



BioLC

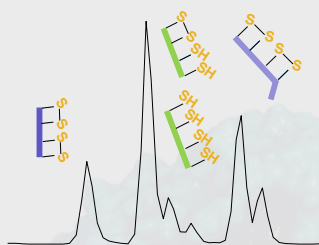
Connected chromatography solutions

BioLC columns and accessories

Introduction

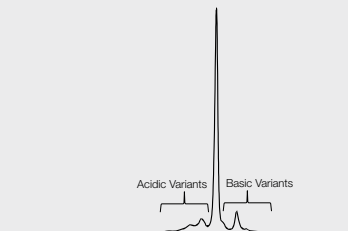
Your complete tool kit

Thermo Fisher Scientific has innovative Thermo Scientific™ BioLC™ columns for each step of your therapeutic protein characterization, no matter how challenging your separation. Here is just one example, a fully characterized model sample of Pertuzumab. Discover our full range in this catalogue.



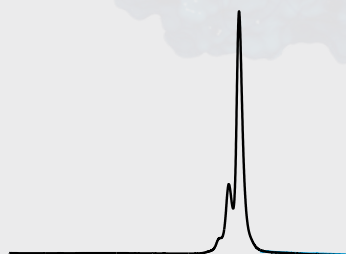
Intact or subunit analysis

Thermo Scientific™ MAbPac™ RP is ideal for intact and subunit analysis by MS or UV detection. The polymeric packing material offers column longevity, high resolution and the wide pores to allow for low carryover profiling of your sample.



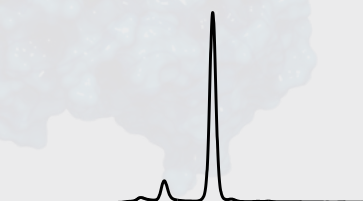
Charge variant analysis

Quickly develop your charge variant method with the Thermo Scientific™ ProPac Elite WCX column and the easy-to-use Thermo Scientific™ CX-1 pH gradient buffers. Elucidate your profile as quickly as 10 minutes on this reproducible platform. Find excellent, complementary selectivity with the Thermo Scientific™ MAbPac™ SCX-10 column.



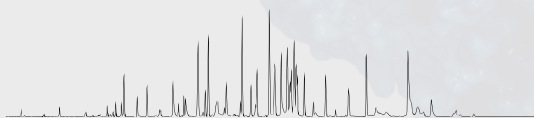
Oxidation monitoring

Deduce protein folding errors or charge-neutral amino acid modifications with the Thermo Scientific™ MAbPac™ HIC-20 hydrophobic interaction column. Our range of innovative HIC chemistries deliver native separations not seen on other columns.



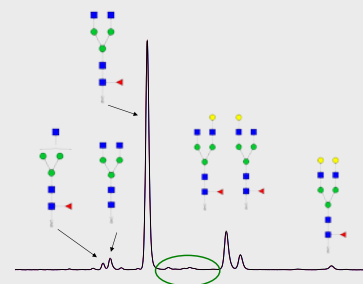
Aggregate analysis

Thermo Scientific™ MAbPac™ SEC-1 offers excellent size exclusion separation even under challenging conditions for aggregate analysis. Compatible with mass spectrometry for native LC-MS/MS workflows.



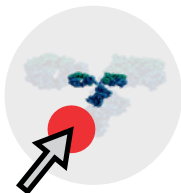
Peptide mapping

Experience reproducible peptide mapping and quantitation. The combination of rapid digestion from the Thermo Scientific™ SMART Digest kit and separation with the high resolution Thermo Scientific™ Hypersil™ GOLD column delivers outstanding, reproducible and efficient peptide mapping separations.



Released glycan analysis

Fully characterize your released N-glycans with the Thermo Scientific™ Accucore™ 150 Amide-HILIC column. This solid core column offers high resolution, durability, and the ability to run separations at lower temperatures to reveal the complete glycan profile.



Flyer:

Take charge of your therapeutic protein separation with Thermo Scientific BioLC columns

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BioLC column selection quick guide

BioLC column selection guide

Target applications	Column type	Mode of analysis	Recommended column	Particle size (µm)	Pore size (Å)	pH range	Maximum backpressure	Solvent compatibility
Affinity	Affinity columns	Affinity	MABPac Protein A	12	Non-porous	2.5-7.5	1,000	—
Intact analysis by HIC	Silica-based hydrophobic interaction chromatography columns	Hydrophobic interaction	MABPac HIC-10	5	1,000	2-8	4.6 x 100 mm = 6,000 7.8 x 100 mm = 5,800	Compatible with common HPLC solvents
			MABPac HIC-20	5	1,000	2-8	4.6 x 250 mm = 8,000	—
			MABPac HIC Butyl	5	1,000	2-12	4,000	—
Released glycan analysis	Released glycan analysis	Silica based, reversed-phase columns	Accucore 150-C18	2.6	150	1-11	11,600	—
	Silica based, mixed-mode columns	Mixed-mode	GlycanPac AXH-1	1.9	175	2-8	10,000	—
				3	120	2-8	6,000	—
			GlycanPac AXR-1	1.9	175	2-8	10,000	Compatible with 0 to 100% aqueous and common HPLC solvents
				3	175	2-8	6,000	Compatible with 0 to 100% aqueous and common HPLC solvents
	Silica-based HILIC columns	HILIC	Accucore 150 Amide HILIC	2.6	150	—	14,500	—
Aggregate fragment analysis	Silica-based size exclusion chromatography phases	Size exclusion	MABPac SEC-1	5	300	2.5-7.5	1,000	100% organic solvents
	Polymeric size exclusion chromatography phase	Size exclusion	Acclaim SEC-300	5	300	2-12	1,200 (7.8 x 150 mm = 700)	—
			Acclaim SEC-1000	7	1,000	—	600 (7.8 x 150 mm = 350)	—
Intact and subunit analysis	Polymeric ion-exchange columns	Reversed-phase	MABPac RP	4	1,500	2.1 mm, 3.0 mm (0-14) 1 mm (1-7)	4,000	Up to 100% CAN, IPA, MeOH
	Polymeric reversed-phase columns	Reversed-phase	ProSwift RP-2H	Monolith	Monolith	1.0-14	2,800	Most common organic solvents
			ProSwift RP-3U				3,000	
			ProSwift RP-4H				3,000	
			ProSwift RP-10R				2,800	
			ProSwift RP-4H				3,000	
Charge variant analysis	Polymeric ion-exchange columns	Ion-exchange	ProPac Elite WCX	5	Non-porous	2.0-12	1,500	Goods buffers and NaCl. Minimum 20 mM salt required. Do not rinse with pure DI H ₂ O
			ProPac SAX-10	10			3,000	80% acetonitrile, acetone, MeOH
			MABPac SCX-10RS	5			7,000	—
			MABPac SCX-10	10			3,000	50% acetonitrile
Peptide mapping	Silica based, reversed-phase columns	Reversed-phase	Hypersil GOLD C18	1.9	175	1-11	18,130	—
				3	175	1-11	5,800	—
			Acclaim 120 C18	2.2	120	2-8	Various	—
				5	120	2-8		—
				3	120	2-8		—
Nucleic acids and oligonucleotides	Polymeric ion-exchange columns	Ion-exchange	DNAPac PA200	8	Non-porous	2.5-12.5	4,000	100% compatible with common organic solvents, Ionic form eluents: chloride, perchlorate
			DNAPac PA200RS	4	Non-porous	2-12	10,000	—
			DNASwift SAX 1S	Monolith	Monolith	2-14	1,500	Most common organic solvents
	Polymeric reversed-phase columns	Reversed-phase	DNAPac RP	4	Proprietary wide pore	0-14	4,000	—

Affinity columns

Providing fast, accurate titer analysis of monoclonal antibodies in harvest cell cultures, the nonporous, polymeric **Thermo Scientific™ MAbPac™ Protein A** HPLC Column delivers reproducible, highly efficient separations.



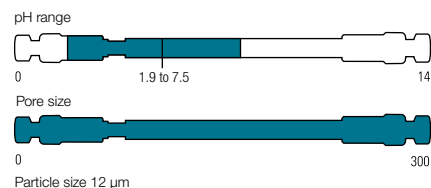
MAbPac Protein A column



Additional reading

- **Application note:** MAbPac Protein A: A novel affinity Protein A column for monoclonal antibody (mAb) titer analysis

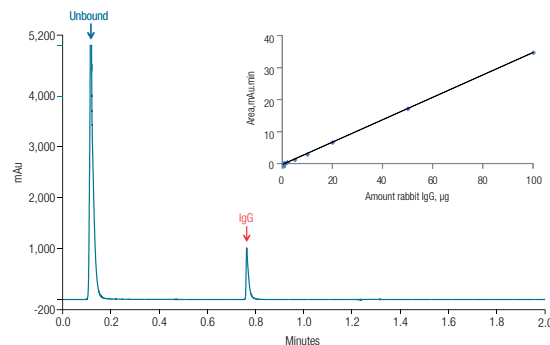
Learn more at thermofisher.com/biolc



Harvest cell culture titer analysis

MAbPac Protein A, 12 µm, 35 x 4.0 mm

Flow rate	2 mL/min
Mobile phase A	50 mM sodium phosphate, 150 mM NaCl, 5% acetonitrile, pH 7.5
Mobile phase B	50 mM sodium phosphate, 150 mM NaCl, 5% acetonitrile, pH 2.5
Gradient	0% B for 0.2 mins, 100% B for 0.60 mins, 0% B for 1.20 mins
Temperature	30 °C
Injection volume	10 µL
Detection	UV at 280 nm
Sample	mAb B, 5 mg/mL harvest cell culture



MAbPac Protein A column

Particle size (µm)	Format	Length (mm)	4.0 mm ID
12	HPLC column	35	082539

Intact analysis by HIC

Orthogonal to IEX and SEC, Hydrophobic Interaction Chromatography (HIC) offers selectivity to resolve charge neutral protein oxidations and protein misfolds. Our proprietary 300 Å silica **Thermo Scientific™ MAbPac™ HIC-10** and **Thermo Scientific™**

MAbPac™ HIC-20 provide unique separation profiles offering high resolution for protein samples. For more hydrophobic samples, select the **Thermo Scientific™ MAbPac™ HIC-Butyl** column.



