Column Selection Tool*

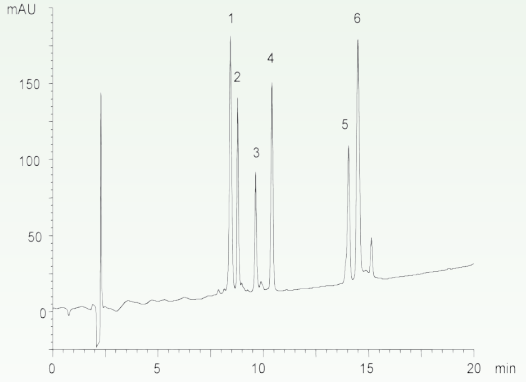
MW		C18	C8	C4
5000	12 nm	◎	○	△
20000	20 nm	○	◎	○
100000	30 nm	△	○	◎

◎: excellent, ○: good, △: moderate

Peptide and Protein Applications

Peptides and Proteins

1. Cytochrome c (Horse heart) MW 12,400
2. Insulin (Bovine pancreas) MW 5,733
3. Amyloid β-protein (1-40) MW 4,330
4. Lysozyme (Chicken egg white) MW 14,300
5. α-Lactalbumin (Human milk) MW 14,100
6. Myoglobin (Horse skeletal muscle) MW 17,000

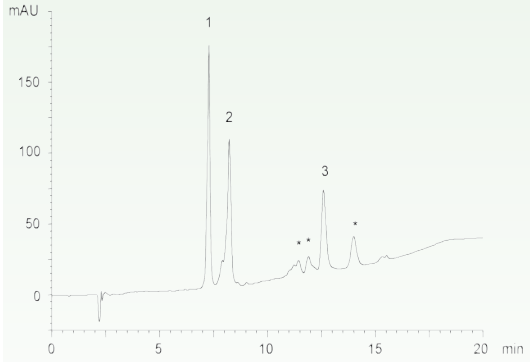


Column: YMC-Pack C8 (5 µm, 20 nm) 150 x 4.6 mm ID
Part No.: OC20S051546WT
Eluent: A) water / TFA (100/0.1)
B) acetonitrile / TFA (100/0.1)
Gradient: 25-60% B (0-20 min)
Flow rate: 1.0 ml/min
Temperature: 37 °C
Detection: UV at 220 nm
Injection: 10 µl (0.1 ~ 0.2 mg/ml)

Proteins

1. BSA MW 66,000
2. Conalbumin (Chicken egg white) MW 77,000
3. Lipoxidase (Soybean) MW 96,000

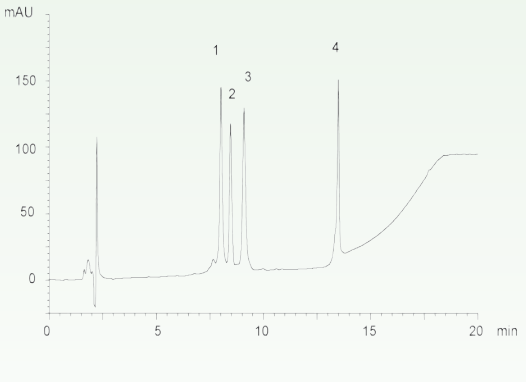
* Impurities in commercial lipoxidase



Column: YMC-Pack C4 (5 µm, 30 nm) 150 x 4.6 mm ID
Part No.: BU30S051546WT
Eluent: A) water / TFA (100/0.1)
B) acetonitrile / 2-propanol / TFA (50/50/0.1)
Gradient: 30-75% B (0-15 min), 75% B (15-20 min)
Flow rate: 1.0 ml/min
Temperature: 37 °C
Detection: UV at 220 nm
Injection: 10 µl (0.25 ~ 1.0 mg/ml)

Proteins

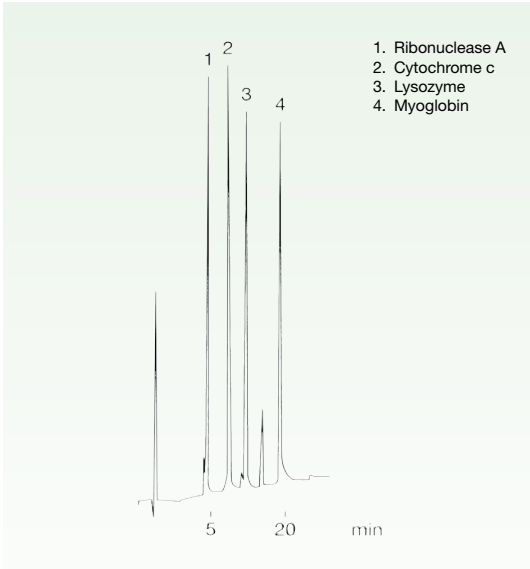
1. β-Lactoglobulin B (Bovine milk) MW 18,300
2. β-Lactoglobulin A (Bovine milk) MW 18,400
3. α-Chymotrypsinogen A (Bovine pancreas) MW 18,300
4. Ovalbumin MW 45,000



Column: YMC-Pack C4 (5 µm, 30 nm) 150 x 4.6 mm ID
Part No.: BU30S051546WT
Eluent: A) water / TFA (100/0.1)
B) acetonitrile / TFA (100/0.1)
Gradient: 40-50% B (0-10 min), 50-90% B (10-15 min), 90% B (15-20 min)
Flow rate: 1.0 ml/min
Temperature: 37 °C
Detection: UV at 220 nm
Injection: 10 µl (0.2 ~ 0.3 mg/ml)

Proteins

1. Ribonuclease A
2. Cytochrome c
3. Lysozyme
4. Myoglobin

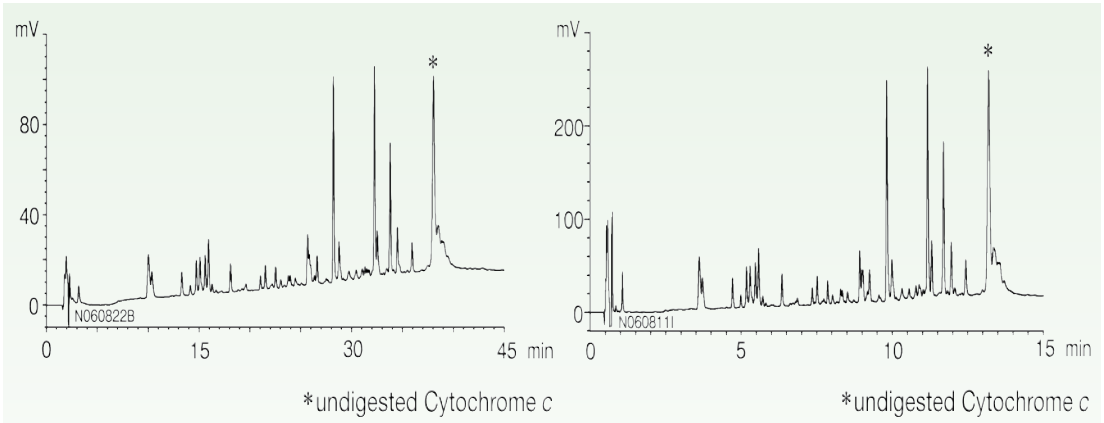


Column: YMC-Pack C4 (5 µm, 30 nm) 150 x 4.6 mm ID
Part No.: BU30S051546WT
Eluent: A) acetonitrile / water / TFA (5/95/0.1)
B) acetonitrile / water / TFA (60/40/0.1)
Gradient: 30%-90% B (0-20 min., linear), 90% B (20-50 min)
Flow rate: 1.0 ml/min
Temperature: 37 °C
Detection: UV at 220 nm

* Application data by courtesy YMC Co., Ltd.

Peptide and Protein Applications

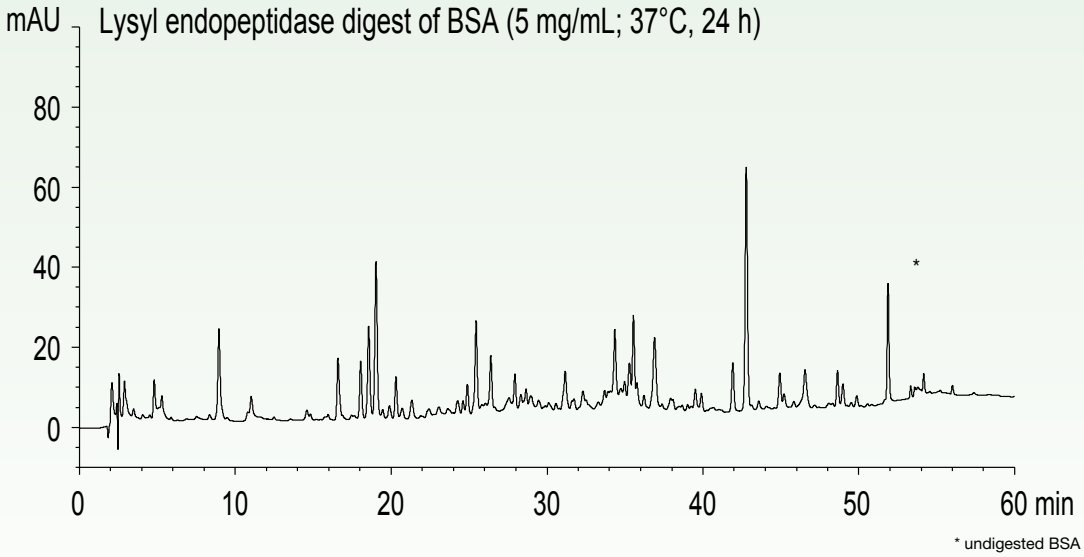
Peptide mapping - excellent reproducibility between 5 µm and 2 µm



