

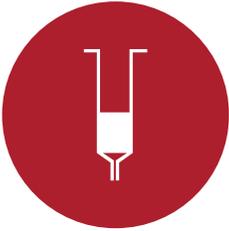
Chromatography consumables

## Connected chromatography solutions

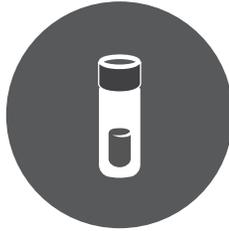
Chromatography consumables catalog

# Comprehensive products to support your chromatography workflows

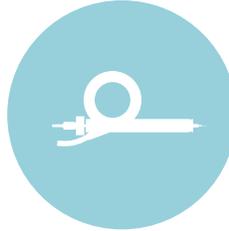
## Sample preparation solutions



## Sample handling solutions



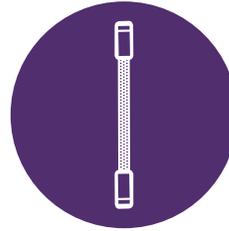
## Low-flow LC columns and accessories



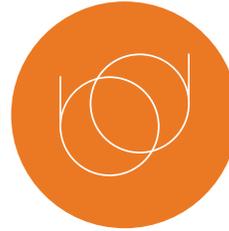
## BioLC columns and accessories



## LC columns and accessories



## GC columns and accessories

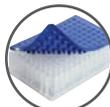


Thermo Scientific™ products:

- SMART Digest™ kits
- SOLA™ SPE products
- HyperSep™ SPE products
- TurboFlow™ and online sample preparation products
- QuEChERS products
- Automated micro solid-phase extraction (μSPE) products
- Syringes and syringe filters



- SureSTART™ AVCS™ closures and SureStop vials
- SureSTART™ Gold grade purity glass vials and vial kits
- SureSTART™ low residual microsampling vials and vial kits
- MS certified vials
- Polyspring vial inserts
- Electronic crimping and decrimping tools
- WebSeal™ well-plates and sealing mats for chromatography



- EASY-Spray™ HPLC columns for top-down and bottom-up proteomics
- Double nanoViper PepMap™ Neo HPLC columns for top-down and bottom-up proteomics
- μPAC™ HPLC columns for bottom-up proteomics



- MAbPac™ size exclusion chromatography
- MAbPac™ and ProPac™ charged variant profiling
- MAbPac™ intact and subunit analysis
- HILIC and mixed-mode glycan analysis
- DNAPac™ oligonucleotide and gene therapy analysis
- Vanquish™ UHPLC peptide analysis



- Accucore™ U/HPLC columns
- Acclaim™ U/HPLC columns
- Hypersil GOLD™ U/HPLC columns
- Hypercarb™ HPLC columns
- Application specific HPLC columns
- Hypersil™ BDS and Hypersil™ classical HPLC columns
- LC accessories
- Preparative HPLC columns



- TracePLOT™ GC columns
- TraceGOLD™ packed GC columns
- GuardGOLD™ capillary GC columns
- LinerGOLD™ liners
- Super Clean™ gas cartridge filters
- GC consumables
- Gas management
- GC equipment
- GC reagents



# Our portfolio

## Sample preparation solutions

Save time, improve reproducibility, and extend the lifetime of your High/Ultra High Performance Liquid Chromatography (HPLC/UHPLC) and gas chromatography (GC) columns with our comprehensive range of sample preparation products. Achieve high sensitivity, selectivity, and recovery with advanced solid-phase extraction (SPE) consumables.



## Sample handling solutions

We provide a broad selection of sample handling and containment solutions from all your chromatography requirements. Our vials, closures and well plates, come with the lowest levels of extractables and leachables, are made from glass that has low compound adsorption, and the highest level of standards and certification available in the marketplace. Whether you have routine and robust samples, or you need to ensure the highest level of confidence and compliance, our market leading portfolio of storage and autosampler vials and closure, well plates and sample handling accessories has everything you'll need.



## Low-flow LC columns and accessories

Low-flow chromatography is ideal when detailed sample information is required from small sample volumes, such as proteomics and intact protein analysis. The Thermo Scientific range of nano-, capillary-, and micro-flow columns offer excellent sensitivity and resolution in easy-to-use formats.



## BioLC columns and accessories

Achieve ultrahigh resolution and high efficiency separations of proteins, peptides, monoclonal antibodies, biosimilars, carbohydrates, oligonucleotides and more. Our unique column chemistries for biological samples have a long-standing reputation for providing excellent reproducibility and durability under a broad range of pH, temperature, and mobile phase compositions.