MAbPac HIC-10, HIC-20, HIC-Butyl columns



MAbPac HIC-10 column additional reading

- **Application note:** MAbPac HIC-10 High resolution separation of a fusion protein on MAbPac HIC-10 column
- **Application note:** HIC as a complementary, confirmatory tool to SEC for the analysis of mAb aggregates

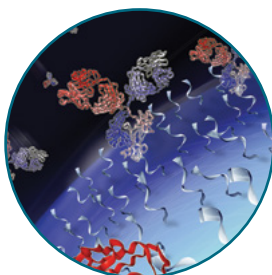
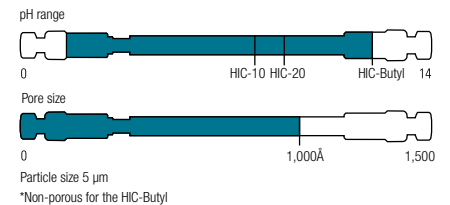
MAbPac HIC-20 column additional reading

- **Application note:** MAbPac HIC-20 High resolution separation of mAb fragments on MAbPac HIC-20 column
- **Application note:** High resolution separation of monoclonal antibody (mAb) oxidation variants on the MAbPac HIC-20 column

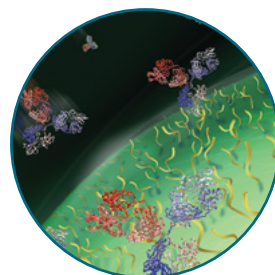
MAbPac HIC-Butyl column additional reading

- **Application note:** High resolution separation of cysteine-conjugated antibody drug mimics using hydrophobic interaction chromatography

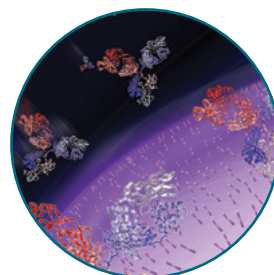
Learn more at [thermofisher.com/biolc](https://www.thermofisher.com/biolc)



MAbPac HIC-10



MAbPac HIC-20



MAbPac HIC-Butyl



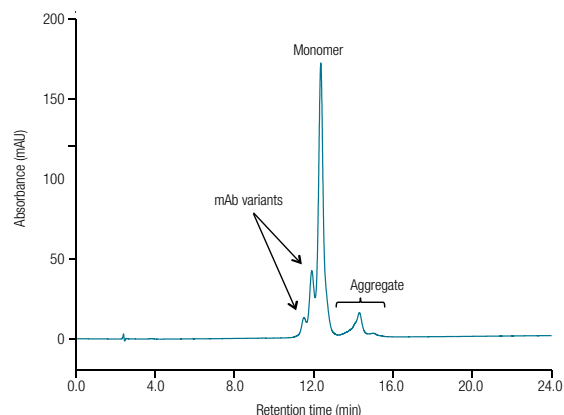
MABPac HIC-10, HIC-20, HIC-Butyl columns

Continued



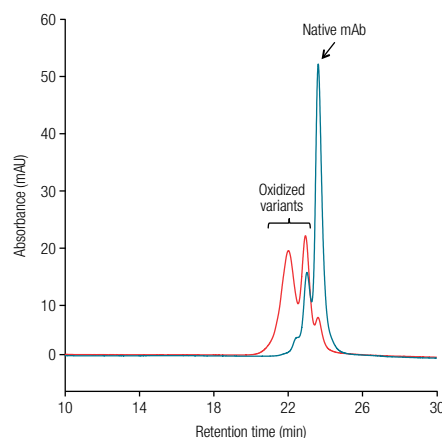
Separation of mAb aggregates

MABPac HIC-10, 5 μ m, 100 x 4.6 mm			
Flow rate	0.5 mL/min		
Mobile phase A	2 mM ammonium sulfate, 100 mM sodium phosphate, pH 7.0		
Mobile phase B	100 mM sodium phosphate, pH 7.0		
Temperature	20 °C		
Injection volume	15 μ L		
Detection	UV at 280 nm		
Sample	Monoclonal antibody (4 mg/mL)		
Gradient	Time (min)	%A	%B
	-5.0	60	40
	0.0	60	40
	1.0	60	40
	29.0	0	0
34.0	0	0	



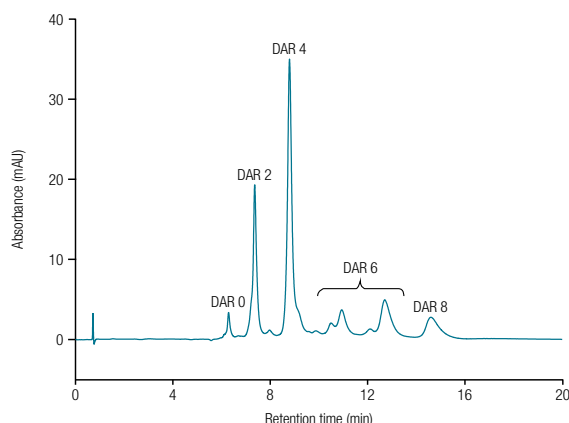
Separation of mAb fragments

MABPac HIC-20, 5 μ m, 250 x 4.6 mm			
Flow rate	0.5 mL/min		
Mobile phase A	2 mM ammonium sulfate, 100 mM sodium phosphate, pH 7.0		
Mobile phase B	100 mM sodium phosphate, pH 7.0		
Temperature	30 °C		
Injection volume	Untreated mAb: 20 μ L (1.25 mg/mL) Oxidized mAb: 20 μ L (1.25 mg/mL)		
Detection	UV at 280 nm		
Sample	Untreated mAb H ₂ O ₂ oxidized mAb		
Gradient	Time (min)	A%	%B
	-6.0	50	50
	0.0	50	50
	2.0	50	50
	30.0	0	100
35.0	0	100	



Separation of Antibody Drug Conjugates (ADCs)

MABPac HIC-Butyl, 5 μ m, 100 x 4.6 mm			
Flow rate	1.0 mL/min		
Mobile phase A	1.5 mM ammonium sulfate, 50 mM sodium phosphate, pH 7.0/ isopropanol (95:5 v/v)		
Mobile phase B	50 mM sodium phosphate, pH 7.0/isopropanol (80:20 v/v)		
Temperature	25 °C		
Injection volume	5 μ L		
Detection	UV at 280 nm		
Sample	Cys-conjugated ADC mimic (5 mg/mL)		
Gradient	Time (min)	%A	%B
	-5.0	100	0
	0.0	100	0
	1.0	100	0
	15.0	0	100
20.0	0	100	





MAbPac HIC-10, HIC-20, HIC-Butyl columns

Continued



MAbPac HIC selection guide

Column	MAbPac HIC-10	MAbPac HIC-20	MAbPac HIC-Butyl
Intact mAbs/proteins	++++	+++	++
mAb aggregates	++++	+++	++
mAb fragments (F _{ab} and F _c)	+++	++++	+++
Oxidized mAbs	+++	++++	+++
Antibody Drug Conjugates (ADCs)	+++	+++	++++
Bispecific mAbs	+++	++++	++

Greater number of ++++ denotes greater suitability



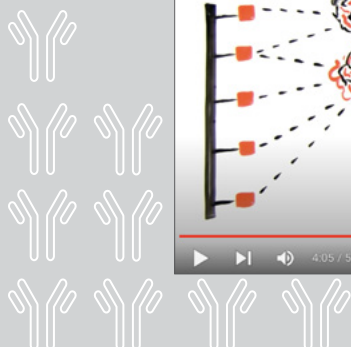
MAbPac HIC family columns

Description	Particle size (µm)	Format	Length (mm)	4.6 mm ID
MAbPac HIC-10	5	Guard cartridges (2/pk)	10	088482
		HPLC column	100	088480
			250	088481
MAbPac HIC-20	5	Guard cartridges (2/pk)	10	088555
		HPLC column	100	088553
			250	088554
MAbPac HIC-Butyl	5	Guard cartridges (2/pk)	10	088559
		HPLC column	100	088558
Guard cartridge holder	—	—	—	069580



Video:

Introduction to hydrophobic interaction chromatography



Released glycan analysis

For monoclonal antibodies, or protein samples with a lot of neutral glycans, the **Thermo Scientific™ Accucore™ 150-Amide HILIC** offers outstanding separation on a solid core particle. The low backpressure of this particle allows users to experiment with optimum temperature of their separation, to maximize the elucidation of their released glycan profile.

For proteins with charged glycans, we offer two mixed mode column chemistries combining anion exchange with HILIC or RP separations. **Thermo Scientific™ GlycanPac™ AXH-1** separates the glycan profile by charge, size, and hydrophilicity. **Thermo Scientific™ GlycanPac AXR-1** separates the profile by charge, size, and branch isomers.