Column:	YMC-UltraHT *Pro* C18 (5 µm, 12 nm) 150 × 2.0 mm ID		
Part No.:	AS12S051502QT		
Eluent:	A) acetonitrile/water/trifluoroacetic acid (10/90/0.1)		
	B) acetonitrile/water/trifluoroacetic acid (35/65/0.1)		
Gradient:	Time	A (in %)	B (in %)
	0	100	0
	5	100	0
	40	0	100
	45	0	100
Flow rate:	0.2 ml/min		
Temperature:	37 °C		
Detection:	UV at 220 nm		
Injection:	1 µl		
Sample:	Tryptic digest of Cytochrome c		

Column:	YMC-UltraHT *Pro* C18 (2 µm, 12 nm) 50 × 2.0 mm ID		
Part No.:	AS12S020502WT		
Eluent:	A) acetonitrile/water/trifluoroacetic acid (10/90/0.1)		
	B) acetonitrile/water/trifluoroacetic acid (35/65/0.1)		
Gradient:	Time	A (in %)	B (in %)
	0	100	0
	1.65	100	0
	13.35	0	100
	15.00	0	100
Flow rate:	0.2 ml/min		
Temperature:	37 °C		
Detection:	UV at 220 nm		
Injection:	1 µl		
Sample:	Tryptic digest of Cytochrome c		

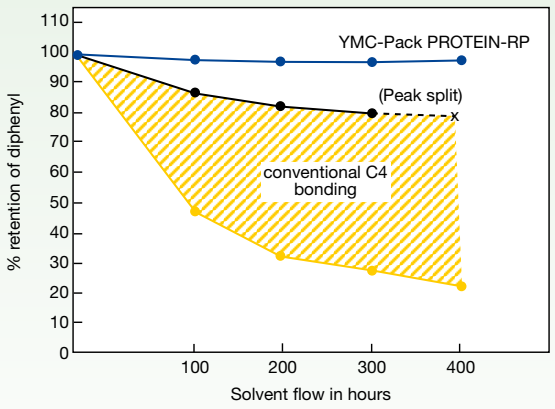
Peptides mapping



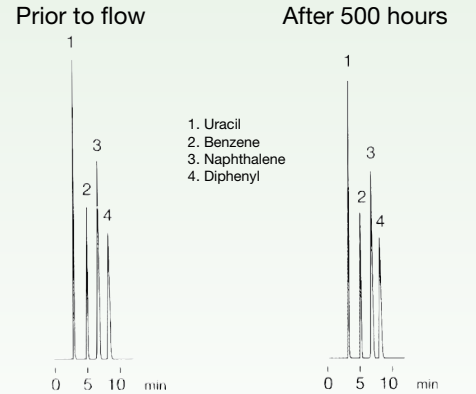
Column:	YMCbasic (5 µm) 150 x 2.0 mm ID
Part No.:	BA99S051502WT
Eluent:	A) water / TFA (94/6) B) acetonitrile / TFA (100/0.1)
Gradient:	5-35% B (0-50 min), 35-45% B (50-55 min), 45% B (55-60 min)
Flow rate:	0.2 ml/min
Temperature:	37 °C
Detection:	UV at 220 nm
Injection:	1 µl

Peptide and Protein Applications

Improved durability when used with TFA solution



Flow conditions
Eluent: water / TFA (100/0.1)
Flow rate: 1.0 ml/min
Temperature: ambient



Theoretical plate number (4) = 14.300
Theoretical plate number (4) = 13.800

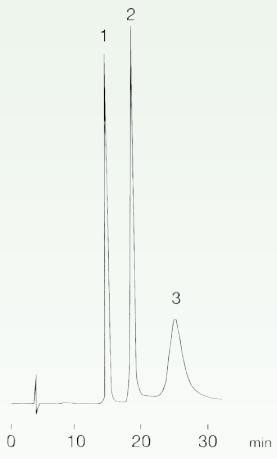
Measurement conditions
Column: YMC-Pack Protein-RP (5 µm) 250 x 4.6 mm ID
Part No.: PR99S052546WT
Eluent: acetonitrile / water (40/60)
Flow rate: 1.0 ml/min
Temperature: 30° C
Detection: UV at 254 nm, 0.32 AUFS

The selectivity of YMC-Pack Protein-RP is different from that seen with conventional wide pore butyl phases and it is specifically suited for the protein analysis.

In the applications below it effectively separates both low molecular weight compounds and high molecular weight proteins, with equally good peak shapes being obtained.

Proteins

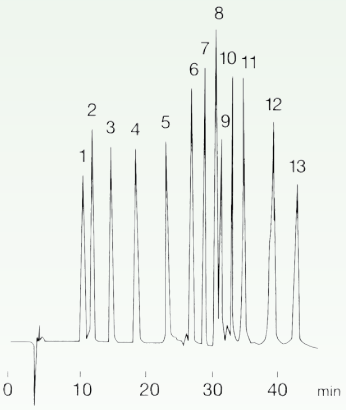
1. Cytochrome c (MW: 12.400, 5 µg)
2. BSA (MW: 66.000, 25 µg)
3. Ferritin (MW: 440.000,10 µg)



Column: YMC-Pack Protein-RP (5 µm) 250 x 4.6 mm ID
Part No.: PR99S052546WT
Eluent: A) water / TFA (100/0.1)
B) acetronitrile / TFA (100/0.1)
Gradient: 30%-90% B (0-45 min., linear)
Flow rate: 1.0 ml/min
Temperature: ambient
Detection: UV at 280 nm, 0.04 AUFS

Proteins and peptides

1. Met-Enkephalin
2. Leu-Enkephalin
3. Oxytocin
4. Bradykinin
5. Angiotensin I
6. Ribonuclease A
7. α-Mating factor
8. Insulin (bovine)
9. Cytochrome c
10. Lysozyme
11. BSA
12. β-Lactoglobulin
13. Ovalbumin

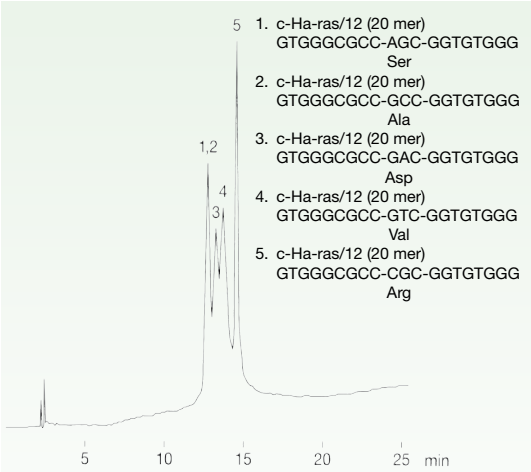


Column: YMC-Pack Protein-RP (5 µm) 250 x 4.6 mm ID
Part No.: PR99S052546WT
Eluent: A) water / TFA (100/0.1)
B) acetonitrile / TFA (100/0.1)
Gradient: 10%-90% B (0-60 min., linear)
Flow rate: 1.0 ml/min
Temperature: ambient
Detection: UV at 220 nm, 0.32 AUFS

* Application data by courtesy YMC Co., Ltd.

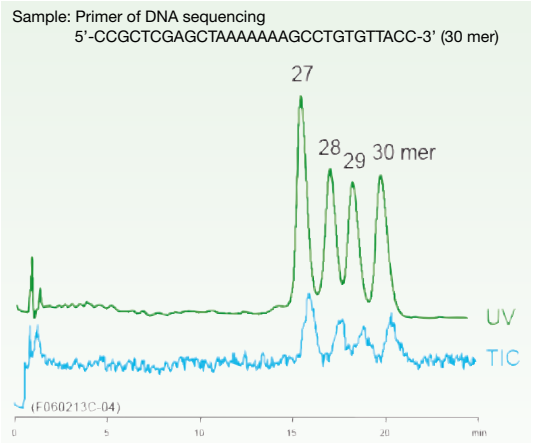
Oligonucleotide Applications

Oligonucleotides



Column:	YMC-Pack ODS-A (5 µm, 30 nm) 150 x 4.6 mm ID
Part No.:	AA30S051546WT
Eluent:	A) 100 mM Triethylamine-acetic acid (pH 6.5) / acetonitrile (94/6) B) 100 mM Triethylamine-acetic acid (pH 6.5) / acetonitrile (85/15)
Gradient:	0%-100% B (0-25 min, linear)
Flow rate:	1.0 ml/min
Temperature:	30 °C
Detection:	UV at 260 nm