## LC columns and accessories

As a leader in LC column technology including silica, polymer and porous graphitic carbon manufacturing, bonded phase production and column packing for 40 years, you can rely on the quality of Thermo Scientific high performance liquid chromatography (HPLC) products: a comprehensive range of innovative columns, accessories and equipment for fast and reproducible analytical and prep HPLC and ultra-high performance liquid chromatography (UHPLC) analysis.



## GC columns and accessories

We offer a broad portfolio of GC columns and accessories designed to give optimal system performance for today's challenging analyses. Our range of GC accessories include all the tools needed by today's gas chromatographers.



# Product selection tools and additional resources

## Sample handling selection guide

### ? **Need a quick answer?**

Why not use our online product selector guide that includes our entire SureSTART Collection of vials, caps, well plates and mats.



SureSTART™ Selection Guide

Selecting your vial and well plate has never been easier.

**About this guide**

Have you ever struggled with finding the right sample handling solution for your application? You will struggle no longer! This simple guide will find the perfect solution product for you in just a few clicks.

[Get started](#)

- Application specific vials**  
Ensure what goes into the lab comes out... and that the vial you choose is fit for purpose for your application set up. This guide will take you right to your vial.
- Plates for high-throughput**  
If you use a high-throughput lab, you may be interested in finding a plate rather than a vial to speed up your throughput. As plate compatibility is dependent on your instrument this guide will find the plate that works with your instrument type.
- Low cost vials at your fingertips**  
Find the correct vial for your application - and budget. If cost is a key purchasing criteria for you then we've got you covered as this guide takes all your lab requirements into consideration.

## Sample handling cross reference tool

### ? **Already purchasing an existing product from us or someone else?**

Let our cross-reference tool find the equivalent SureSTART product/catalog number for you.



SureSTART Cross Reference Tool

Designed for cross referencing chromatography vials, caps and inserts, finding an equivalent product is easy. Using this cross-reference tool, there are 2 easy options for you to find an equivalent Thermo Scientific SureSTART™ product. All you need to know is your current catalog number part number.

**Option 1: Input SKUs Directly**

Either type or copy/paste a list of SKUs into the text field below.

**Option 2: Upload CSV**

File to upload:  [Choose file](#) [Don't have a data file? Download a sample .csv file](#)

[Search](#)

# Product selection tools and additional resources

## Septa selection tool



### Choosing the right septa can be complex!

There are a number of factors that should be considered including: needle type, vial type, solvents and temperature that the septa will be exposed to. Let us help you find the right septa with this easy-to-use tool.



The screenshot shows the 'Septa Selection Tool' webpage. The header features the title 'Septa Selection Tool' and a subtitle 'An easy-to-use tool that ensures you find the right septa for your experimental requirements.' Below this is a white box titled 'About this tool' with a 'Get Started' button. The main content area is titled 'Why use the Septa Selection Guide?' and contains three columns of text, each with a red circular icon: 'Needle / autosampler issues', 'Septa compatibility with solvents', and 'New experimental parameters'. The background is red with a pattern of colorful septa.

## LC columns selection guide



### Find your columns with ease!

Finding the correct column can be a challenge, so we have made it easy for you. This guide will take you directly to the right product for you, so that you can start your method today.



The screenshot shows the 'LC Column Selection Guide' webpage. The header features the title 'LC Column Selection Guide' and a subtitle 'An easy-to-use tool that ensures you find the right LC column for your experimental requirements.' Below this is a white box titled 'Find your column with ease!' with a 'Get started' button. The main content area is titled 'Find your column with ease!' and contains three columns of text, each with a red circular icon: 'Need an equivalent column?', 'Setting up a USP method?', and 'Brand new method?'. The background is grey with a molecular structure graphic on the right.