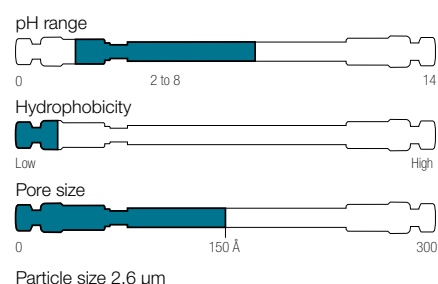
Accucore 150-Amide-HILIC column



Additional reading

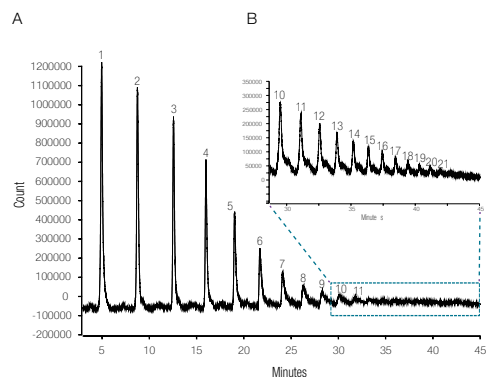
- **Application note:** Analysis of human IgG glycans on a solid core amide HILIC stationary phase

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2-AB labeled dextran ladder

Accucore 150-Amide-HILIC, 2.6 µm, 100 x 2.1 mm	
Flow rate	500 µL/min
Mobile phase A	Acetonitrile
Mobile phase B	50 mM ammonium formate, pH 4.5
Temperature	60 °C
Injection volume	2 µL to 5 µL
Backpressure at starting conditions	110 bar
Injection wash solvent	80:20 (v/v) acetonitrile:water
Detector	Fluorescence, 330 nm excitation wavelength; 420 nm emission wavelength; acquisition start after 3 min from gradient start
Run time	50 min
Gradient	20–50% B in 40.0 minutes 50% B for 5.0 minutes 50–20% B in 0.5 minutes 50% B for 4.5 minutes



(A) 2 µL injection of sample, where 11 glycans were separated.

(B) 5 µL injection of sample, zoomed-in to the later part of the gradient rise. A further 10 glycans were detected.



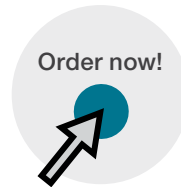
Accucore 150-Amide-HILIC column

Continued



Accucore 150-Amide-HILIC columns

Particle size (µm)	Format	Length (mm)	2.1 mm ID	3.0 mm ID	4.6 mm ID
2.6	Defender guard (4/pk)	10	16726-012105	—	—
	HPLC column	50	16726-052130	16726-053030	—
		100	16726-102130	16726-103030	16726-104630
		150	16726-152130	16726-153030	16726-154630
		250	16726-252130	—	—
—	Guard cartridge holder		852-00	852-00	850-00



Webinars:
Analytical and life science webinars live and on-demand



NIBRT collaboration information
A collaboration built for Biopharma between the National Institute for Bioprocessing Research and Training (NIBRT) and Thermo Fisher Scientific
thermofisher.com/nibr



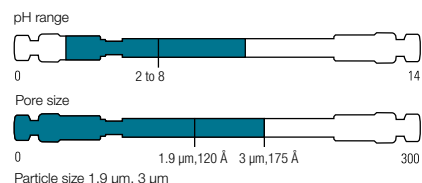
GlycanPac AXH-1 column



Additional reading

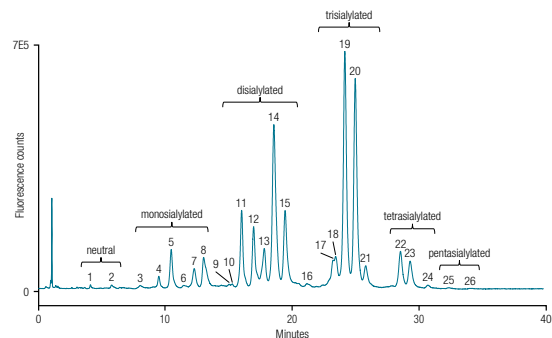
- **Application note:** Separation of 2AB-labeled N-linked glycans from bovine fetuin on a novel ultra high resolution mixed-mode column
- **Application note:** Separation of 2AA-labeled N-linked glycans from human IgG on a high resolution mixed-mode column
- **Application note:** Separation of 2AA-labeled N-linked glycans from glycoproteins on a high resolution mixed-mode column

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Separation of 2AB labeled N-glycans from bovine fetuin by charge, size and polarity

GlycanPac AXH-1, 1.9 μm, 150 x 2.1 mm				
Flow rate	0.4 mL/min			
Mobile phase A	Acetonitrile (100%)			
Mobile phase B	Water			
Mobile phase C	Ammonium formate (100 mM, pH = 4.4)			
Temperature	30 °C			
Injection volume	5 μL			
Detection	Fluorescence, 320/420 nm			
Sample	2AB labeled N-glycan from bovine fetuin			
Curve	5			
Gradient	Time (min)	%A	%B	%C
	-10.0	78	20	2
	0.0	78	20	2
	30.0	70	20	10
	35.0	60	20	20
	40.0	50	20	30



GlycanPac AXH-1 columns

Particle size (μm)	Format	Length (mm)	2.1 mm ID	3.0 mm ID	4.6 mm ID
1.9	UHPLC column	100	082473	—	—
		150	082472	—	—
		250	082521	—	—
3	Guard cartridges (2/pk)	10	082476	082475	082474
	HPLC column	150	082470	082469	082468
—	Guard cartridge holder	—	069580	069580	069580



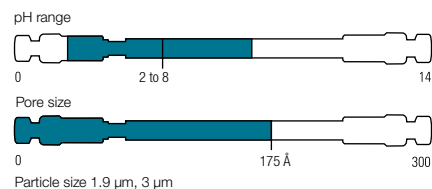
GlycanPac AXR-1 column



Additional reading

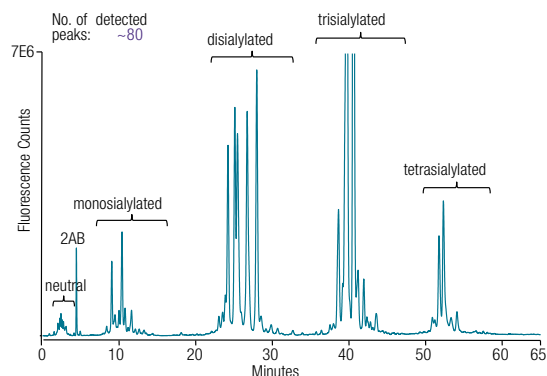
- **Analyteguru.com:** Separation of 2AB labeled N-glycans from bovine fetuin on a novel mixed-mode stationary phase
- **Application note:** Structural analysis of native N-glycans released from proteins using a novel mixed-mode column and a hybrid quadrupole-orbitrap mass spectrometer

Learn more at thermofisher.com/biolc



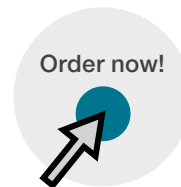
Separation of 2AB labeled N-glycans from bovine fetuin

GlycanPac AXR-1, 1.9 μm, 150 x 2.1 mm				
Flow rate	0.4 mL/min			
Mobile phase A	Acetonitrile			
Mobile phase B	Water			
Mobile phase C	Ammonium formate (100 mM, pH = 4.4)			
Temperature	40 °C			
Sample load	100 pmoles			
Detection	Fluorescence, 320/420 nm			
Sample	2AB labeled N-glycan from bovine fetuin			
Curve	5			
Gradient	Time (min)	%A	%B	%C
	-10.0	0	95	5
	0.0	0	95	5
	1.0	0	95	15
	30.0	1	74	25
	65.0	20	50	30



GlycanPac AXR-1 columns

Particle size (μm)	Format	Length (mm)	2.1 mm ID	3.0 mm ID	4.6 mm ID
1.9	UHPLC column	150	088136	—	—
		250	088135	—	—
—	Guard cartridge holder	—	069580	069580	069580



Aggregate fragment analysis

For mAb samples, our 300 Å silica **Thermo Scientific™ MAbPac™ SEC-1** provides separation of aggregate and fragment samples to characterize your sample by LC-UV or LC-MS. Polymer-based **Thermo Scientific™ Acclaim™**

SEC-300Å and **Thermo Scientific™ Acclaim™ SEC-1000** columns should be selected when working with mAbs conjugated to another compound, such as PEGylated samples.



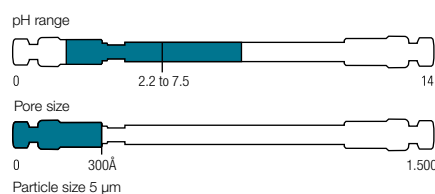
MAbPac SEC-1 column



Additional reading

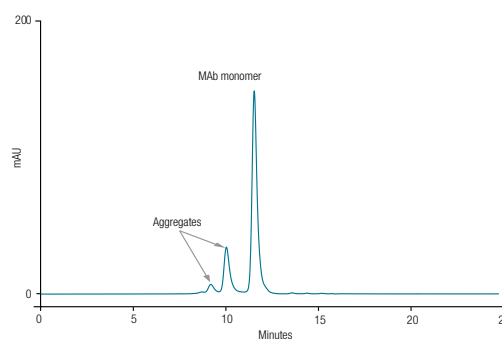
- **Application note:** Lifetime stability of size-exclusion chromatography columns for protein aggregate analysis
- **Application note:** Analysis of monoclonal antibodies and their fragments by size-exclusion chromatography coupled with an Orbitrap mass spectrometer

Learn more at thermofisher.com/biolc



Monoclonal antibody aggregate separation

MAbPac SEC-1, 5 µm, 300 x 4.0 mm (PEEK)	
Flow rate	0.20 mL/min
Mobile phase	0.3 mM NaCl in 50 mM phosphate buffer pH 6.8
Gradient	0% B for 0.2 mins, 100% B for 0.60 mins, 0% B for 1.20 mins
Temperature	30 °C
Injection volume	2 µL
Detection	280 nM
Sample	mAb (10 mg/mL)



MAbPac SEC-1 columns

Particle size (µm)	Format	Length (mm)	2.1 mm ID	4.0 mm ID	7.8 mm ID
5	Guard column	50	—	074697	—
—	HPLC column	150	088790	075592	—
		300	088789	074696	088460