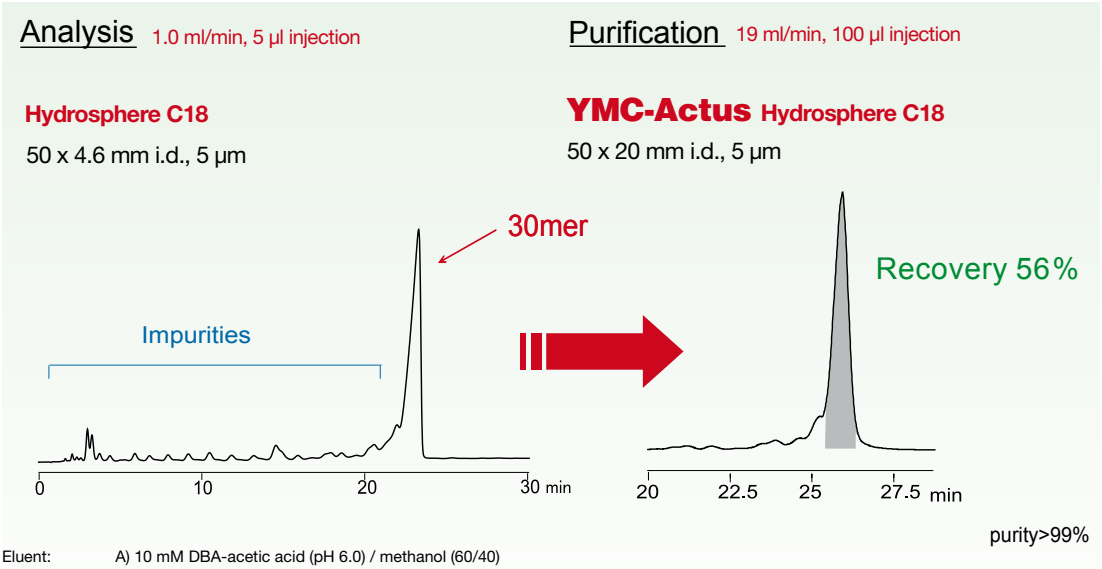
LC-MS analysis of synthetic 27-30 mer oligonucleotides



Column:	YMC Hydrosphere C18, 50 x 2.0 mm ID, 3 µm
Part No.:	HS12S030502WT
Eluent:	A) 10 mM DBAA (pH 6.0) B) Mobile phase A / acetonitrile (50/50)
Gradient:	58%-62% B (0-20 min), 62% B (20-25 min)
Flow rate:	0.2 ml/min
Temperature:	35 °C
Detection:	UV at 269 nm and ESI negative-mode
Injection:	1 µl (10 pmol/component)

Outstanding separation of highly polar compounds

Crude synthetic 30mer oligonucleotide



Eluent:	A) 10 mM DBA-acetic acid (pH 6.0) / methanol (60/40) B) 10 mM DBA-acetic acid (pH 6.0) / methanol (20/80)
Gradient:	10%-35% B (0-30 min.)
Temperature:	ambient
Detection:	UV at 269 nm
Sample:	synthetic oligonucleotide (100 µM)

Ordering information

2 µm analytical columns, 2.0 mm ID, C18

Phase	Column dimension			
	30 x 2.0 mm ID	50 x 2.0 mm ID	100 x 2.0 mm ID	150 x 2.0 mm ID
YMC-UltraHT *Pro* C18	AS12S020302WT	AS12S020502WT	AS12S021002WT	AS12S021502WT
YMC-UltraHT Hydrosphere C18	HS12S020302WT	HS12S020502WT	HS12S021002WT	HS12S021502WT

2 µm analytical columns, 3.0 mm ID, C18

Phase	Column dimension			
	30 x 3.0 mm ID	50 x 3.0 mm ID	100 x 3.0 mm ID	150 x 3.0 mm ID
YMC-UltraHT *Pro* C18	AS12S020303WT	AS12S020503WT	AS12S021003WT	AS12S021503WT
YMC-UltraHT Hydrosphere C18	HS12S020303WT	HS12S020503WT	HS12S021003WT	HS12S021503WT

3 µm analytical columns, C18

Phase	Column dimension				
	150 x 2.0 mm ID	150 x 3.0 mm ID	150 x 4.6 mm ID	250 x 3.0 mm ID	250 x 4.6 mm ID
YMC-Pack ODS-A (C18)	AA12S031502WT	AA12S031503WT	AA12S031546WT	AA12S032503WT	AA12S032546WT
YMC-Pack ODS-AQ (C18)	AQ12S031502WT	AQ12S031503WT	AQ12S031546WT	AQ12S032503WT	AQ12S032546WT
YMC-Pack *Pro* C18	AS12S031502WT	AS12S031503WT	AS12S031546WT	AS12S032503WT	AS12S032546WT
Hydrosphere C18	HS12S031502WT	HS12S031503WT	HS12S031546WT	HS12S032503WT	HS12S032546WT
YMC-Triart C18	TA12S031502WT	TA12S031503WT	TA12S031546WT	TA12S032503WT	TA12S032546WT

3 µm analytical columns, C8 & C4

Phase	Column dimension				
	150 x 2.0 mm ID	150 x 3.0 mm ID	150 x 4.6 mm ID	250 x 3.0 mm ID	250 x 4.6 mm ID
YMC-Pack Octyl (C8)	OC12S031502WT	OC12S031503WT	OC12S031546WT	OC12S032503WT	OC12S032546WT
YMCbasic (eq. C8)	BA12S031502WT	BA12S031503WT	BA12S031546WT	BA12S032503WT	BA12S032546WT
YMC-Pack Butyl (C4)	BU12S031502WT	BU12S031503WT	BU12S031546WT	BU12S032503WT	BU12S032546WT

Other dimensions are also avialable. Please contact us: Phone +49(0)2064/427-0 or E-Mail: info@ymc.ded.

Ordering information

5 µm analytical columns, C18

Phase	Column dimension				
	150 x 2.0 mm ID	150 x 3.0 mm ID	150 x 4.6 mm ID	250 x 3.0 mm ID	250 x 4.6 mm ID
YMC-Pack ODS-A (C18)	AA12S051502WT	AA12S051503WT	AA12S051546WT	AA12S052503WT	AA12S052546WT
YMC-Pack ODS-AQ (C18)	AQ12S051502WT	AQ12S051503WT	AQ12S051546WT	AQ12S052503WT	AQ12S052546WT
YMC-Pack *Pro* C18	AS12S051502WT	AS12S051503WT	AS12S051546WT	AS12S052503WT	AS12S052546WT
Hydrosphere C18	HS12S051502WT	HS12S051503WT	HS12S051546WT	HS12S052503WT	HS12S052546WT
YMC-Triart C18	TA12S051502WT	TA12S051503WT	TA12S051546WT	TA12S052503WT	TA12S052546WT

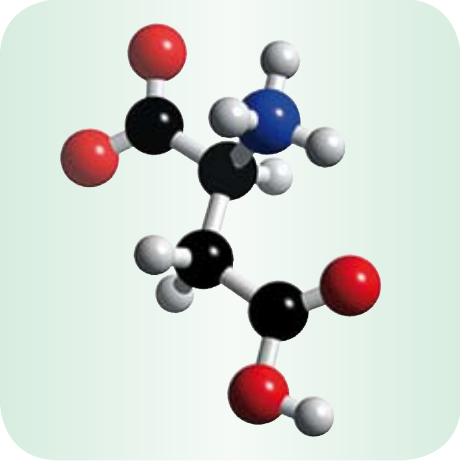
5 µm analytical columns, C8 & C4

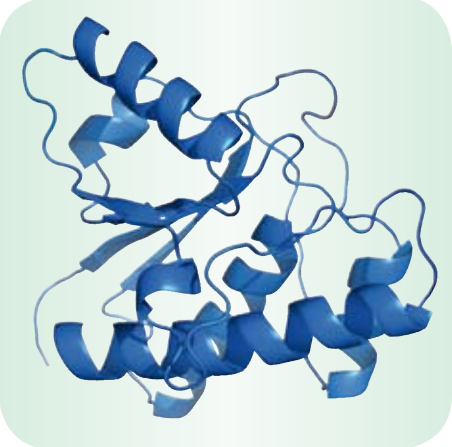
Phase	Column dimension				
	150 x 2.0 mm ID	150 x 3.0 mm ID	150 x 4.6 mm ID	250 x 3.0 mm ID	250 x 4.6 mm ID
YMC-Pack Octyl (C8)	OC12S051502WT	OC12S051503WT	OC12S051546WT	OC12S052503WT	OC12S052546WT
YMCbasic (eq. C8)	BA12S051502WT	BA12S051503WT	BA12S051546WT	BA12S052503WT	BA12S052546WT
YMC-Pack Butyl (C4)	BU12S051502WT	BU12S051503WT	BU12S051546WT	BU12S052503WT	BU12S052546WT
YMC-Pack Protein-RP (eq. C4)	PR12S051502WT	PR12S051503WT	PR12S051546WT	PR12S052503WT	PR12S052546WT

5 µm semi-preparative columns

Phase	Column dimension				
	150 x 20 mm ID	150 x 30 mm ID	250 x 10 mm ID	250 x 20 mm ID	250 x 30 mm ID
YMC-Pack ODS-A (C18)	AA12S051520WT	AA12S051530WT	AA12S052510WT	AA12S052520WT	AA12S052530WT
YMC-Pack ODS-AQ (C18)	AQ12S051520WT	AQ12S051530WT	AQ12S052510WT	AQ12S052520WT	AQ12S052530WT
YMC-Pack *Pro* C18	AS12S051520WT	AS12S051530WT	AS12S052510WT	AS12S052520WT	AS12S052530WT
Hydrosphere C18	HS12S051520WT	HS12S051530WT	HS12S052510WT	HS12S052520WT	HS12S052530WT
YMC-Triart C18	TA12S051520WT	TA12S051530WT	TA12S052510WT	TA12S052520WT	TA12S052530WT
YMC-Pack Octyl (C8)	OC12S051520WT	OC12S051530WT	OC12S052510WT	OC12S052520WT	OC12S052530WT
YMC-Pack Butyl (C4)	BU12S051520WT	BU12S051530WT	BU12S052510WT	BU12S052520WT	BU12S052530WT
YMCbasic (eq. C8)	BA12S051520WT	BA12S051530WT	BA12S052510WT	BA12S052520WT	BA12S052530WT
YMC-Pack Protein-RP (eq. C4)	PR12S051520WT	PR12S051530WT	PR12S052510WT	PR12S052520WT	PR12S052530WT

Guard Columns are also available.
For more details please contact us: Phone 02064-427-0 or email info@ymc.de.