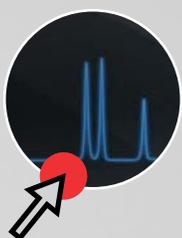
# More information



## Chromatography columns and consumables

For more information on our range of chromatography columns and consumables, including the latest applications, educational resources, selection guides and product literature, please visit

[thermofisher.com/chromatographyconsumables](https://thermofisher.com/chromatographyconsumables)



## Instrumentation and key applications

For more information on our instrumentation and key applications, please visit

[thermofisher.com/chromatography](https://thermofisher.com/chromatography)



## AppsLab

Gain access to our applications expertise on cloud-based Thermo Scientific™ AppsLab library of analytical applications for a comprehensive fully searchable method repository

[appslab.thermofisher.com](https://appslab.thermofisher.com)



## 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](https://thermofisher.com/nibr)



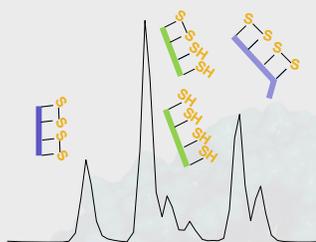
# Connected chromatography solutions

BioLC columns and accessories

# Introduction

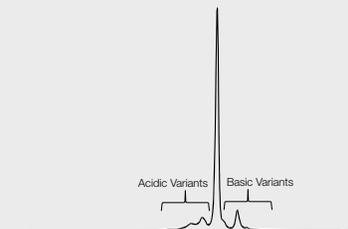
## Your complete tool kit

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.



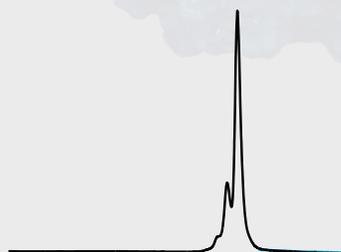
### Intact or subunit analysis

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.



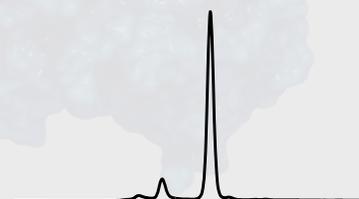
### Charge variant analysis

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.



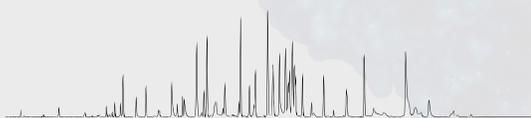
### Oxidation monitoring

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.



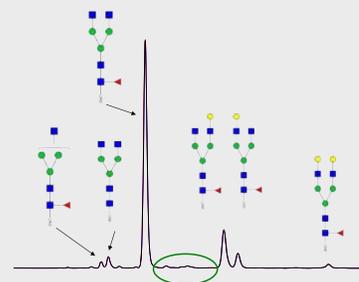
### Aggregate analysis

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



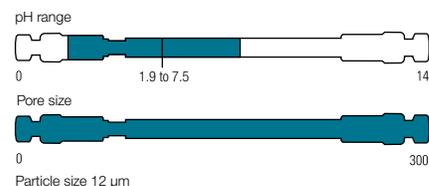
## MAbPac Protein A column



### Additional reading

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

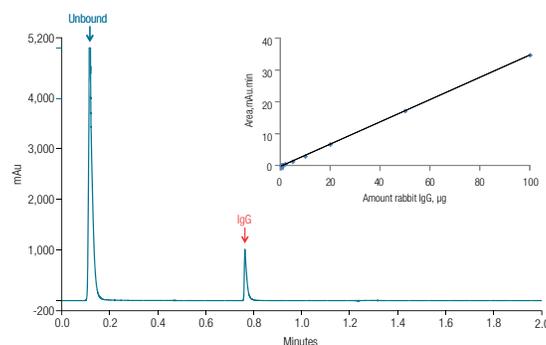
Learn more at [thermofisher.com/biolc](http://thermofisher.com/biolc)



### 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	<a href="#">082539</a>

# 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

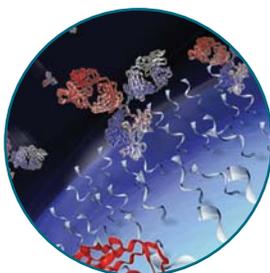
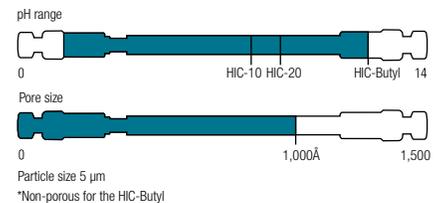
### MAbPac HIC-20 column additional reading

- **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

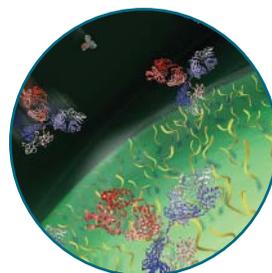
### MAbPac HIC-Butyl column additional reading

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

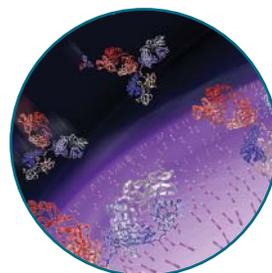
Learn more at [thermofisher.com/biolc](https://www.thermofisher.com/biolc)



