



HICHROM

Chromatography Columns and Supplies

LC COLUMNS Thermo Scientific Columns for Biomolecules

Catalogue 9

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Thermo Scientific Columns for Biomolecules

Thermo Scientific manufacture a wide range of silica and polymeric columns specifically designed for analysis of proteins, peptides, oligonucleotides and other biomolecules by reversed-phase, ion-exchange, size exclusion, hydrophobic interaction and affinity chromatography. An overview of some of these phases is given in the following pages.

Columns for Proteins

A) Reversed-Phase Columns for Proteins

BioBasic™ reversed-phase columns are available in C18, C8 and C4 chemistries. These silica based columns provide superior chromatography because the extra dense bonding chemistry produces a highly stable, reproducible surface. Columns show excellent reproducibility and are ideally suited for LC-MS separations.

BioBasic RP Phases

BioBasic Phase	Particle Size (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load (%)	Endcapped
18	5	300	100	9	Yes
8	5	300	100	5	Yes
4	5	300	100	4	Yes

Please see page 242 for ordering information.

ProSwift® RP polystyrene-divinylbenzene monolith columns provide the unique advantages of high resolution at exceptionally high flow rates for fast protein separations and analysis. The monolith is bonded with phenyl functional groups and shows excellent stability over a wide pH range of 1 to 14. Please enquire for further details.

B) Ion-Exchange Columns for Proteins

BioBasic™ AX and SCX silica based columns show excellent performance for proteins, peptides and other ionic species and polar molecules. These ion-exchange materials can be used across a wide range of pH and ionic strength conditions. In addition to its anion-exchange applications, BioBasic AX can also be used under high organic conditions in the HILIC mode. BioBasic SCX is a versatile strong cation-exchange phase for proteins, peptides and small molecules, also useful for protein fractionations for proteomics analyses by capillary LC-MS, including 2D proteomics combined with reversed-phase (see p.29).

BioBasic Ion-Exchange Phases

BioBasic Phase	AX	SCX
Ligand	Polyethyleneimine	Sulphonic acid
Particle Size (µm)	5	5
Pore Size (Å)	300	300
Surface Area (m²/g)	100	100
Carbon Load (%)	3	3

ProPac™ and **MABPac** ion-exchange columns are based on pellicular non-porous core particles providing exceptionally high resolution and efficiency for separations of protein variants, resolving isoforms that differ by a single charged residue. A hydrophilic layer prevents unwanted secondary interactions and a grafted cation-exchange or anion-exchange surface provides pH-based selectivity control. The ProPac™ series is based on non-porous polymer resin consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene coated with a hydrophilic layer.

ProPac and MABPac Phases	Base Material	Functional Group	Particle Size (µm)	pH Range	Capacity
WCX-10	Ethylvinylbenzene cross-linked with 55% divinylbenzene non-porous particles	Carboxylate	10	2 - 12	6mg/ml lysozyme
SCX-10		Sulphonate	10	2 - 12	3mg/ml lysozyme
WAX-10		Tertiary amine	10	2 - 12	5mg/ml BSA
SAX-10		Quaternary ammonium	10	2 - 12	15mg/ml BSA
MABPac SCX-10	Highly cross-linked divinylbenzene non-porous particles	Sulphonic	3, 5, 10	2 - 12	30µg/ml

ProSwift® IEX monolithic columns provide the outstanding resolving power of non-porous analytical media combined with fast analysis performance. Please enquire for further details and ordering information.

ProSwift IEX Phase	Base Material	Functional Group	pH Range	Capacity
WCX-1S	Polymethacrylate monolith	Carboxylic acid	2 - 12	23mg/ml lysozyme
SCX-1S		Sulphonic acid	2 - 12	30mg/ml lysozyme
WAX-1S		Tertiary amine (DEAE)	2 - 12	18mg/ml BSA
SAX-1S		Quaternary amine	2 - 12	18mg/ml BSA

Thermo Scientific Columns for Biomolecules (continued)

B) Ion-Exchange Columns for Proteins (continued)

Figure 21 shows the separation of lysine truncation variants on a ProPac™ WCX-10 column and Figure 22 shows the separation of haemoglobin variants on ProPac SCX-10.