NP/
HILIC

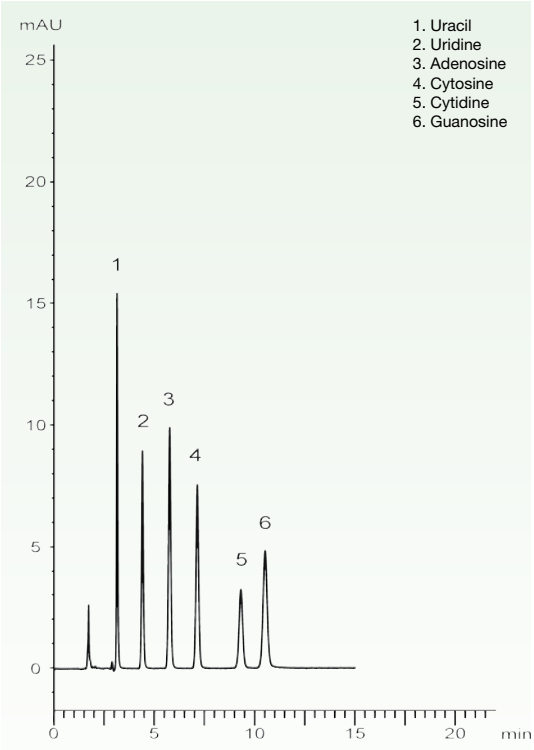
Hydrophilic Interaction Chromatography (HILIC)

Hydrophilic Interaction Chromatography is a technique which has attracted more and more attention since it offers an alternative approach for the separation of highly polar compounds. The method itself, although it has been known for more than 25 years, has become more popular recently due to the introduction of several specialised HILIC phases. However it is not well known that HILIC separations can be accomplished using any highly polar stationary phase. This opens up a large range of materials which are suitable for HILIC separations. HILIC separations traditionally use a highly polar stationary phase and a non polar mobile phase e.g. functionalised silica with a hydrophilic coating and an acetonitrile/water mixture (90/10) for small molecules but application to larger biomolecules is becoming increasingly more popular.

YMC Columns for HILIC:

	YMC-Pack Silica	PVA-Sil	Polyamine II	YMC-Pack Amino	YMC-Pack Diol
Particle size / µm	3; 5	5	5	3; 5	5
Pore size / nm	6; 12; 20; 30	12	12	12	12; 20; 30
Carbon content / %	n/a	4; 3	n/a	3	n/a
pH range	2.0 - 7.5	2.0 - 9.5	2.0 - 9.0	2.0 - 7.5	2.0 – 7.5

Nucleosides and bases



Column: YMC-Pack Diol-NP (5µm 12nm) 150 x 2.0 mm ID)
Part No: DL12S051502WT
Eluent: water / acetonitrile (10/90) containing 10 mM CH_3COONH_4
Flow rate: 0.2 ml/min
Temperature: 30 °C
Detection: UV at 254 nm

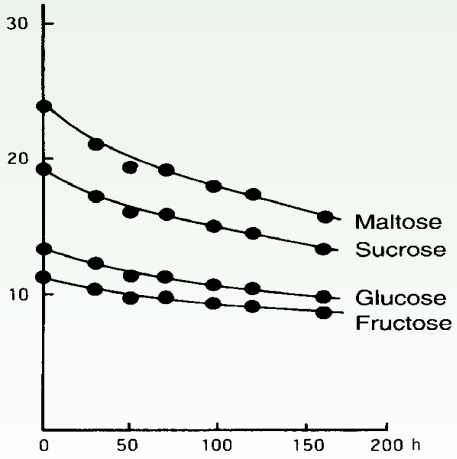
Outstanding Retention and Resolution with YMC HILIC!

YMC-Pack Polyamine II

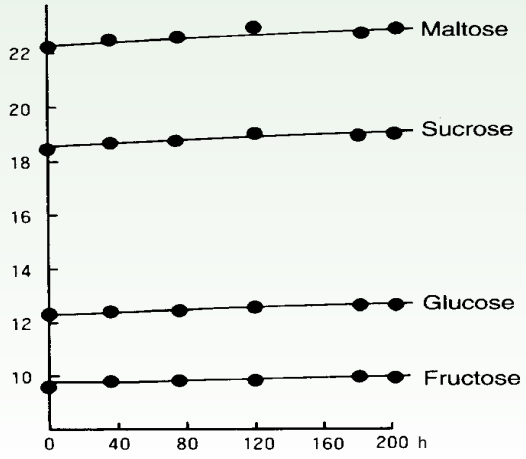
YMC-Pack Polyamine II is a unique phase, based on ultrapure YMC silica as a support material. The functionality of the stationary phase is achieved by a covalently bonded polymer layer containing secondary (2°) and tertiary (3°) amino groups. The 2° and 3° amino groups of YMC-Pack Polyamine II are only weakly nucleophilic, exhibiting a significantly reduced reactivity towards carbonyl compounds.

Therefore, unlike conventional amino phases with primary n-propylamino ligands, YMC-Pack Polyamine II does not form Schiff' bases or other stable condensation products. In addition, the 2° and 3° amino groups of the polymer layer are to a large extent resistant to oxidation and hydrolysis (as shown in the figure below).

Stability of amino type packings



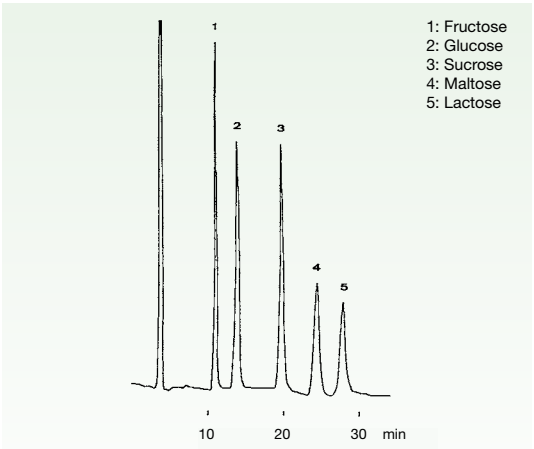
a) conventional amino phase



b) YMC-Pack Polyamine II

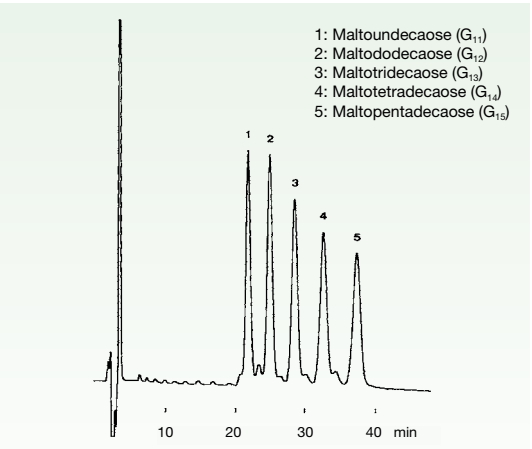
Applications

Mono- and Di-saccharides



Column: YMC-Pack Polyamine II (5 µm) 250 x 4.6 mm ID
Part No.: PB12S052546WT
Eluent: ACN / H_2O = 75/25
Flow rate: 1.0 ml/min
Detection: RI, 32x10^{-6} RIU/FS
Temperature: 26 °C

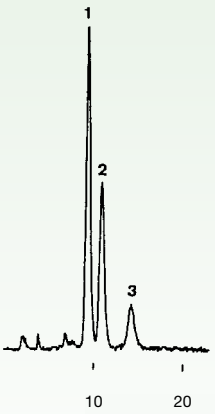
Malto-oligosaccharides



Column: YMC-Pack Polyamine II (5 µm) 250 x 4.6 mm ID
Part No.: PB12S052546WT
Eluent: ACN / H_2O = 55/45
Flow rate: 1.0 ml/min
Detection: RI, 32 x 10^{-6} RIU/FS
Temperature: 26 °C

* Application data by courtesy YMC Co., Ltd.