MAbPac HIC-10



MAbPac HIC-20



MAbPac HIC-Butyl



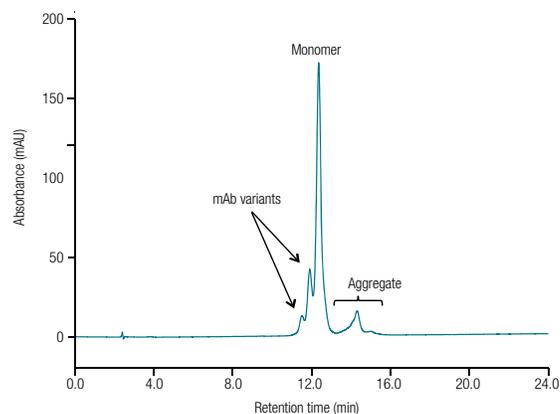
# MAbPac HIC-10, HIC-20, HIC-Butyl columns

Continued



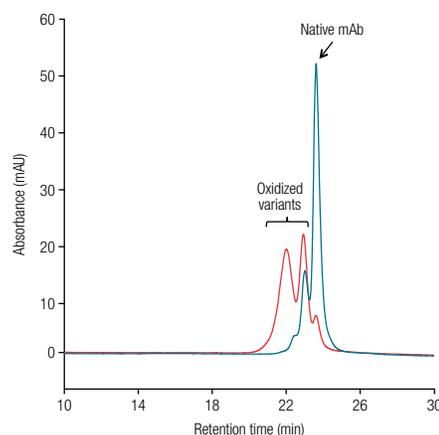
## Separation of mAb aggregates

MAbPac HIC-10, 5 $\mu$ 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 $\mu$ 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



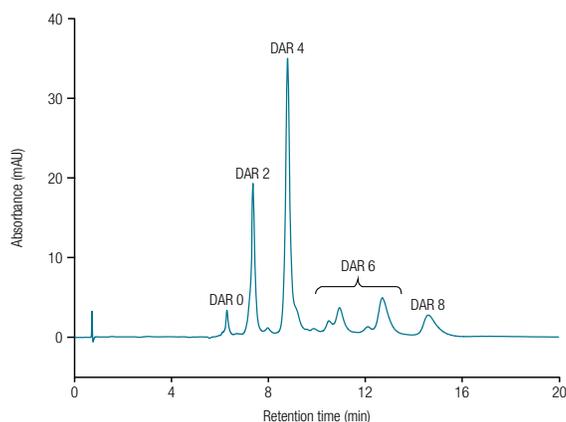
## Separation of mAb fragments

MAbPac HIC-20, 5 $\mu$ 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 $\mu$ L (1.25 mg/mL) Oxidized mAb: 20 $\mu$ L (1.25 mg/mL)		
Detection	UV at 280 nm		
Sample	Untreated mAb H <sub>2</sub> O <sub>2</sub> 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 $\mu$ 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 $\mu$ 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

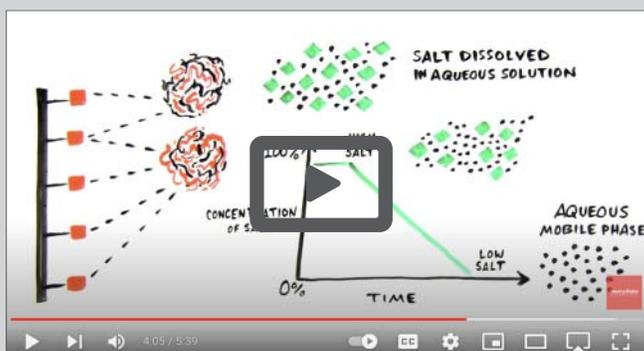
Column	MABPac HIC-10	MABPac HIC-20	MABPac HIC-Butyl
Intact mAbs/proteins	++++	+++	++
mAb aggregates	++++	+++	++
mAb fragments (F <sub>ab</sub> and F <sub>c</sub> )	+++	++++	+++
Oxidized mAbs	+++	++++	+++
Antibody Drug Conjugates (ADCs)	+++	+++	++++
Bispecific mAbs	+++	++++	++