Acclaim SEC-300 column

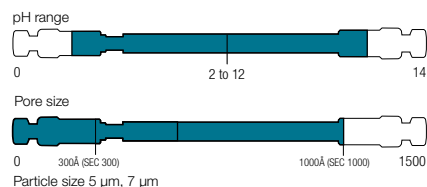
Acclaim SEC-1000 column



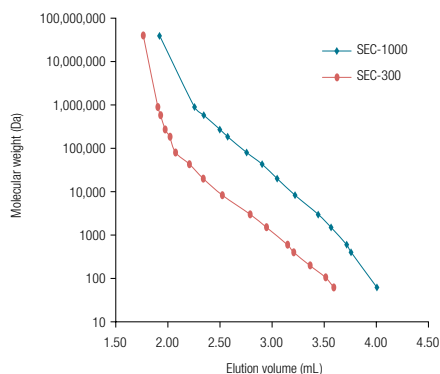
Additional reading

- **Technical note:** Acclaim column selection guide
- **Brochure:** Acclaim columns overview

Learn more at thermofisher.com/biolc

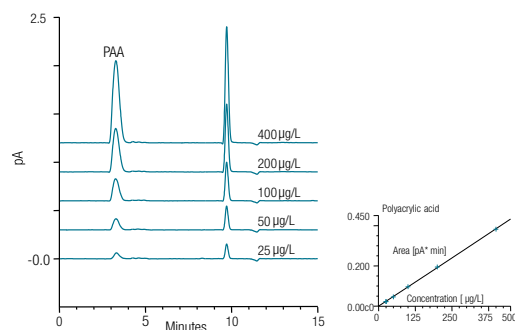


Acclaim SEC-300, 5 µm, 300 x 4.6 mm	
Acclaim SEC-1000, 7 µm, 300 x 4.6 mm	
Flow rate	0.35 mL/min
Mobile phase	10 mM sodium perchlorate
Analytes	(0.03% - 0.1% in mobile phase) dextran (MW 5,000,000-40,000,000), PEO (MW 895,000, 580,000, 272,000, 185,000, 80,000, 43,000, and 20,000), PEG (MW 8,300, 3,000, 1,500, 600, 400 and 200), diethylene glycol (MW 106 and ethylene glycol (MW 62)
Temperature	25 °C
Injection volume	50 µL
Detection	RI



Polyacrylic acid using SEC with charged-aerosol detection

Acclaim SEC-300, 5 µm, 300 x 4.6 mm	
Flow rate	0.35 mL/min
Mobile phase	A: Acetonitrile B: Water
Analytes	1. PAA standards in water
Temperature	50 °C
Injection volume	35 µL
Detection	Corona III; evaporator 55 °C, Engine 40 °C, 2 Hz, filter 5, power function 1.20



Acclaim size exclusion chromatography (SEC) columns

Description	Particle size (µm)	Format	Length (mm)	4.6 mm ID	7.8 mm ID
Acclaim SEC-300	5	Guard	33	082740	—
		HPLC column	150	—	079726
			300	079723	079725
Acclaim SEC-1000	7	Guard	33	082739	—
		HPLC column	150	—	079722
			300	079724	079721

Intact and subunit analysis (RP)

The wide pore (1500 Å) polymeric **Thermo Scientific™ MAbPac™ RP** columns offers high resolution separation and minimal carryover for monoclonal antibody samples. Excellent lifetime and ability to separate intact and protein subunits, compatible with LC-UV and LC-MS/MS applications.

The monolithic **Thermo Scientific™ ProSwift™ RP** columns offer unique selectivity, high throughput separations for a wide range of protein sizes. These columns provide high loadability and operate under very low backpressure.



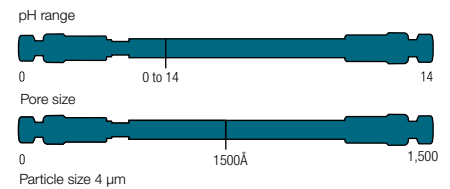
MAbPac RP column



Additional reading

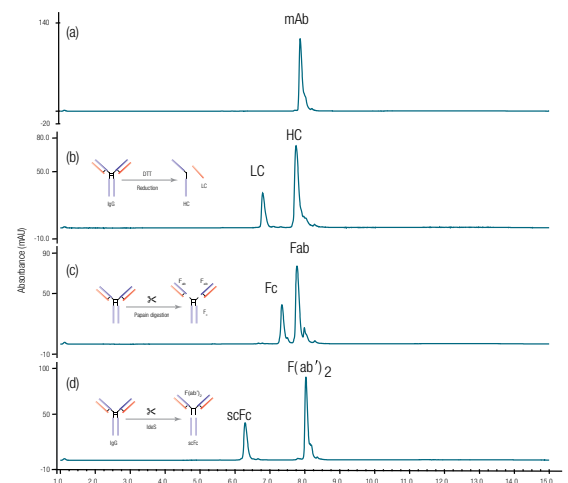
- **Application note:** Confident monoclonal antibody sequence verification by complementary LC-MS techniques
- **Application note:** Fast analysis of therapeutic monoclonal antibody fragments using a supermacroporous, reversed-phase chromatography column

Learn more at thermofisher.com/biolc



mAb and mAb fragments analysis

MAbPac RP, 4 µm, 50 x 3.0 mm			
Flow rate	0.5 mL/min		
Mobile phase A	H ₂ O/FA/TFA (99.88 : 0.1 : 0.02 v/v/v)		
Mobile phase B	ACN/H ₂ O/FA/TFA 90 : 9.88 : 0.1 : 0.02 v/v/v/v)		
Temperature	80 °C		
Injection volume	5 µL		
Detection	UV at 280 nm		
Sample	(a) trastuzumab (5 mg/mL) (b) trastuzumab + DTT (4 mg/mL) (c) trastuzumab + Papain (2 mg/mL) (d) trastuzumab + IdeS (2 mg/mL)		
Gradient	Time (min)	%A	%B
	0.0	80	20
	1.0	80	20
	11.0	55	45
	12.0	55	45
	16.0	80	20





MABPac RP column

Continued



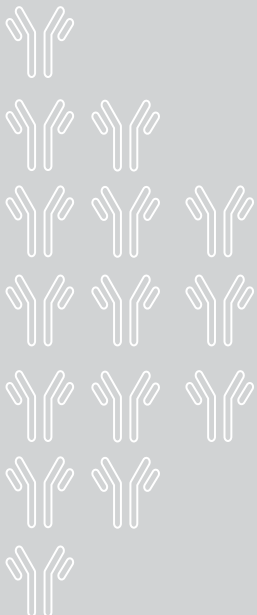
MABPac RP columns

Particle size (μm)	Format	Length (mm)	2.1 mm ID	3.0 mm ID
4	Guard cartridges (2/pk)	10	088649	088646
		50	088648	088645
	HPLC column	100	088647	088644
		150	303270	303269
—	Guard cartridge holder	—	069580	069580

MABPac RP 1 mm columns

Particle size (μm)	Length (mm)	1 mm ID
4	50	303182
	100	303183
	150	303184

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ProSwift RP column



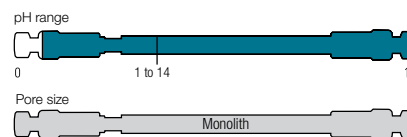
Additional reading

Learn more at [thermofisher.com/biolc](https://www.thermofisher.com/biolc)

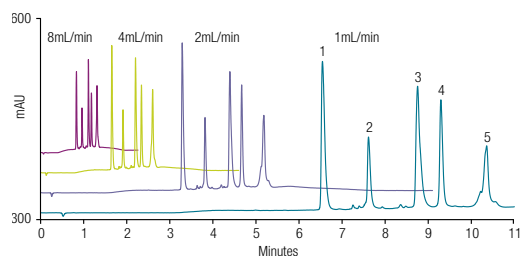


ProSwift column

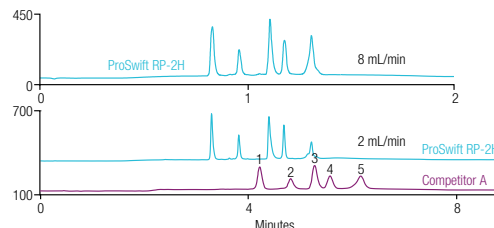
ProSwift RP-2H, 50 x 4.6 mm	
Flow rate	1, 2, 4, or 8 mL/min
Mobile phase A	H ₂ O/ACN (95:5; V/V) + 0.1% TFA
Mobile phase B	H ₂ O/ACN (5:95; V/V) + 0.1% TFA
Injection volume	2 µL
Detection	UV at 214 nm
Sample	Mixture of five proteins
Gradient	1 mL/min: 1-75% B in 12 min 2 mL/min: 1-75% B in 6 min 4 mL/min: 1-75% B in 3 min 8 mL/min: 1-75% B in 1.5 min
Analytes	1. Ribonuclease A 1.5 mg/mL 2. Cytochrome C 0.5 mg/mL 3. BSA 1.5 mg/mL 4. Carbonic anhydrase 0.9 mg/mL 5. Ovalbumin 1.5 mg/mL



Proteins

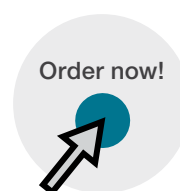


Competitive comparison



ProSwift RP columns

Functional group	Length (mm)	1.0 mm ID	4.6 mm ID
RP-1S	50	—	064297
RP-2H	50	—	064296
RP-3U	50	—	064298
RP-4H	50	069477	—
RP-10R	50	164586TS	—
RP-4H	250	066640	—