Pyridylamino (PA)-Sugar chains



G: Galactose
GN: N-Acetylglucosamine
M: Mannose
F: Fructose
PA: Pyridylamino

1:PA Sugar Chain 014, N-Acetyllactosamine-type
agalacto tetraantennary

GN(β1♦6)
GN(β1♦2)
M(α1♦6)
GN(β1♦4)
GN(β1♦2)
M(α1♦3)
M(β1♦4)GN(β1♦4)GN-PA

2:PA Sugar Chain 001, N-Acetyllactosamine-type
biantennary

G(β1♦4)GN(β1♦2)M(α1♦6)
G(β1♦4)GN(β1♦2)M(α1♦3)
M(β1♦4)GN(β1♦4)GN-PA

3:PA Sugar Chain 002, N-Acetyllactosamine-type
triantennary

G(β1♦4)GN(β1♦2)
G(β1♦4)GN(β1♦4)
G(β1♦4)GN(β1♦2)
M(α1♦6)
M(α1♦3)
M(β1♦4)GN(β1♦4)GN-PA

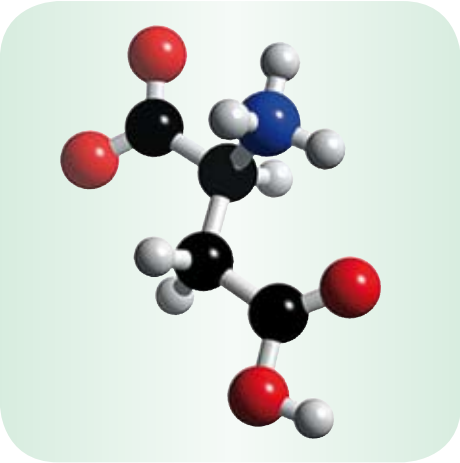
Column:	YMC-Pack Polyamine II (5 µm) 150 x 4.6 mm ID
Part No.:	PB12S051546WT
Eluent:	methanol / $NH_4H_2PO_4$ (20 mM) = 80/20
Flow rate:	1.0 ml/min
Detection:	fluoresence, Ex.320 nm, Em. 400 nm, 4 mV/FS
Temperature:	37 °C

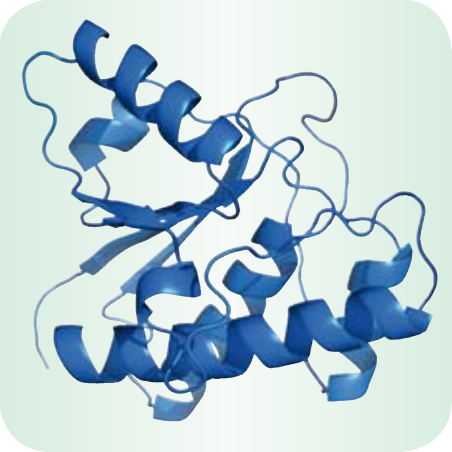
Ordering Information

YMC-Pack Polyamine II, 12 nm, 5 µm

Column length	Column ID (mm)			
	2.1	3.0	4.0	4.6
33 mm	PB12S050302QT	PB12S050303QT	PB12S050304QT	PB12S050346WT
50 mm	PB12S050502QT	PB12S050503QT	PB12S050504QT	PB12S050546WT
100 mm	PB12S051002QT	PB12S051003QT	PB12S051004QT	PB12S051046WT
150 mm	PB12S051502QT	PB12S051503QT	PB12S051504QT	PB12S051546WT
250 mm	PB12S052502QT	PB12S052503QT	PB12S052504QT	PB12S052546WT

Guard Columns are also available.
For more details please contact us: Phone 02064-427-0 or email info@ymc.de.

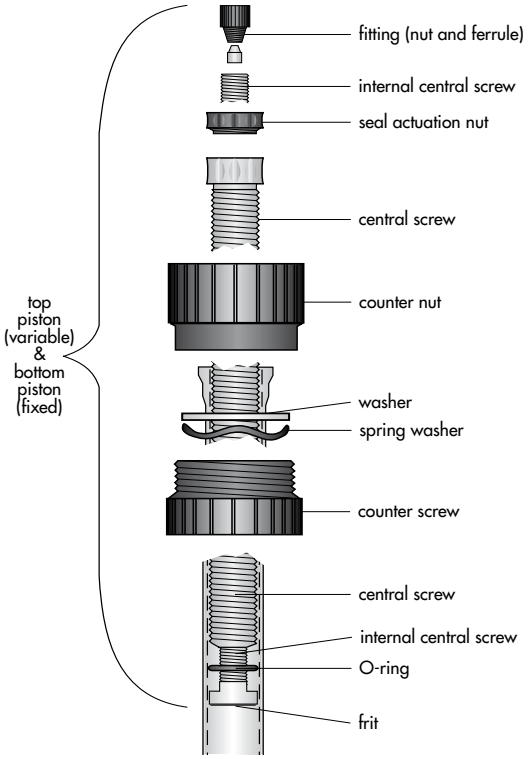




GLASS
COLUMNS

ECO Glass Columns

- **biocompatible**
- **solvent resistant version (optional)**
- **easy to use**
- **low temperature application**
- **2 adjustable length plungers (Multivario) supplied on request**
- **compatible with any LC system**
- **water-jacketed version available on request**



ECO Column ID 10-50 mm

General

ECO columns are glass columns for almost all types of soft gel and low pressure (pressure limit 5 - 30 bar) liquid chromatography applications. With a choice of one or two adjustable length plungers, they are available in two forms: AB (aqueous buffer) for use with aqueous buffers and cold room applications and SR (solvent resistant) for all forms of normal and reversed phase chromatography.

ECO columns are produced by high-precision CNC manufacturing. They are competitively priced and equipped with a screw-lock system which makes it possible to open and seal the column simply and quickly. Each column passes a quality control pressure test. A water-jacketed option can be supplied on request.

Versions available

Version	Temperature Range [°C]	Plunger	Seal	Frit
ECO AB (Aqueous Buffer)	4 - 40	POM	Viton® O-ring EPDM	Porous glass (ID 10 - 50 mm) Polyethylene (ID 70 - 80 mm)
ECO SR (Solvent Resistant)	16 - 40	PVDF	Kalrez® O-ring	Porous glass (ID 10 - 50 mm) Stainless steel (ID 70 - 80 mm)

Characteristics

Pressure limit: 5 - 30 bar (depending on diameter)

Temperature range: aqueous buffer version (AB): 4 - 40 °C
solvent resistant version (SR): 16 - 40 °C

Wetted parts: borosilicate glass
aqueous buffer version (AB): POM, sintered glass frit and Viton® seal (ID 10 - 50 mm)
POM, polyethylene frit and EPDM seal (ID 70 - 80 mm)
solvent resistant version (SR): PVDF, sintered glass frit and Kalrez® seal (ID 10 - 50 mm)
PVDF, stainless steel frit and Karlez® seal (ID 70 - 80 mm)

Diameters: 10 mm, 15 mm, 25 mm, 50 mm, 70 mm, 80 mm

Bed lengths: 120 mm, 200 mm, 450 mm, 750 mm, 1000 mm

Height adjustment: Adjustable plunger provides up to 120 mm bed height adjustment (2 adjustable plungers supplied on request).

Connections: The columns are supplied with different adaptors to allow direct connection to any LC-system.

Specifications

		Vario		Multivario	
ID [mm]*	Pressure limit [bar]	Bed length [mm]	Volume [ml]	Bed length [mm]	Volume [ml]
10	30	0-120 80-200 330-450 630-750 880-1000	0-9.4 6.3-16 26-35 50-59 69-79	0-120 0-200 210-450 510-750 760-1000	0-9.4 0-16 17-35 40-59 60-79
15	25	0-120 80-200 330-450 630-750 880-1000	0-21 14-35 58-80 111-133 156-177	0-120 0-200 210-450 510-750 760-1000	0-21 0-35 37-80 90-133 134-177
25	15	0-120 80-200 330-450 630-750 880-1000	0-59 39-98 162-221 309-368 432-491	0-120 0-200 210-450 510-750 760-1000	0-59 0-98 103-221 250-368 373-491
50	10	0-120 80-200 330-450 630-750 880-1000	0-236 157-393 648-884 1237-1473 1728-1964	0-120 0-200 210-450 510-750 760-1000	0-236 0-393 412-884 1001-1473 1492-1964
70	5	—	—	0-120 0-200 90-450 390-750 640-1000	0-462 0-770 356-1732 1501-2886 2463-3848
80	5	—	—	0-120 0-200 90-450 390-750 640-1000	0-603 0-1005 452-2262 1960-3770 3217-5026

* Columns with inner diameter of 20 and 32 mm are available upon request

Accessories supplied

All columns: 1x frit removal tool / 2x plugs, PTFE (1/4“-28G)

and for each specific diameter the following tubing, nuts and ferrules:

ID 10–15 mm: 1x 1m FEP-tubing (0.8 x 1.6 mm); 4x 1/4“-28G nuts and ferrules (collapsible) for 1/16“ tubing; 2x M6 nuts and ferrules for 1/16“ tubing and 2x 10-32 nuts and ferrules for 1/16“ tubing

ID 25–80 mm: 1x 1m FEP-tubing (1.6 or 2.4 x 3.2 mm); 4x 1/4“-28G nuts and ferrules (collapsible) for 1/8“ tubing and 2x M6 nuts and ferrules for 1/8“ tubing

* Application data by courtesy YMC Co., Ltd.