Greater number of ++++ denotes greater suitability



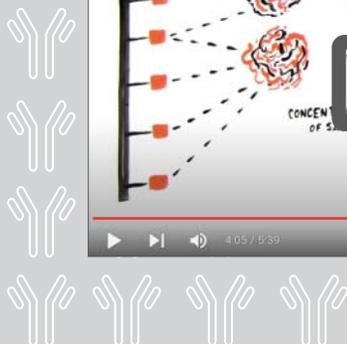
## MABPac HIC family columns

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



### 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.



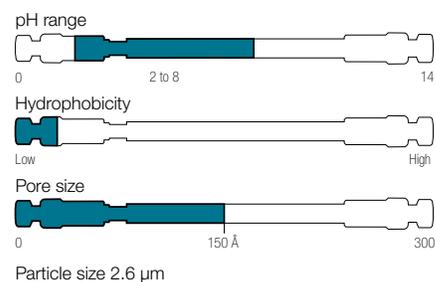
## Accucore 150-Amide-HILIC column



### Additional reading

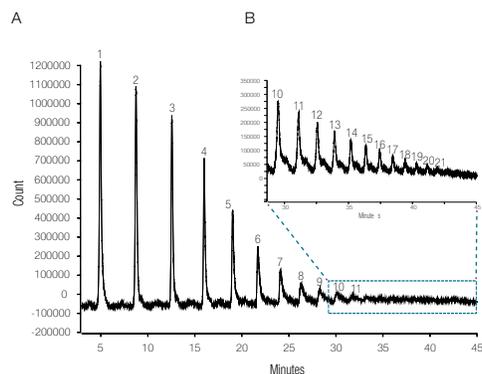
- **Application note:** Analysis of human IgG glycans on a solid core amide HILIC stationary phase

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



### 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	<a href="#">16726-012105</a>	—	—
	HPLC column	50	<a href="#">16726-052130</a>	<a href="#">16726-053030</a>	—
		100	<a href="#">16726-102130</a>	<a href="#">16726-103030</a>	<a href="#">16726-104630</a>
		150	<a href="#">16726-152130</a>	<a href="#">16726-153030</a>	<a href="#">16726-154630</a>
		250	<a href="#">16726-252130</a>	—	—
—	Guard cartridge holder		<a href="#">852-00</a>	<a href="#">852-00</a>	<a href="#">850-00</a>



### 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](http://thermofisher.com/nibr)



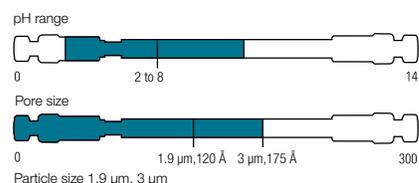
# GlycanPac AXH-1 column



## Additional reading

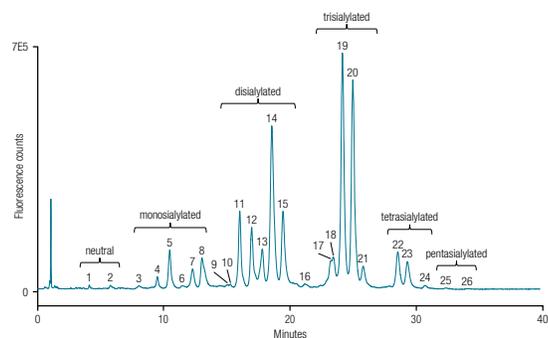
- **Application note:** Separation of 2AB-labeled N-linked glycans from bovine fetuin on a novel ultra high resolution mixed-mode column
- **Application note:** Separation of 2AA-labeled N-linked glycans from human IgG on a high resolution mixed-mode column
- **Application note:** Separation of 2AA-labeled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

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



## 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	<a href="#">082473</a>	—	—
		150	<a href="#">082472</a>	—	—
		250	<a href="#">082521</a>	—	—
3	Guard cartridges (2/pk)	10	<a href="#">082476</a>	<a href="#">082475</a>	<a href="#">082474</a>
	HPLC column	150	<a href="#">082470</a>	<a href="#">082469</a>	<a href="#">082468</a>
—	Guard cartridge holder	—	<a href="#">069580</a>	<a href="#">069580</a>	<a href="#">069580</a>