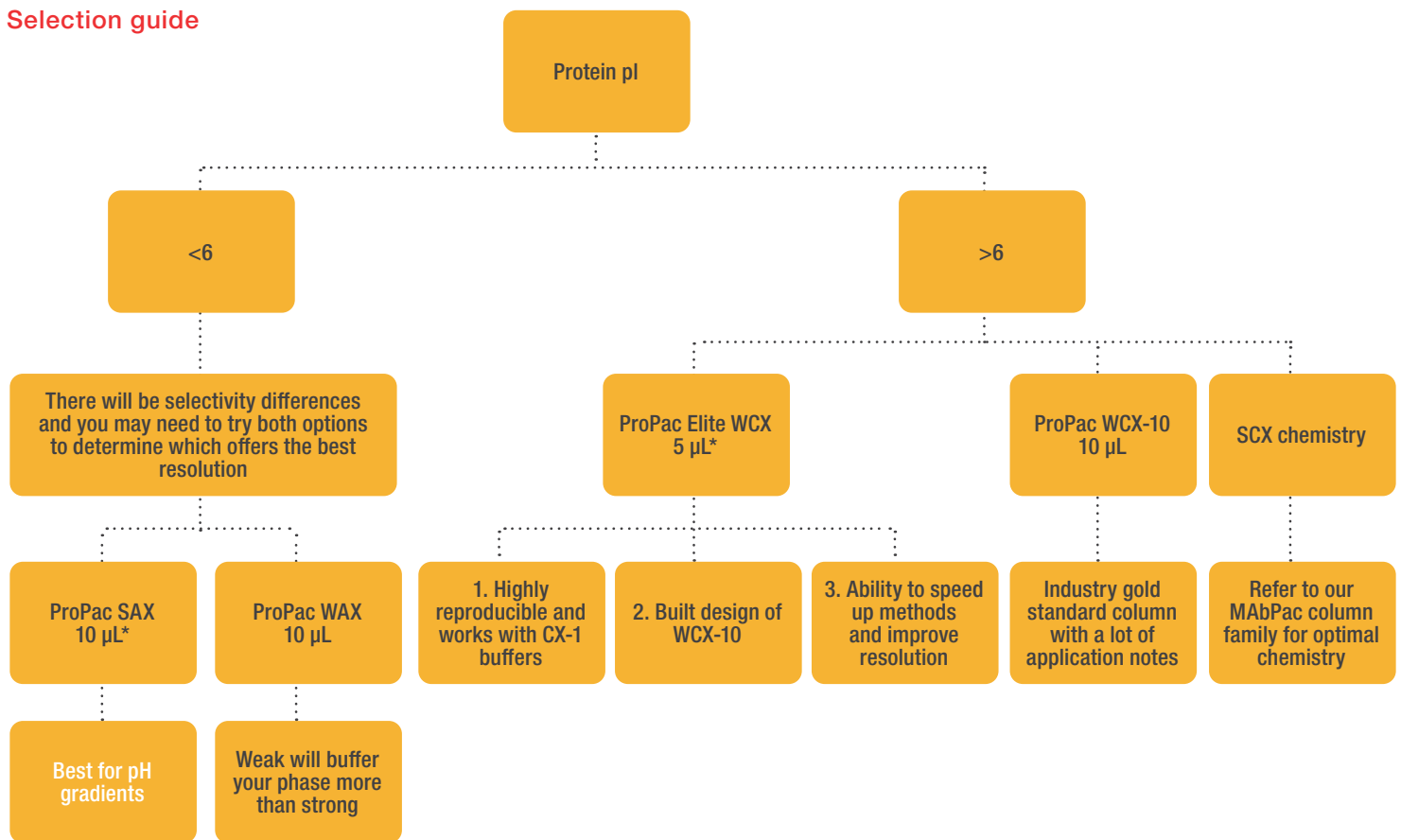


Charge variant analysis

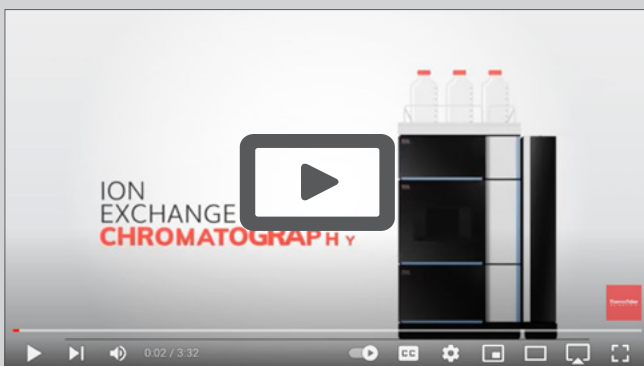
For charge variant analysis by LC-UV or LC-MS/MS **Thermo Scientific™ ProPac™ Elite WCX** and **Thermo Scientific™ MAbPac™ SCX-10** columns deliver outstanding resolution on a highly reproducible platform. When used in combination with our linear CX-1 pH gradient buffers, quickly develop

an LC-UV platform method for proteins with a pI from 6-10. For proteins with a pI less than 6, it is recommended that you start with a strong anion exchange column, such as the **Thermo Scientific™ ProPac™ SAX-10** columns.

Selection guide

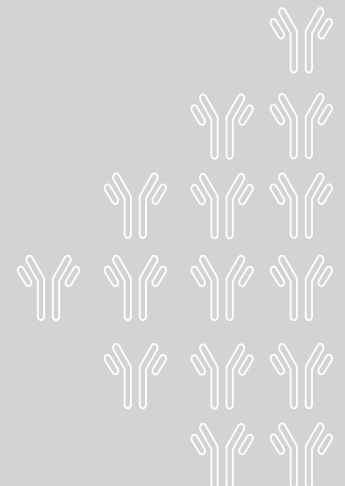


*= if uncertain on which phase to choose start here



Video:

Tips to improve your charge variant analysis by ion exchange





ProPac Elite WCX column



Additional reading

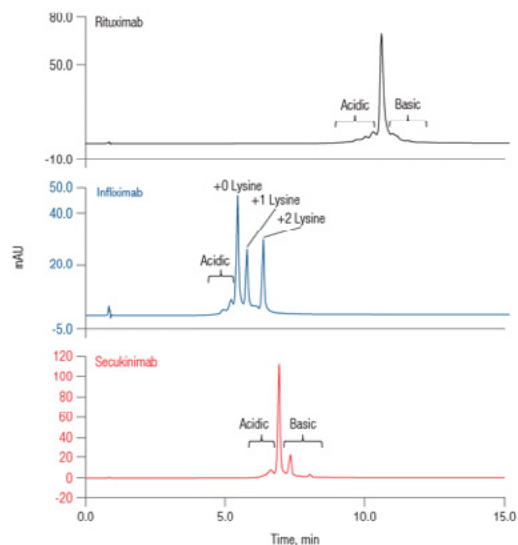
- **Application note:** Separation of IgG2 and IgG4 therapeutics using weak cation exchange chromatography
- **Application note:** Salt gradient analysis of IgG1 monoclonal antibodies using a 5 µm WCX chromatography column

Learn more at thermofisher.com/biolc



ProPac Elite WCX, 5 µm, 150 x 4.0 mm

Flow rate	1.0 mL/min	
Mobile phase A	1x CX-1 pH Gradient buffer A	
Mobile phase B	1x CX-1 pH Gradient buffer B	
Temperature	30 °C	
Injection volume	2 µL	
Detection	UV at 280 nm	
Sample	Top: rituximab, 5 mg/mL Middle: infliximab, 5 mg/mL Bottom: secukinimab, 5 mg/mL	
Gradient	Time (min)	%A %B
	0.0	80 20
	15.0	20 80
	15.1	0 100
	17.0	0 100
	25.0	80 20



ProPac Elite WCX columns

Particle size (µm)	Format	Length (mm)	2.0 mm ID	4.0 mm ID
5	Analytical	50	303028	302973
		100	303027	302972
	HPLC column	250	303026	303025

ProPac Elite WCX kits

Description	Set contents	Column dimensions	Part. no.
ProPac Elite WCX	3 columns from 1 lot	4 × 150 mm	302976
	3 columns from 3 lots		302977
ProPac Elite WCX, analytical	3 columns from 1 lot	4 × 250 mm	303061
	3 columns from 3 lots		303062



pH gradient buffers



Ready-to-use buffers for simple method development during charge variant characterization

The Thermo Scientific pH gradient platform accelerates method development and facilitates method transfer to QA/QC for a wide range of protein and mAb charge variants through a generic LC-based approach to charge variant characterization.

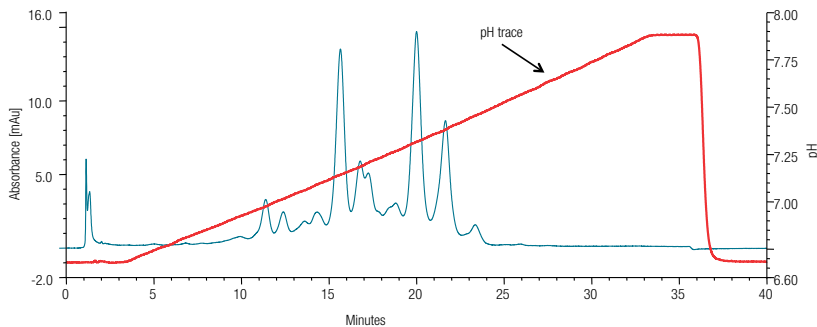
Thermo Scientific pH buffer concentrates can be purchased individually or as a pair, in quantities of 125 mL or 250 mL. For added convenience, the 125 mL buffers can also be bundled with columns in a number of specifically preconfigured kits.