Ordering guide

The part numbers for the columns contain information on the column type, inner diameter, column length, plunger type, frit porosity and seal (O-ring) material.

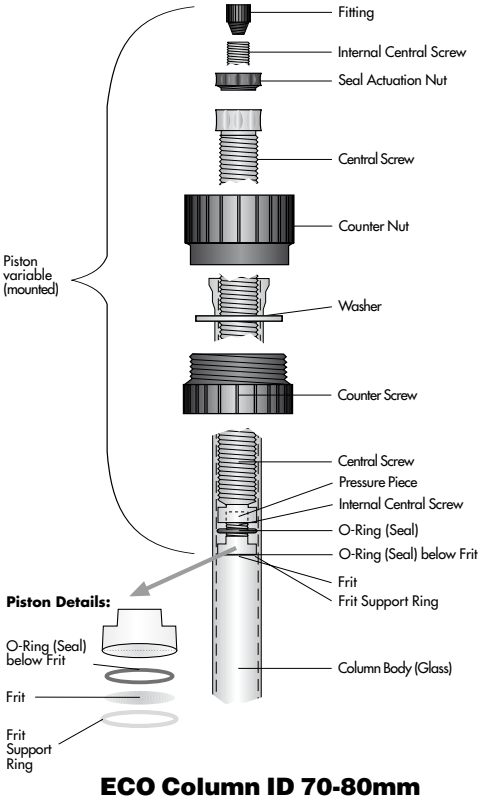
Inner diameter ID [mm]*	Pressure limit [bar]	Order code
10	30	ECO10/
15	25	ECO15/
25	15	ECO25/
50	10	ECO50/
70	5	ECO70/
80	5	ECO80/

* Columns with inner diameter of 20 and 32 mm are available upon request

Max. bed length [mm]	Order code
120	120
200	200
450	450
750	750
1000	999
Longer columns are available on request.	

No. of adjustable plungers	Order code
1 adjustable plunger (Vario)	V
2 adjustable plungers (Multivario)	M
up to 120 mm bed variability each	

Frit porosity [µm]	Order code
10	0
16 - 40	3
40 - 100	4
Other frit porosities are available on request.	



ECO Column ID 70-80mm

Column version	Seal O-ring material	Order code
ECO AB (Aqueous Buffer)	Viton® / EPDM	V
ECO SR (Solvent Resistant)	Kalrez®	K

Option	Order code
Water-jacket version*	-K
*(only in combination with Multi Vario plunger)	

Ordering guide

Examples

To order an aqueous buffer ECO column with an inner diameter of 15 mm, a column length of 120 mm, with 1 adjustable plunger and a frit porosity of 16 - 40 µm, a Viton O-ring and without the water-jacket option, please use the corresponding part number ECO15/120V3V.

Part Number: ECO15/120V3V

Example	ECO	15/	120	V	3	V
Column type	ECO					
Inner diameter		15/				
Max. bed length			120			
Plunger type				V		
Frit porosity					3	
Seal O-ring material						V

To order a solvent resistant ECO column with an inner diameter of 10 mm, a column length of 120 mm, with 2 adjustable plungers and a frit porosity of 10 µm, a Kalrez O-ring and with the water-jacket option, please use the corresponding part number ECO10/120M0K-K.

Part Number: ECO10/120M0K-K

Example	ECO	10/	120	M	0	K	-K
Column type	ECO						
Inner diameter		10/					
Column length			120				
Plunger type				M			
Frit porosity					0		
Seal O-ring material						K	
Water-jacket version							-K

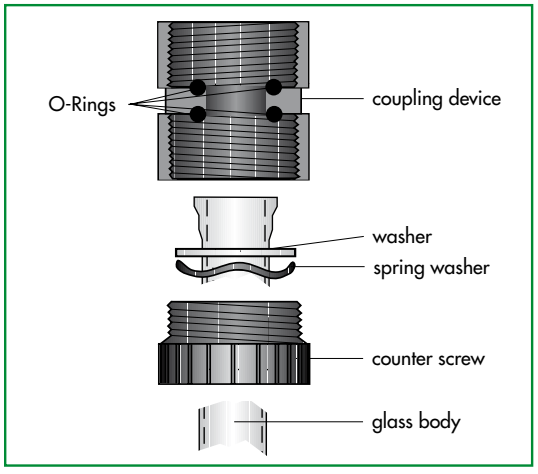
Packing Adaptors

The ECO series packing adaptors consist of a column coupler and an empty glass body. These must be of the same diameter as the column to be packed and must be used as packing adaptors, not for extending the length of a column body. The length of the additional glass body used should be selected to allow:

- Double the volume of slurry compared to the required packed bed volume if packing silica materials
- Triple the volume of slurry for softer packing materials

The product manual supplied with each column contains detailed examples of dry packing and slurry packing techniques.

For ordering information please see next page.



column coupler

* Application data by courtesy YMC Co., Ltd.

Ordering information for ECO packing adaptors

Inner Diameter*	Description	Length	Part Number
10	Column Coupler (no Glass Body) including Viton® O-Ring		ECO10KU/V
15	Column Coupler (no Glass Body) including Viton® O-Ring		ECO15KU/V
25	Column Coupler (no Glass Body) including Viton® O-Ring		ECO25KU/V
50	Column Coupler (no Glass Body) including Viton® O-Ring		ECO50KU/V
70	Column Coupler (no Glass Body) including EPDM O-Ring		ECO70KU/V
80	Column Coupler (no Glass Body) including EPDM O-Ring		ECO80KU/V
10	Glass Body for use with Column Coupler	120 200 450 750 1000	ECO10/120 ECO10/200 ECO10/450 ECO10/750 ECO10/999
15	Glass Body for use with Column Coupler	120 200 450 750 1000	ECO15/120 ECO15/200 ECO15/450 ECO15/750 ECO15/999
25	Glass Body for use with Column Coupler	120 200 450 750 1000	ECO25/120 ECO25/200 ECO25/450 ECO25/750 ECO25/999
50	Glass Body for use with Column Coupler	120 200 450 750 1000	ECO50/120 ECO50/200 ECO50/450 ECO50/750 ECO50/999
70	Glass Body for use with Column Coupler	120 200 450 750 1000	ECO70/120 ECO70/200 ECO70/450 ECO70/750 ECO70/999
80	Glass Body for use with Column Coupler	120 200 450 750 1000	ECO80/120 ECO80/200 ECO80/450 ECO80/750 ECO80/999

* Column Couplers for columns with inner diameter of 20 and 32mm are available upon request

ECO^{PLUS} Glass Columns

- **Suitable for universal use**
- **Biocompatible**
- **Simple to use**
- **Problem-free connection to any LC system**
- **Height-adjustable pistons at both ends**
- **Suitable for cold rooms from 4 - 40 °C (with polyethylene piston and EPDM O ring)**
- **SR-Version resistant to organic solvents (SR = Solvent Resistant)**

General

Biochromatography is widely applied in high-performance downstream processing techniques that can be used for a range of compounds, such as proteins, peptides or nucleic acids. When using various chromatographic techniques such as ion exchange, affinity or gel permeation chromatography, increasingly high-performance separation media are used and, as a result, higher demands are made on the quality of the column hardware.
ECO^{PLUS} glass columns meet the highest criteria for professional laboratory use. Particular attention has been paid to the column volume ranges that are as wide as possible (0.4 - 982 ml) and to the high pressure resistance (up to 80 bar / 1160 psi), so that high flow rates and performance/efficiency can be achieved.
We have selected high-quality, inert materials to make sure ECO^{PLUS} glass columns are biocompatible and offer the best conditions for high recovery with no loss of bio-activity of your biomolecules.
Thanks to the “Quick-Lock” seal and the two adjustable pistons, the columns are fully adjustable and easy to use.
Given the wide range of diameters, frit porosities and lengths available, you can use ECO^{PLUS} glass columns for the most diverse of applications.

„Quick-Lock“ Fitting

No more than a quarter turn is needed to seal the column.
Piston height adjustment is done by turning the locked “Quick-Lock” fitting.

* Application data by courtesy YMC Co., Ltd.

“Connectivity and compatibility”

Two of the most frequently asked questions about using Kronlab glass columns are:

Question 1:

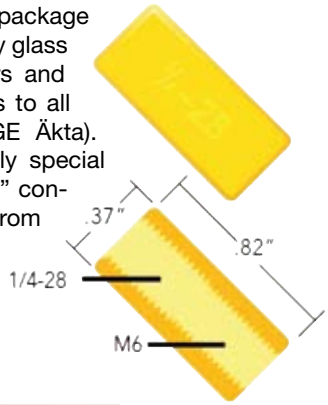
What packing materials can I use in Kronlab glass columns?