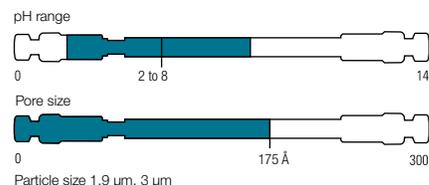
# GlycanPac AXR-1 column



## Additional reading

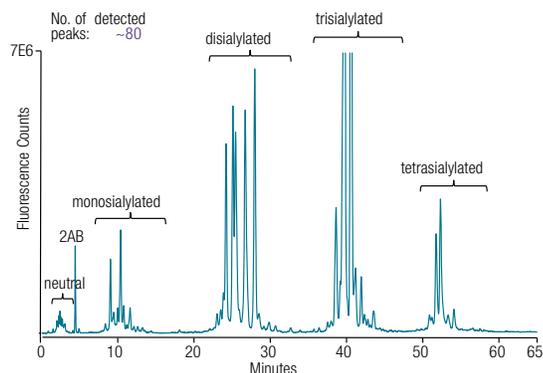
- **Analyteguru.com:** Separation of 2AB labeled N-glycans from bovine fetuin on a novel mixed-mode stationary phase
- **Application note:** Structural analysis of native N-glycans released from proteins using a novel mixed-mode column and a hybrid quadrupole-orbitrap mass spectrometer

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



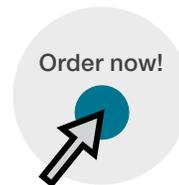
## Separation of 2AB labeled N-glycans from bovine fetuin

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	<a href="#">088136</a>	—	—
		250	<a href="#">088135</a>	—	—
—	Guard cartridge holder	—	<a href="#">069580</a>	<a href="#">069580</a>	<a href="#">069580</a>



# 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.



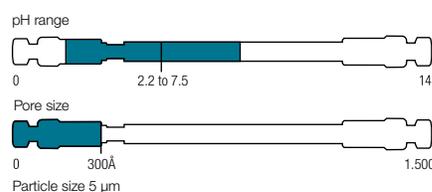
## MAbPac SEC-1 column



### Additional reading

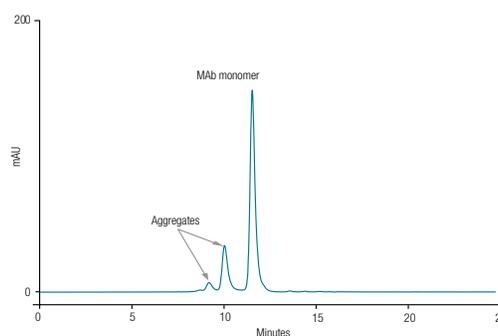
- **Application note:** Lifetime stability of size-exclusion chromatography columns for protein aggregate analysis
- **Application note:** Analysis of monoclonal antibodies and their fragments by size-exclusion chromatography coupled with an Orbitrap mass spectrometer

Learn more at [thermofisher.com/biolc](https://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	—	<a href="#">074697</a>	—
—	HPLC column	150	<a href="#">088790</a>	<a href="#">075592</a>	—
		300	<a href="#">088789</a>	<a href="#">074696</a>	<a href="#">088460</a>