- Patented buffer formulations enable fast, robust and reproducible pH gradients that are simple to optimize and easily automated
- Ready to use with existing LC columns and systems, without the need for time consuming mobile phase adjustments
- Applicable to the majority of mAbs

Learn more at thermofisher.com/biolc



Optimization of mAb charge variant separation using a linear pH gradient: 25% B (pH 6.75) to 50% B (pH 7.9)



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pH gradient buffers

Continued



pH gradient buffers

Description	Buffer bottle size		
Buffer	125 mL	250 mL	500 mL
CX-1 pH Gradient buffer A (pH 5.6)	083273	085346	302779
CX-1 pH Gradient buffer B (pH 10.2)	083275	085348	302780

Kits		Buffer bottle size	
Buffer	MABPac SCX-10 column	125 mL	250 mL
Gradient buffer Kit: includes both buffer A and buffer B (available in either 125 mL or 250 mL size – one bottle each/kit)	—	083274	085349
Gradient starter kit: includes both buffer A and buffer B + MABPac SCX-10	10 µm, 4 × 250 mm	083381	—
Gradient high throughput kit: includes both buffer A and buffer B + MABPac SCX-10	5 µm, 4 × 50 mm	083378	—
Gradient high resolution kit: includes both buffer A and buffer B + MABPac SCX-10	5 µm, 4 × 250 mm	083272	—

Order now!



Video:

Fast, reproducible biopharmaceutical charge variant profiling



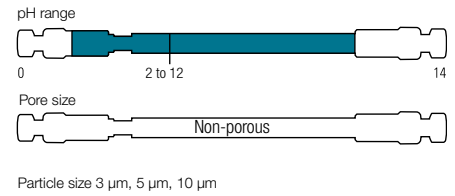
MABPac SCX-10 column



Additional reading

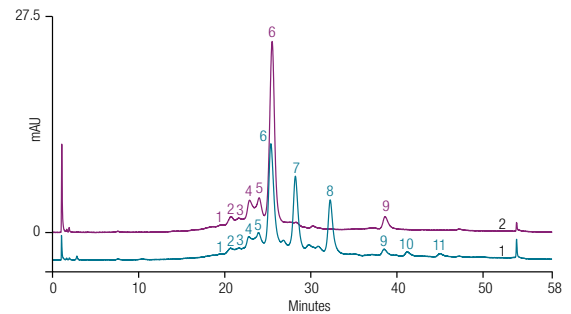
- **Application note:** A global pH-gradient based charge variant analysis directly coupled to HRAM-MS (CVA-MS) for mAb analysis
- **Application note:** High throughput, high resolution monoclonal antibody analysis with small particle size HPLC columns

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Baseline resolution of C-terminal lysine variants of a monoclonal antibody

MABPac SCX-10, 5 µm, 250 x 4.0 mm	
Flow rate	1 mL/min
Mobile phase A	20 mM MES (pH 5.6) + 60 mM NaCl
Mobile phase B	20 mM MES (pH 5.6) + 300 mM NaCl
Gradient	15–36% B in 50 min
Temperature	30 °C
Injection volume	5 µL
Detection	UV at 280 nm
Sample	1. mAb B, 900 µg in 100 µL (no carboxypeptidase) 2. mAb B, 900 µg in 100 µL + carboxypeptidase, 50 µg, incubation at 37 °C for 3 h
Both chromatograms	Peaks 1–5: acidic variants
Sample 1	Peaks 6–8: C-Terminal lysine truncation variants of main peak. Peaks 9–11: C-Terminal lysine truncation variants of minor variant peak
Sample 2	Peak 6 results from peaks 6, 7, and 8 after CBP treatment. Peak 9 results from peaks 9, 10, and 11 after CBP treatment



MABPac SCX-10 columns

Particle size (µm)	Format	Length (mm)	2.0 mm ID	4.0 mm ID	9.0 mm ID
3	HPLC column	50	—	077907	—
		50	—	078656	—
5	HPLC column	150	—	085198	—
		250	—	078655	—
10	Guard column	50	075749	074631	—
		50	—	075603	—
	HPLC column	150	—	075602	—
		250	075604	074625	088784

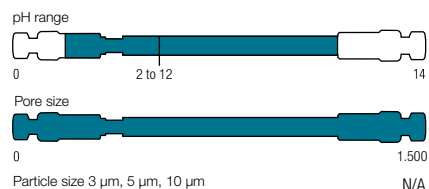


MabPac SCX-10RS column

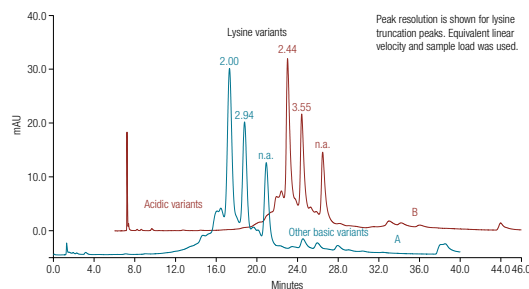


Additional reading

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MabPac SCX, 5 μm, 250 x 4.6 mm	
Flow rate	1.5 mL/min
Mobile phase A	20 mM MES pH 5.6 + 60 mM
Mobile phase B	20 mM MES pH 5.6 + 3 mM NaCl
Injection volume	15 μL
Detection	UV at 280 nm
Sample	mAb 5 mg/mL
Both chromatograms	Peaks 1–5: acidic variants
Chromatogram A	Gradient: 33-53% B in 30 min
Chromatogram B	Gradient: 33-53% B in 20 min

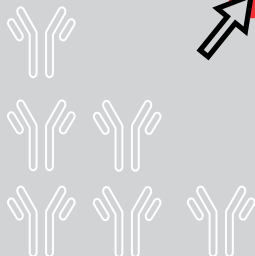


MabPac SCX-10 RS columns

Particle size (μm)	Format	Length (mm)	2.1 mm ID	4.6 mm ID
5	UHPLC column	50	082675	082674
		150	088242	085209
		250	082515	082673



Webinar:
Taking charged variant analysis of therapeutic proteins to the next level

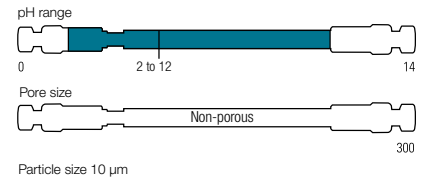




ProPac SAX-1 column

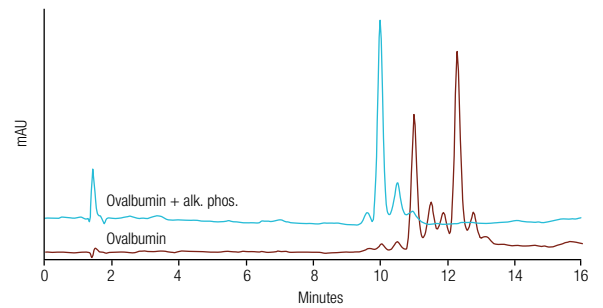


Additional reading
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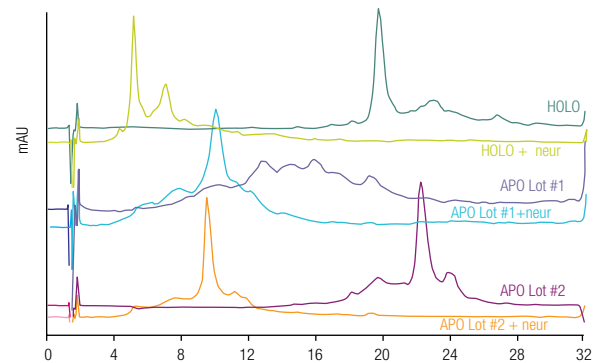
Resolution of phosphorylation variants of ovalbumin

ProPac SAX-10, 10 µm, 250 x 4.0 mm				
Flow rate	1.0 mL/min			
Mobile phase A	Water			
Mobile phase B	2.0 mM NaCl			
Mobile phase C	0.1 mM Tris/HCl (pH 8.5)			
Injection volume	1.0 µL			
Detection	UV at 214 nm			
Sample	Ovalbumin before and after alkaline phosphatase treatment			
Gradient	Time (min)	%A	%B	%C
	0.0	80	0	20
	15.0	67.5	12.5	20



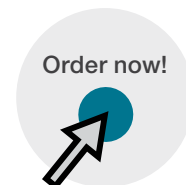
Effect of sialylation on transferrin chromatography

ProPac SAX-10, 10 µm, 250 x 4.0 mm				
Flow rate	1.0 mL/min			
Mobile phase A	Water			
Mobile phase B	2.0 mM NaCl			
Mobile phase C	0.2 mM Tris/HCl (pH 9)			
Injection volume	50.0 µL			
Detection	UV at 214 nm			
Sample	HOLO (iron rich) and APO (iron poor) human transferrin samples before and after neuraminidase treatment. Digestions were carried out overnight at 37 °C in sodium acetate buffer at pH 5.			
Gradient	Time (min)	%A	%B	%C
	0.0	87	3	10
	30.0	83	7	10



ProPac SAX-10 columns

Particle size (µm)	Format	Length (mm)	2.0 mm ID	4.0 mm ID	9.0 mm ID	22.0 mm ID	4 x 50 mm
10	Guard column	50	063454	054998	—	—	—
	HPLC column	250	063448	054997	063703	088770	078990





pH gradient buffers



Ready-to-use buffers for simple method development during charge variant characterization

The Thermo Scientific pH gradient platform accelerates method development and facilitates method transfer to QA/QC for a wide range of protein and mAb charge variants through a generic LC-based approach to charge variant characterization.

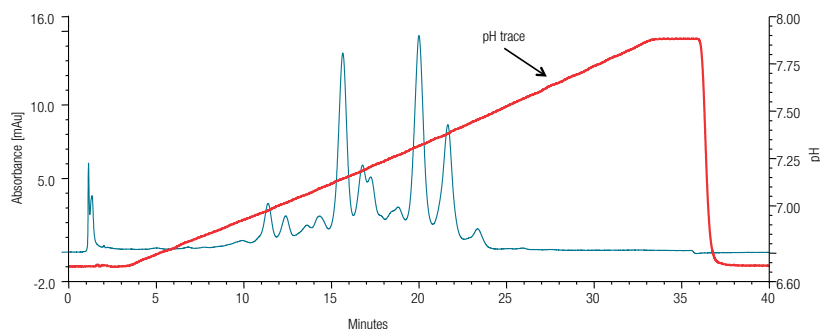
Thermo Scientific pH buffer concentrates can be purchased individually or as a pair, in quantities of 125 mL or 250 mL. For added convenience, the 125 mL buffers can also be bundled with columns in a number of specifically preconfigured kits.