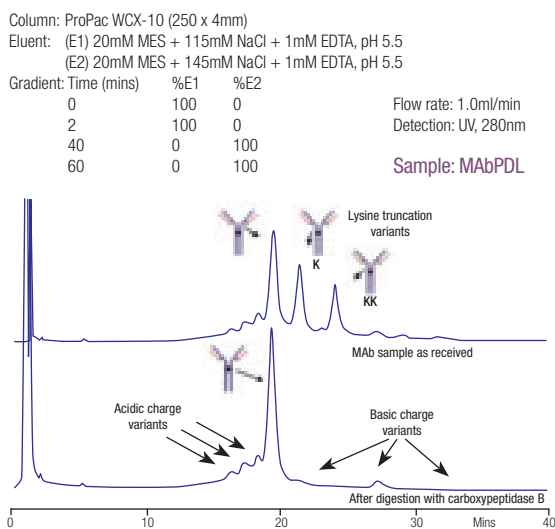


Figure 21. MAb separation on ProPac WCX-10

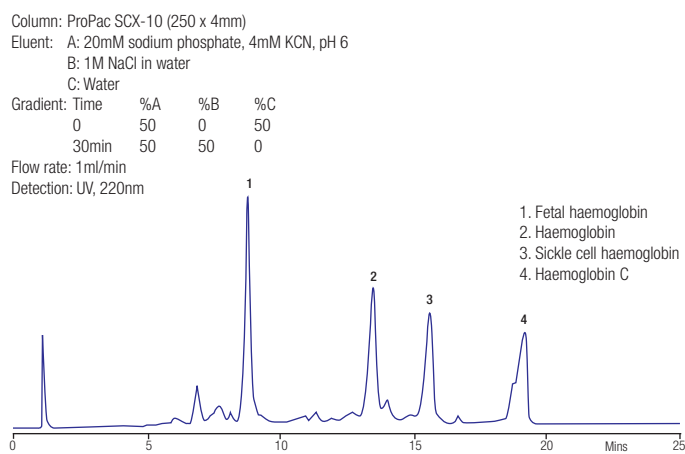


Figure 22. Separation of haemoglobin variants on ProPac SCX-10

C) Size Exclusion Columns for Proteins

BioBasic™ SEC columns, based on silica with a proprietary polymeric coating, offer the mechanical stability of silica-based size exclusion columns with higher efficiencies than that of polymer-based columns. Four pore sizes are available, making them ideal for molecular weight determination of peptides and proteins and for sample clean-up prior to other analyses.

BioBasic Phase	Particle Size (µm)	Pore Size (Å)	Exclusion Limit (kDa)
SEC 60	5	60	0.1 - 6
SEC 120	5	120	0.1 - 50
SEC 300	5	300	1 - 500
SEC 1000	5	1000	20 - 4000

MAbPac SEC-1 (300Å, 5µm diol-bonded silica) is a size exclusion column specifically designed for separation and characterisation of monoclonal antibodies and their aggregates, as well as the analysis of Fab and Fc fragments resulting from proteolysis. Please enquire for ordering information.

D) Hydrophobic Interaction Columns for Proteins

The ProPac HIC-10 column is a high resolution, high capacity, 300Å, 5µm silica based HIC column that provides excellent high resolution separations of proteins and variants for analytical and preparative applications. ProPac HIC columns provide exceptional hydrolytic stability under the highly aqueous conditions used in HIC. Please enquire for ordering information for Hydrophobic Interaction columns.