# Acclaim SEC-300 column

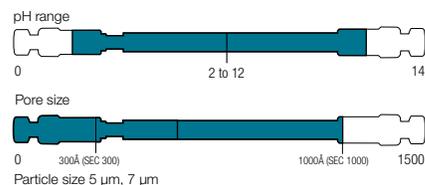
# Acclaim SEC-1000 column



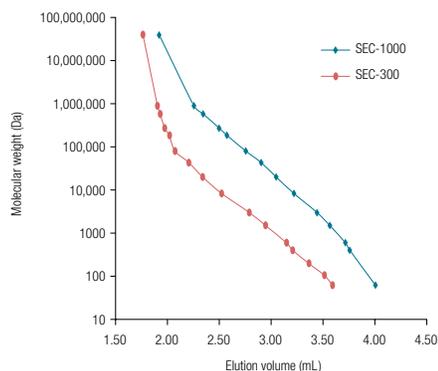
**Additional reading**

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

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

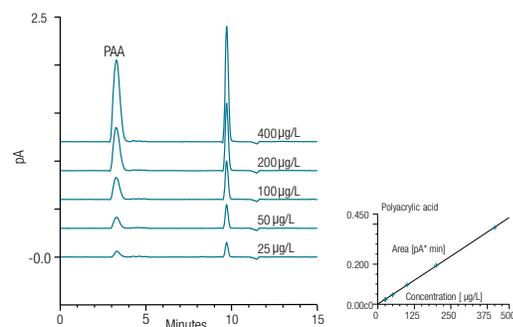


Acclaim SEC-300, 5 µm, 300 x 4.6 mm	
Acclaim SEC-1000, 7 µm, 300 x 4.6 mm	
Flow rate	0.35 mL/min
Mobile phase	10 mM sodium perchlorate
Analytes	(0.03% - 0.1% in mobile phase) dextran (MW 5,000,000-40,000,000), PEO (MW 895,000, 580,000, 272,000, 185,000, 80,000, 43,000, and 20,000), PEG (MW 8,300, 3,000, 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, 5µm, 300 x 4.6mm	
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	<a href="#">082740</a>	—
		HPLC column	150	—	<a href="#">079726</a>
			300	<a href="#">079723</a>	<a href="#">079725</a>
Acclaim SEC-1000	7	Guard	33	<a href="#">082739</a>	—
		HPLC column	150	—	<a href="#">079722</a>
			300	<a href="#">079724</a>	<a href="#">079721</a>

# 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.



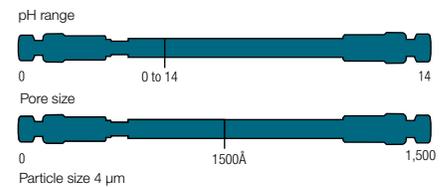
## MAbPac RP column



### Additional reading

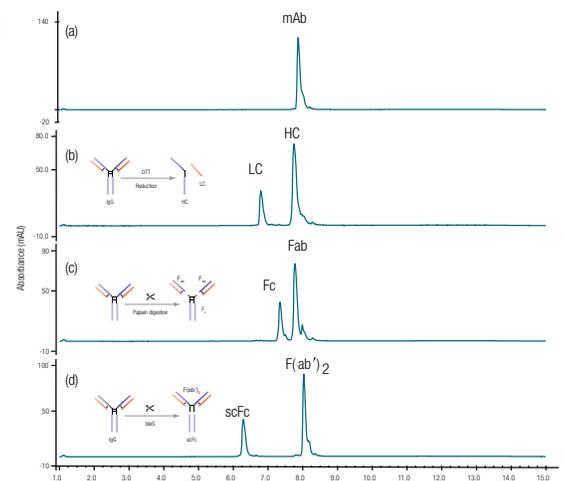
- **Application note:** Confident monoclonal antibody sequence verification by complementary LC-MS techniques
- **Application note:** Fast analysis of therapeutic monoclonal antibody fragments using a supermacroporous, reversed-phase chromatography column

Learn more at [thermofisher.com/biolc](https://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 <sub>2</sub> O/FA/TFA (99.88 : 0.1 : 0.02 v/v/v)		
Mobile phase B	ACN/H <sub>2</sub> 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

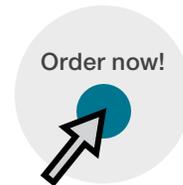


## MABPac RP columns

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

## MABPac RP 1 mm columns

Particle size (µm)	Length (mm)	1 mm ID
4	50	<a href="#">303182</a>
	100	<a href="#">303183</a>
	150	<a href="#">303184</a>



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# ProSwift RP column



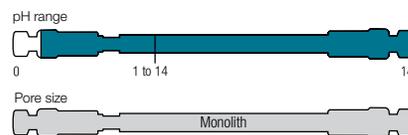
## Additional reading

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

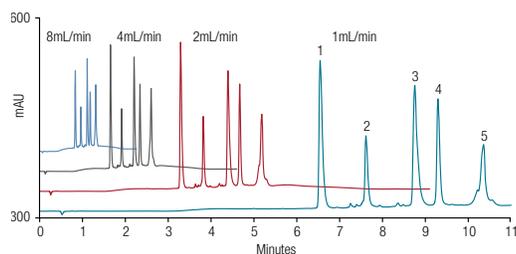


## ProSwift column

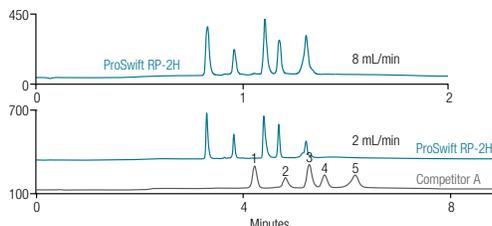
ProSwift RP-2H, 50 x 4.6 mm	
Flow rate	1, 2, 4, or 8 mL/min
Mobile phase A	H <sub>2</sub> O/ACN (95:5; V/V) + 0.1% TFA
Mobile phase B	H <sub>2</sub> O/ACN (5:95; V/V) + 0.1% TFA
Injection volume	2 µL
Detection	UV at 214 nm
Sample	Mixture of five proteins
Gradient	1 mL/min: 1-75% B in 12 min 2 mL/min: 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