- Patented buffer formulations enable fast, robust and reproducible pH gradients that are simple to optimize and easily automated
- Ready to use with existing LC columns and systems, without the need for time consuming mobile phase adjustments
- Applicable to the majority of mAbs

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Optimization of mAb charge variant separation using a linear pH gradient: 25% B (pH 6.75) to 50% B (pH 7.9)



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pH gradient buffers

Continued



pH gradient buffers

Description	Buffer bottle size		
Buffer	125 mL	250 mL	500 mL
CX-1 pH Gradient buffer A (pH 5.6)	083273	085346	302779
CX-1 pH Gradient buffer B (pH 10.2)	083275	085348	302780

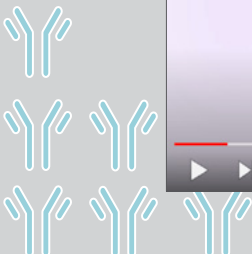
Kits		Buffer bottle size	
Buffer	MABPac SCX-10 column	125 mL	250 mL
Gradient buffer Kit: includes both buffer A and buffer B (available in either 125 mL or 250 mL size – one bottle each/kit)	—	083274	085349
Gradient starter kit: includes both buffer A and buffer B + MABPac SCX-10	10 µm, 4 × 250 mm	083381	—
Gradient high throughput kit: includes both buffer A and buffer B + MABPac SCX-10	5 µm, 4 × 50 mm	083378	—
Gradient high resolution kit: includes both buffer A and buffer B + MABPac SCX-10	5 µm, 4 × 250 mm	083272	—

Order now!



Video:

Fast, reproducible biopharmaceutical charge variant profiling



Peptide mapping and MAM

Thermo Scientific™ Hypersil GOLD™ VANQUISH™ C18

UHPLC columns are an excellent column choice for a broad range of peptides, offering high resolution for all critical quality attributes, without extremely long retention for more hydrophobic peptides.

For faster separation of peptide samples select the **Thermo Scientific™ Accucore™ C18 VANQUISH™** column. The column offers sub-2 µm particles providing ultra-short diffusion paths that result in extremely efficient separations.



Additional reading

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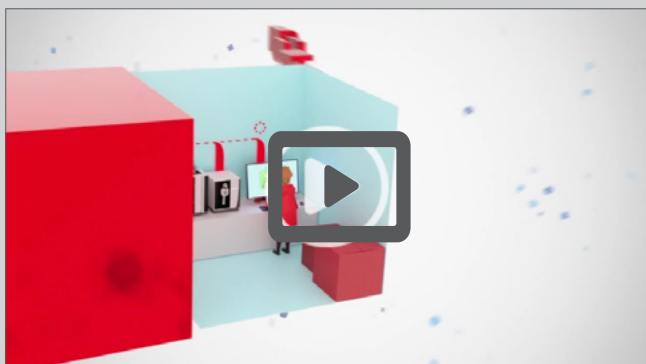


Multi-Attribute Method (MAM):

Straight through to breakthrough



Biopharmaceutical Multi-Attribute Method (MAM) learning centre



Video:

End-to-end MAM solution to move biopharma forward



Hypersil GOLD VANQUISH column



Additional reading

- **Flyer:** VANQUISH UHPLC columns. Delivering powerful separations
- **Application note:** An integrated LC-MS system performance evaluation test for peptide mapping and monitoring

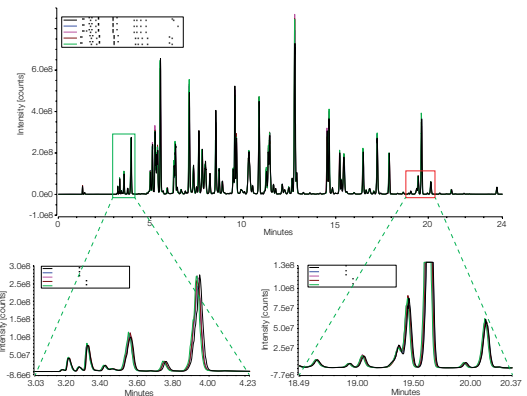
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Overlay of 5 TIC traces from the SET injection sequence

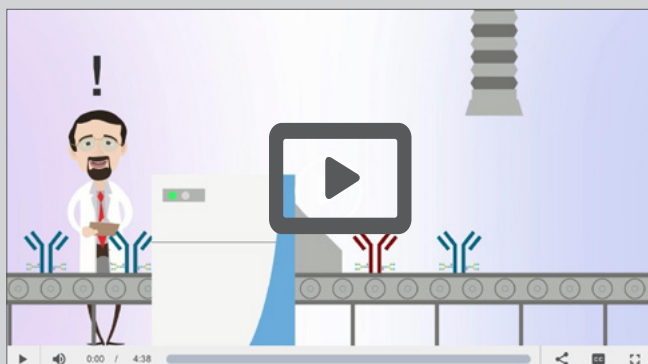
Hypersil GOLD VANQUISH C18 UHPLC column, 150 × 2.1 mm, 1.9 μm

Flow rate	0.25 mL/min
Mobile phase A	H ₂ O + 0.1% FA
Mobile phase B	ACN + 0.1% FA
Injection volume	5 μL
Detection	Mass spectrometer – Full scan
Sample	Pierce BSA protein digest standard, MS grade, UD294474 (P/N 88341)
Chromatogram B	Gradient: 33-53% B in 20 min



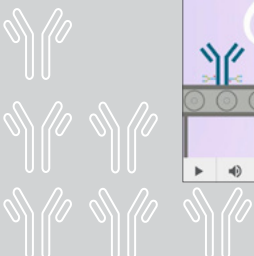
Hypersil GOLD Vanquish columns

Columns	Particle size (μm)	Length (mm)	ID (mm)	Cat. no.
		50		25002-052130-V
Hypersil GOLD VANQUISH	1.9	100	2.1	25002-102130-V
		150		25002-152130-V



Video:

Learn how innovation and monitoring strategies can reduce the number of tests and enhance the methodology of validating impurity





Accucore VANQUISH C18+ column



Additional reading

- **Application note:** Comparative analysis of innovator and biosimilar monoclonal antibodies using a multi-attribute method
- **Technical guide:** Powerful separations are our core performance
- **Poster:** Application of a MS in QC method for characterization and attribute monitoring in Antibody-Drug Conjugates

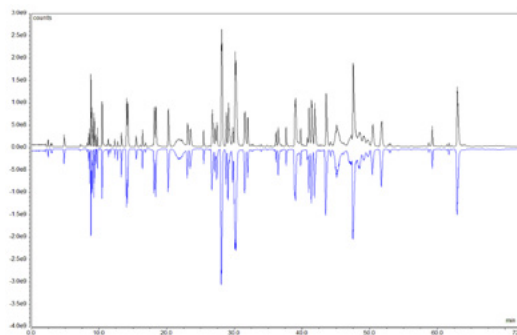
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Mirrored base peak chromatograms of rituximab innovator (black) and its biosimilar product (blue)

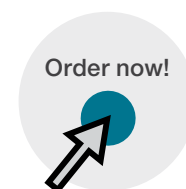
Accucore Vanquish C18+ UHPLC column, 1.5 µm, 2.1 × 150 mm (P/N 27101-152130)

Flow rate	0.25 mL/min
Mobile phase A	H2O + 0.1% FA
Mobile phase B	ACN + 0.1% FA
Injection volume	8 µL
Detection	Mass spectrometer
Sample	Rituximab innovator
Temperature	50 °C



Accucore Vanquish C18+ columns

Particle size (µm)	Length (mm)	ID mm	Cat. no.
1.5 µm	50 mm	2.1	27101-052130
	100 mm	2.1	27101-102130
	150 mm	2.1	27101-152130



Nucleic acids/oligonucleotides

Thermo Scientific™ DNAPac™ RP

column offers ion-pair reversed phase separations of nucleic acid mixtures. Samples from siRNA to mRNA easily resolve on this polymer chemistry. Compatible with LC-UV and LC-MS/MS methodologies this column delivers outstanding separations.

Thermo Scientific™ DNAPac™ PA200

and **Thermo Scientific™ DNAPac™ PA200RS** columns are strong anion exchange columns for n-1 separation of oligo samples. Compatible with LC-UV, these columns offer orthogonal separation to reversed phase columns, separating the oligonucleotide sample by size and charge.

Thermo Scientific™ DNASwift™

column is a monolithic column designed for users who would like to do SAX purification of oligonucleotide samples using their analytical HPLC. These monolithic columns offer high loadability, with slightly less resolution than our analytical columns.