Phase	ProPac HIC-10
Base material	Porous silica with amide/ethyl surface chemistry
Particle Size (µm)	5
Pore Size (Å)	300
Surface Area (m ² /g)	100
Capacity	340mg Lysozyme (75 x 7.8mm column)
pH Range	2.5 – 7.5

E) Affinity Columns for Proteins

Affinity Phases

Phase	Base Material	Functional Group	Particle Size (µm)	pH Range	Capacity
ProPac IMAC-10	Non-porous polystyrene-divinylbenzene	Poly(IDA) grafts	10	2 - 12	>60mg lysozyme/ml gel
ProSwift ConA-1S	Polymethacrylate monolith	Concanavalin A ligands	N/A	5 - 8	12-16mg protein

The ProPac IMAC-10 is a high resolution analytical and semi-preparative column for separation of proteins and peptides by immobilised metal affinity chromatography. It is packed with 10µm non-porous polymeric beads coated with a hydrophilic layer, then grafted with poly(iminodiacetic acid) chains. These grafts are converted to metal-containing nanoparticles when the column is charged with metal ions. Applications include His-tagged proteins, phosphopeptides, prion peptides and proteins.

The ProSwift® ConA-1S affinity monolith column is designed for the highly efficient enrichment and purification of Concanavalin A binding glycans, glycopeptides and glycoproteins. It shows high capacity and high sample recovery.

Please enquire for ordering information for affinity columns.

Columns for Oligonucleotides

Thermo Scientific offer DNAPac® pellicular anion-exchange resins and DNASwift™ polymeric monolithic phase specifically for the analysis of oligonucleotides.

Phase	Base Material	Substrate Crosslinking	Latex Crosslinking	Particle Size (µm)	Capacity	pH Range
DNAPac PA100	Non-porous substrate agglomerated with alkyl quaternary ammonium functionalised latex beads	55%	5%	13	40µeq	2.0 - 12.5
DNAPac PA200		55%	5%	8	40µeq	2.0 - 12.5
DNASwift SAX-1S	Polymethacrylate monolith agglomerated with quaternary amine functionalised latex	N/A	N/A	N/A	50mg of a 20mer oligonucleotide	6.0 - 12.4

DNAPac® PA100 and PA200 are strong anion-exchange columns developed to provide high resolution analysis and purification of synthetic oligonucleotides. They are capable of resolving full length from n-1, n+1 and other failure sequences and resolving oligonucleotides with secondary structures. Double-stranded DNA, such as plasmids, or restriction fragments are also separated. Unit-base resolution of synthetic oligonucleotides to 60 bases and beyond can be achieved. DNAPac PA200 offers improved efficiency and enhanced stability under alkaline conditions over DNAPac PA100. Figure 23 shows the separation of 40-60mer oligonucleotides on DNAPac PA100. Please see page 242 for ordering details.

DNASwift™ SAX-1S is a strong porous anion-exchange monolith column that provides exceptionally high purity and yield of oligonucleotides. It is compatible with high pH eluents and high temperatures and has a high sample capacity. It is ideal for therapeutic and diagnostic research.

Column: DNAPac PA100 (250 x 4mm)
Eluent: 410-510mM NaCl in 25mM Tris-Cl, pH 8.0
Flow rate: 1.5ml/min
Detection: UV 260nm

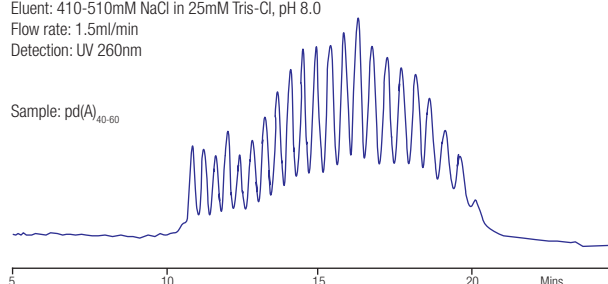


Figure 23. Separation of oligonucleotides on DNAPac PA100

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Columns for Proteomics

- High resolution in protein identification, biomarker discovery and systems biology
- High LC-MS sensitivity
- nanoViper™ fingertight connections for easy column installation