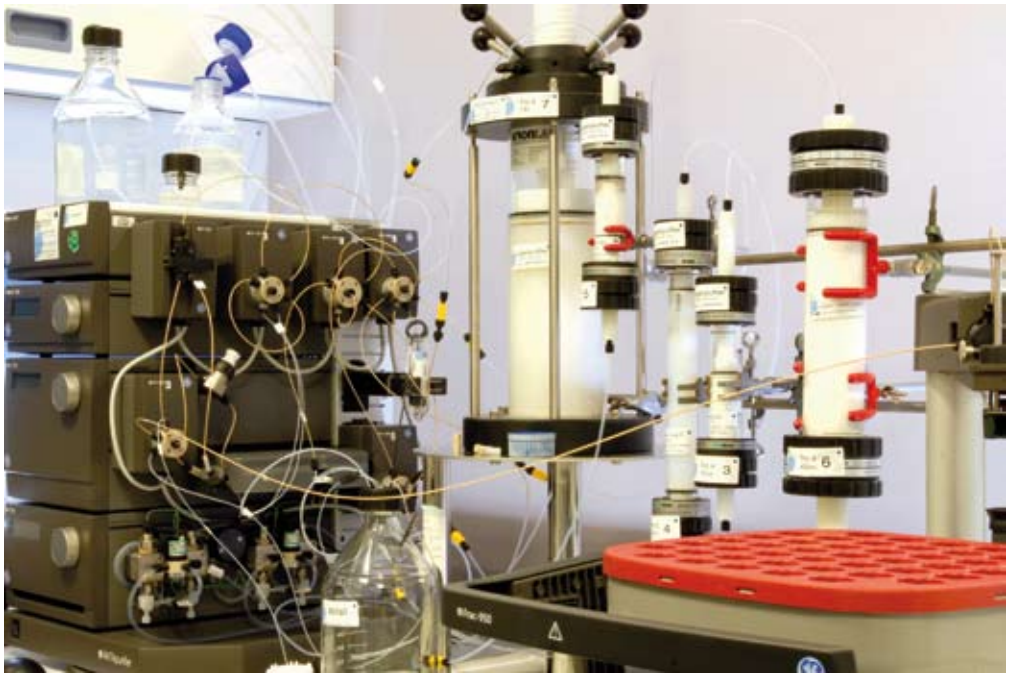
Answer:
In theory you can use any packing material from any manufacturer of your choice!
The only restrictions are those linked to the conditions of use with materials that come into contact with the media, such as the pressure limits of the column and packing material. To accommodate this, Kronlab offers a wide range of variants and different column versions. Our application laboratory has examples of applications in the fields of ion exchange, size exclusion, gel permeation, normal/reversed phase and affinity chromatography, etc. with an enormous range of phases from various manufacturers, including YMC, GE, Pall, Bio-Rad, Tosoh and others.

Question 2:

Can I link Kronlab glass columns to any LC system from other manufacturers, or can I only use Kronlab systems?

Answer:
Of course we would love you to use Kronlab glass columns as a “package” with Kronlab LC systems – but of course there are no restrictions! The accessory package included in Kronlab laboratory glass columns contains connectors and adaptors to link our columns to all current LC systems (e.g. GE Äkta). As an option, we can supply special components such as “yellow” connection adaptors to convert from metric to imperial systems (M6 at 1/4-28).



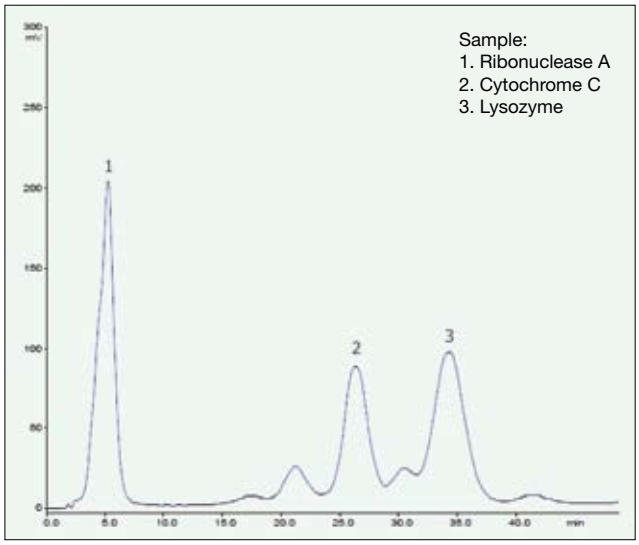


Kronlab laboratory glass columns in a “multi-purpose” application laboratory
(with the kind permission of InVivo BioTech Service GmbH)

Application Examples

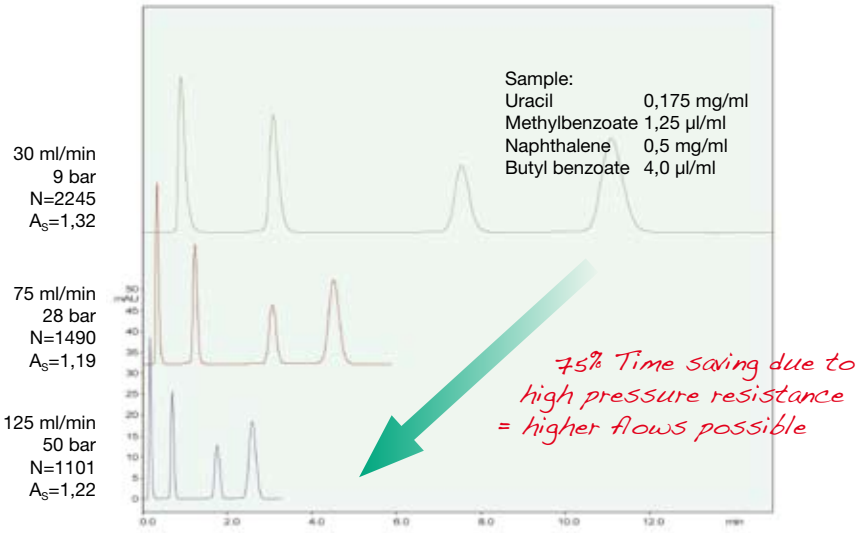
In reversed phase and adsorption chromatography, the possibilities for using glass columns are often limited due to high back pressures generated by small particles. The high pressure resistance of the ECO^{PLUS} glass columns allow you to achieve high flow rates for demanding separations. The example shows that this enables a considerable acceleration of the separation, which means that you can achieve significant time savings.

Separation of a standard test mixture of proteins



Column:	Kronlab ECO^{PLUS} 250 x 15 mm ID
Stationary phase:	YMC-BioPro SP, 30 µm (bed length 170 mm)
Mobile phase:	A) 20 mM KH_2PO_4*K_2HPO_4 (pH 6.8)
	B) 20 mM KH_2PO_4*K_2HPO_4 (pH 6.8) containing 0.5 M NaCl
Gradient:	40-80% B
Flow rate:	6 ml/min
Temperature:	25°C
Detection:	UV at 220 nm
Injection:	100 µl

Example of application with reversed phase media



Column:	Kronlab ECO^{PLUS} 125 x 25 mm ID
Stationary phase:	YMC-Pack ODS-AQ, 10 µm, 12 nm, 8 cm bed length
Flow rate:	30 ml/min - 75 ml/min - 125 ml/min
Mobile phase:	ACN/H_2O (50:50)
Injection:	500 µl
Detection:	UV at 254 nm

* Application data by courtesy YMC Co., Ltd.

Product options

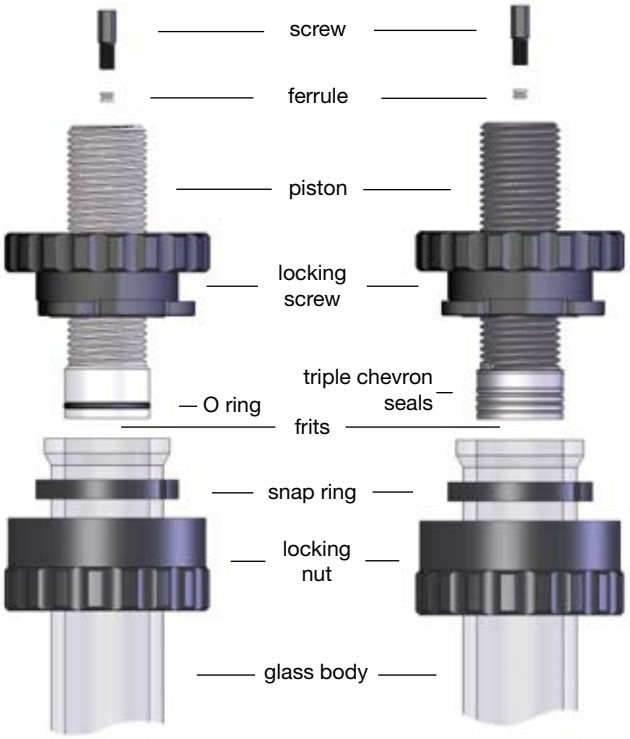
ECO^{PLUS} laboratory glass columns are routinely available in three different lengths (125, 250, 500 mm) and three combinations of pistons (Short, Short/long, Long) in order to accommodate different volume configurations.

5 mm ID | 10 mm ID | 15 mm ID | 25 mm ID | 35 mm ID | 50 mm ID

The modular construction allows for a range of piston variations to provide the ideal column volume.

Standard Version
for aqueous buffers (AB)

Optional Version
Solvant Resistant (SR)



ECO^{PLUS} glass columns are multi-purpose columns for all liquid chromatography applications (with pressure limits of 30 to 80 bar (435 to 1160 psi) - depending on column diameter as shown in the table on page 6). ECO^{PLUS} glass columns are available in two versions:

Standard-Version

(AB = Aqueous Buffer) for aqueous buffers and applications in cold rooms.