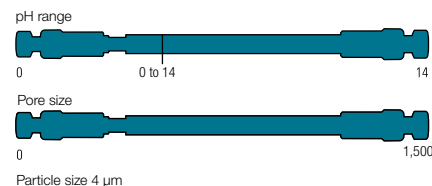


DNAPac RP column



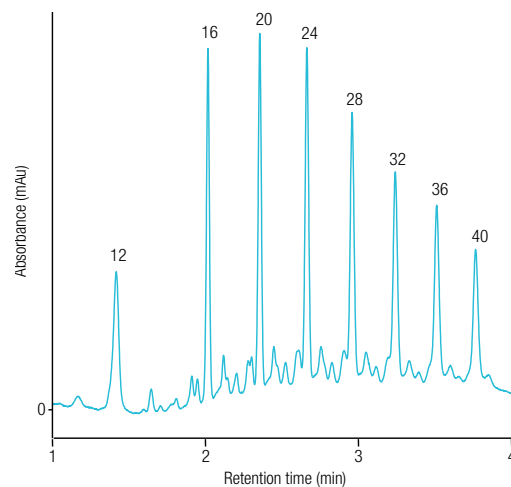
Additional reading

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Fast analysis of mixed base DNA

DNAPac RP, 4 μm, 50 x 2.1 mm			
Flow rate	0.8 mL/min		
Mobile phase A	25 mM HAA, pH 8.5		
Mobile phase B	25 mM HAA, pH 8.5/acetonitrile (50:50 v/v)		
Temperature	65 °C		
Injection volume	4 μL		
Detection	UV at 260 nm		
Sample	8-Combo DNA		
Gradient curve	3		
Peak label	Length of DNA		
Gradient	Time (min)	%A	%B
	-0.1	67	33
	0.0	67	33
	3.0	41	59
	3.1	5	95
	4.9	5	95
	5.0	67	33
	8.0	67	33





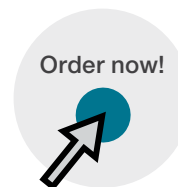
DNAPac RP column

Continued



DNAPac RP columns

Particle size (µm)	Format	Length (mm)	2.1 mm ID	3.0 mm ID
4	Guard cartridges (2/pk)	10	088925	088921
	HPLC column	50	088924	088920
		100	088923	088919
—	Guard cartridge holder	—	069580	069580



Brochure:

Thermo Scientific DNAPac family of columns



Webinar:

Oligonucleotide analysis, new practical advances and tips to a mature technique



Webinar:

The future of oligonucleotide analysis, from short synthetic DNA to mRNA sequencing



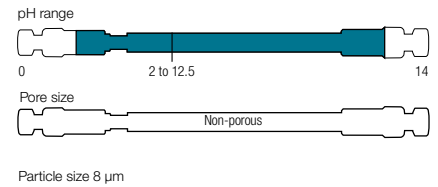


DNAPac PA200 column



Additional reading

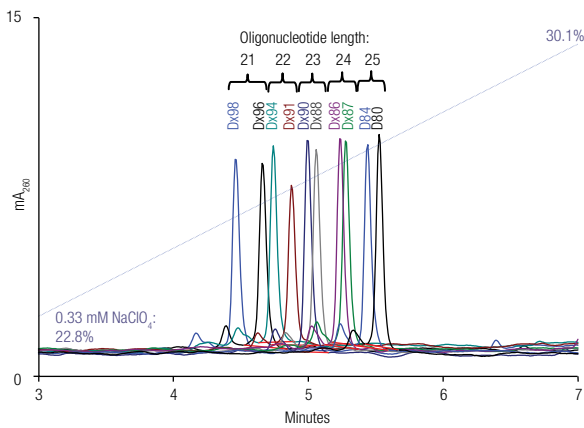
Learn more at [thermofisher.com/biolc](https://www.thermofisher.com/biolc)



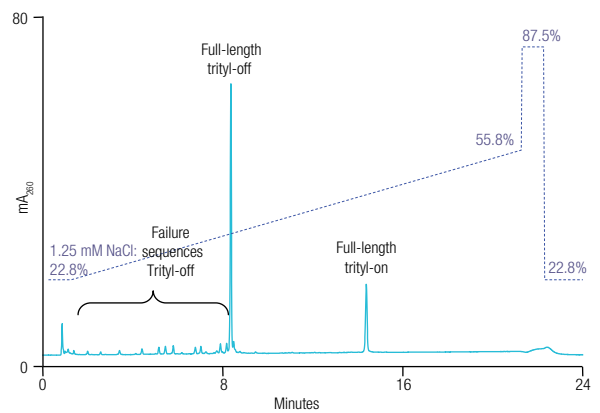
DNAPac PA200, 8 µm, 250 x 4.0 mm

Flow rate	1.2 mL/min
Mobile phase	NaClO ₄ , pH 6.5 with 20% ACN
Detection	UV at 260 nm
Flow rate	1.2 mL/min

Separation of oligonucleotides by length

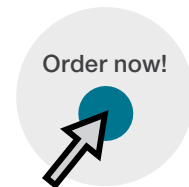


Target, failure and trityl-on oligonucleotides



DNAPac PA200 columns

Particle size (µm)	Format	Length (mm)	2.0 mm ID	4.0 mm ID	9.0 mm ID	22.0 mm ID
8	Guard column	50	063423	062998	063419	088780
	HPLC column	250	063425	063000	063421	088781





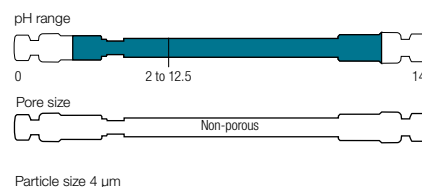
DNAPac PA200 RS column



Additional reading

- **Brochure:** Superior oligonucleotide analysis
- **Application note:** High resolution separation of oligonucleotides
- **Application note:** Ultra-high-resolution separation of oligonucleotides by UHPLC
- **Application note:** Separation of mixed-base oligonucleotides using a high-resolution, reversed-phase chromatography column

Learn more at thermofisher.com/biolc



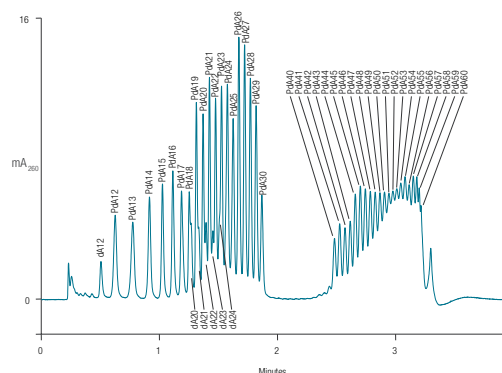
Partial resolution of 46 oligonucleotides

DNAPac PA200 RS, 4 µm, 50 x 4.6 mm

Flow rate	1.30 mL/min
Mobile phase A	20 mM Tris pH 8
Mobile phase B	A + 1.25 mM NaCl
Temperature	30 °C
Injection volume	2.5 µL
Gradient	28–43% B in 4 CV* (2.56 min) curve 3**
Sample	PdA12–30, 40–60

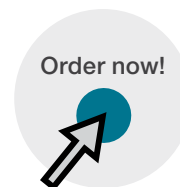
*CV = column volumes

**Curve 3 indicates continuously changing gradient, asymptotically approaching a maximum salt concentration. Programmed in Thermo Scientific™ Chromeleon™ 6.8.



DNAPac PA200 RS columns

Particle size (µm)	Format	Length (mm)	4.6 mm ID
4	BioRS column	50	082508
		150	082509
		250	082510





DNASwift SAX-1S column



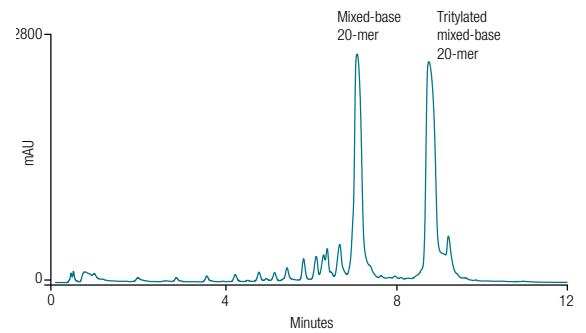
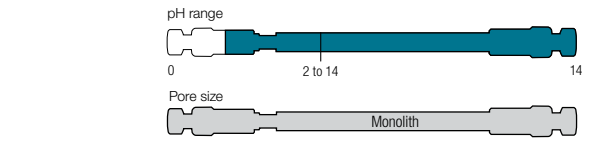
Additional reading

Learn more at [thermofisher.com/biolc](https://www.thermofisher.com/biolc)



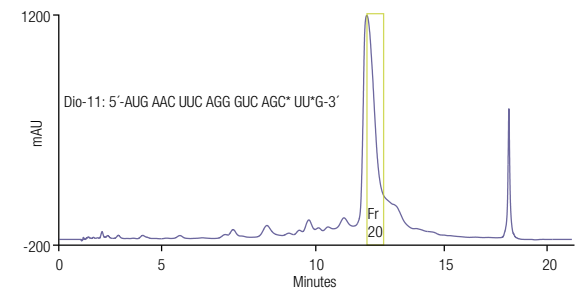
Tritylated oligonucleotide

DNASwift SAX-1S, 150 x 5.0 mm	
Flow rate	1.5 mL/min
Mobile phase A	15 mM Tris, pH 8
Mobile phase B	15 mM Tris, pH 8, 1.25 M NaCl
Temperature	30 °C
Injection volume	20 µL
Detection	UV at 260 nm
Gradient	8–64% B in 10 min



Purification of a 21-base RNA sample with aberrant 2'-5' linkages at the 1 and 3 positions from the 3' end

DNASwift SAX-1S, 150 x 5.0 mm	
Flow rate	1.5 mL/min
Mobile phase A	40 mM Tris, pH 7
Mobile phase B	40 mM Tris, pH 7 + 1.25 M NaCl
Temperature	30 °C
Injection volume	125 µg
Detection	UV at 260 nm
Gradient	26–42% B in 10 column volumes



DNASwift SAX-1S column

Length (mm)

150

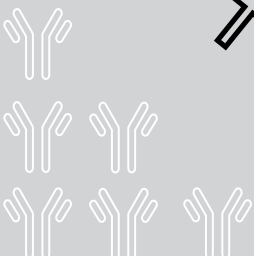
5.0 mm ID

[066766](#)



Webinar:

Oligonucleotide analysis, new practical advances and tips to a mature technique





Brochure:

See your protein therapeutics in high resolution



Webinars

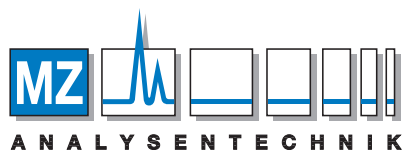
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NIBRT collaboration information

A collaboration built for Biopharma between the National Institute for Bioprocessing Research and Training (NIBRT) and Thermo Fisher Scientific

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