Acclaim™ PepMap has become the standard for peptide separations in proteomics and can be used with all modern nano LC systems. The 2µm Acclaim PepMap RSLC phase has been developed for ultra-high resolution analyses of tryptic, natural and synthetic peptides. Acclaim PepMap Trap columns are typically applied for the desalting of peptides before LC separation with MS detection, thus allowing fast sample preconcentration and clean-up of large volume injections. Trap columns are available in two formats:

- Fused silica nano trap columns to provide the highest chromatographic performance
- Stainless steel cartridges to provide maximum robustness

Acclaim PepMap Phase	Particle Size (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load (%)	Endcapped
100C18	2, 3, 5	100	300	15	Yes
300C18	5	300	100	9	Yes
100C8	3, 5	100	300	9	Yes
300C4	5	300	100	3	Yes

PepSwift and ProSwift – PepSwift (100, 200 or 500µm i.d.) and ProSwift RP-10R (1.0mm i.d.) polystyrene-divinylbenzene monolithic columns show high sensitivity for LC-MS and are ideal for high speed peptide and protein separations.

PepMap, PepSwift and ProSwift nano columns are available with classic or nanoViper fittings. Please enquire for ordering information.

Thermo Scientific Columns for Biomolecules (continued)

Ordering Information

Reversed-phase and Ion-exchange BioBasic Phases

Column i.d. ¹ (mm)	Column Length ¹ (mm)				Drop-In Guard Cartridges (4/pk)
	50	100	150	250	
2.1	xxxx-052130	xxxx-102130	xxxx-152130	xxxx-252130	xxxx-012101 ² !
3.0	xxxx-053030	xxxx-103030	xxxx-153030	xxxx-253030	xxxx-013001 ² !
4.6	xxxx-054630	xxxx-104630	xxxx-154630	xxxx-254630	xxxx-014001 ³ !

¹ Other dimensions available

² Use with Uniguard direct connect holder 852-00

³ Use with Uniguard direct connect holder 850-00

When ordering please replace 'xxxx' with the appropriate BioBasic material code.

BioBasic 18 xxxx=72105 BioBasic 8 xxxx=72205 BioBasic 4 xxxx=72305 BioBasic AX xxxx=73105 BioBasic SCX xxxx=73205

Please note that not all phases are available in every dimension.

Ion Exchange Phases – ProPac and ProSwift

ProPac Phase	Column Dimensions (mm)			
	250 x 2 ¹	250 x 4 ¹	250 x 9	250 x 22
WCX-10	063472	054993	063474	SP5482
SCX-10	063456	054995	063700	SP5522
WAX-10	063464	054999	063707	SP5598
SAX-10	063448	054997	063703	SP5594
MABPac SCX-10 ²	075604	074625	-	-

¹ Guard columns available

² Other dimensions available

Column Dimensions (mm)	ProSwift Phase			
	WCX-1S	SCX-1S	WAX-1S	SAX-1S
50 x 1.0	066643	071977	066642	068459
50 x 4.6	064295	066765	064294	064293

Size Exclusion Phases – BioBasic

BioBasic Phase	Column Dimensions (mm)		Guard (30 x 7.8mm)
	150 x 7.8	300 x 7.8	
SEC 60	73305-157846	73305-307846	73305-037821
SEC 120	73405-157846	73405-307846	73405-037821
SEC 300	73505-157846	73505-307846	73505-037821
SEC 1000	73605-157846	73605-307846	73605-037821

Columns for Oligonucleotides

DNAPac Phase	Column Dimensions (mm)			
	250 x 2	250 x 4	250 x 9	250 x 22
PA100	SP3686	043010	043011	SP2091
PA200	063425	063000	063421	SP6734