Optional-Version

(SR = Solvent Resistant) for normal and reversed phase chromatography.

The height-adjustable pistons (standard) at each end of the ECO^{PLUS} glass column with Teflon ribs (SR-version) are suitable for the entire spectrum of normal phase and reversed phase chromatography as well as biochromatography above ambient temperature.

All ECO^{PLUS} glass columns are made with high-precision CNC machines and undergo several rigorous quality controls before they are delivered.

Versions available / materials used / components in contact with media

All the columns are made of borosilicate glass 3.3 (calibrated precision glass - KPG®)

Version*	Temperature range [°C]	max. Pressure [bar]	Piston	Seal	Frits
ECO^{PLUS} AB (Aqueous buffer)	4 - 40	ID 05 mm: 80 ID 10 mm: 80 ID 15 mm: 70 ID 25 mm: 50 ID 35 mm: 40 ID 50 mm: 30	Polyethylene	O ring EPDM (ethylene-propylene-diene-M-class rubber)	Column ID 5-50 mm: Polyethylene
ECO^{PLUS} SR (solvent resistant)	16 - 40	ID 05 mm: 80 ID 10 mm: 50 ID 15 mm: 50 ID 25 mm: 50 ID 35 mm: 40 ID 50 mm: 25	PTFE (Teflon)	PTFE (Teflon)	Column ID 5-15 mm: sintered glass Column ID 25-50 mm: Stainless steel (SS)

* Material certificates for wetted parts are available upon request.

Specifications

ID [mm]	Short pistons		Short/long piston		Long pistons	
	Bed length [mm]	Volume [ml]	Bed length [mm]	Volume [ml]	Bed length [mm]	Volume [ml]
5	22 - 125 147 - 250 397 - 500	0.4 - 2.5 2.9 - 4.9 7.8 - 9.8	0 - 125 67 - 250 317 - 500	0 - 2.5 1.3 - 4.9 6.2 - 9.8	0 - 125 0 - 250 237 - 500	0 - 2.5 0 - 4.9 4.7 - 9.8
10	32 - 125 157 - 250 407 - 500	2.5 - 9.8 12 - 20 32 - 39	0 - 125 77 - 250 327 - 500	0 - 9.8 6.0 - 20 26 - 39	0 - 125 0 - 250 247 - 500	0 - 9.8 0 - 20 19 - 39
15	24 - 125 149 - 250 399 - 500	4.2 - 22 26 - 44 71 - 88	0 - 125 69 - 250 319 - 500	0 - 22 12 - 44 56 - 88	0 - 125 0 - 250 239 - 500	0 - 22 0 - 44 42 - 88
25	28 - 125 153 - 250 403 - 500	14 - 61 75 - 123 198 - 245	0 - 125 73 - 250 323 - 500	0 - 61 36 - 123 159 - 245	0 - 125 0 - 250 243 - 500	0 - 61 0 - 123 119 - 245
35	30 - 125 155 - 250 405 - 500	29 - 120 149 - 241 390 - 481	0 - 125 75 - 250 325 - 500	0 - 120 72 - 241 313 - 481	0 - 125 0 - 250 245 - 500	0 - 120 0 - 241 236 - 481
50	36 - 125 161 - 250 410 - 500	71 - 245 316 - 491 805 - 982	0 - 125 81 - 250 331 - 500	0 - 245 159 - 491 650 - 982	0 - 125 0 - 250 250 - 500	0 - 245 0 - 491 491 - 982

Standard accessories (included with the column)

All glass columns include: 1x frit ejector / 2x plugs, PTFE (1/4“-28G),

plus the screws, ferrules and capillaries required to link up to any LC system, depending on the tube ID:

ID 5 mm: 1x 1m ETFE 1/16” capillary tubing pre-assembled / 4x ¼”-28G screws / ferrules for 1/16“ tubing / 2x M6 screws / ferrules for 1/16” tubing / 2 x 10-32 screws / ferrules for 1/16“ tubing.

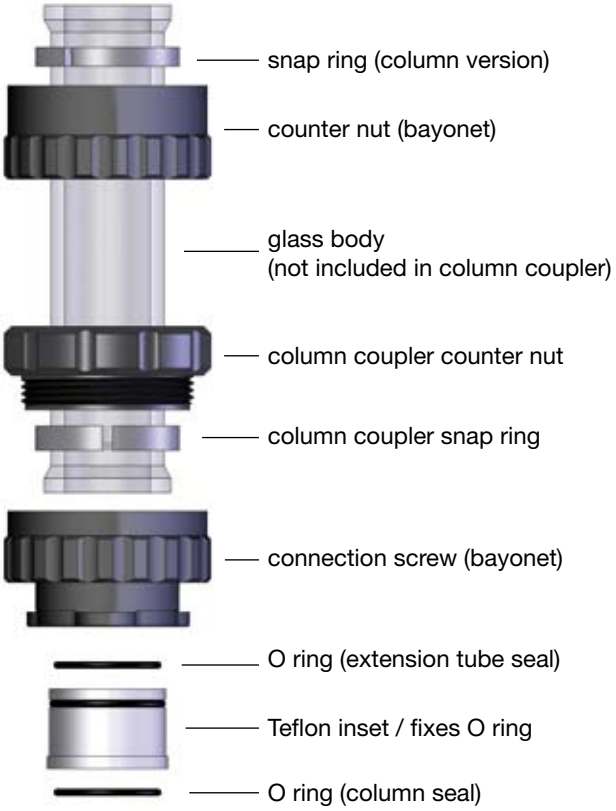
ID 10 –15 mm: 1x 1m FEP 1/16” capillary tubing (0.8 x 1.6 mm) / 4x ¼”-28G screws / ferrules for 1/16” tubing / 2x M6 screws / ferrules for 1/16” tubing / 2x 10-32 screws / ferrules for 1/16” tubing.

ID 25 – 50 mm: 1x 1m FEP 1/8” capillary tubing (1.6 x 3.2 mm) / 4x ¼”-28G screws / ferrules for 1/8” tubing / 2x M6 screws / ferrules for 1/8” tubing.

* Application data by courtesy YMC Co., Ltd.

Accessories / Replacement parts

To allow packing of a glass column, you can use the ECO^{PLUS} column coupler to join a glass body to a column. For this to work, it must have the same inside diameter as the column.
The length of the extra glass body required for column packing depends on the packing material being used and can be calculated from the packing instructions for the chosen packing material.



Column couplers consist of:

- ECO^{PLUS} connection screw with Teflon insert (assembled)
- Column coupler counter screw with snap ring
- Counter nut (bayonet) with snap ring
- AB-version has two sets (4 items) of Viton® O rings
- SR-version has two Kalrez® O rings

ECO^{PLUS} column coupler

Column ID [mm]	AB-Version column couplers* Part-No.	SR-Version column couplers* Part-No.
5	TAC05KU-AB	TAC05KU-SR
10	TAC10KU-AB	TAC10KU-SR
15	TAC15KU-AB	TAC15KU-SR
25	TAC25KU-AB	TAC25KU-SR
35	TAC35KU-AB	TAC35KU-SR
50	TAC50KU-AB	TAC50KU-SR

* the connection piece does not include a glass body: please order this separately

ECO^{PLUS} glass bodies

Column ID [mm]	max. bed length 125 mm Part-No.	max. bed length 250 mm Part-No.	max. bed length 500 mm Part-No.
5	TAC05/125-2	TAC05/250-2	TAC05/500-2
10	TAC10/125-2	TAC10/250-2	TAC10/500-2
15	TAC15/125-2	TAC15/250-2	TAC15/500-2
25	TAC25/125-2	TAC25/250-2	TAC25/500-2
35	TAC35/125-2	TAC35/250-2	TAC35/500-2
50	TAC50/125-2	TAC50/250-2	TAC50/500-2

Part numbers

The part number for an ECO^{PLUS} glass column consists the identification of the inner diameter, maximum bed length, piston set type, frit porosity and material, plus the model type (SR or AB version).

To order a solvent-resistant ECO^{PLUS} glass column with an inner diameter of 25 mm, a maximum bed length of 500 mm, 2 short pistons and stainless steel frits with a porosity of 2 µm, please use the following order number: TAC25/500S2-SR-2 (see example).

Combination options	TAC05/ (5 mm ID) TAC10/ (10 mm ID) TAC15/ (15 mm ID) TAC25/ (25 mm ID) TAC35/ (35 mm ID) TAC50/ (50 mm ID)	125 (125 mm max. bed length) 250 (250 mm max. bed length) 500 (500 mm max. bed length)	— Standard version has 2 short pistons: no product coding required; For other versions, please insert either: SL (1 short/1 long piston) or L (2 long pistons)	PE Polyethylene (AB-Version) G Sintered glass (SR-Version with ≤ 15 mm ID) S Stainless steel (SS) (SR-Version with ≥ 25 mm ID)	2 (2 µm) 5 (5 µm only poly-ethylene frits available) 0 (10 µm)	-AB-2 (aqueaous buffer) -SR-2 (solvent restistant)
Example	TAC25/	500		S	2	-SR-2
Inner diameter	25 mm					
max. bed length		500 mm				
Piston type						
Frit material				Stainless steel		
Frit porosity					2 µm	
Version						SR-Version

* Application data by courtesy YMC Co., Ltd.

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