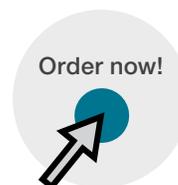


## Competitive comparison



## ProSwift RP columns

Functional group	Length (mm)	1.0 mm ID	4.6 mm ID
RP-1S	50	—	<a href="#">064297</a>
RP-2H	50	—	<a href="#">064296</a>
RP-3U	50	—	<a href="#">064298</a>
RP-4H	50	<a href="#">069477</a>	—
RP-10R	50	<a href="#">164586TS</a>	—
RP-4H	250	<a href="#">066640</a>	—

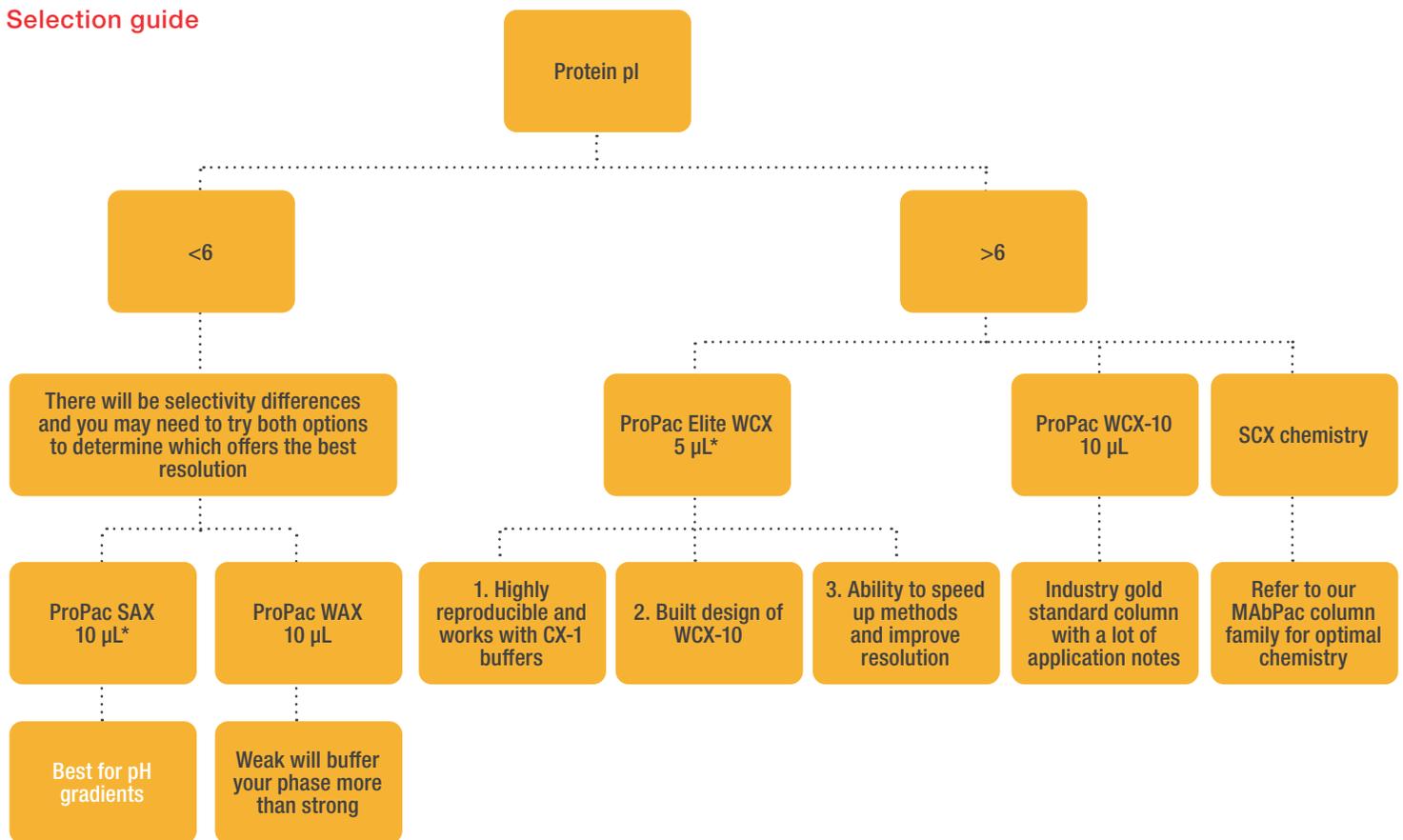


# Charge variant analysis

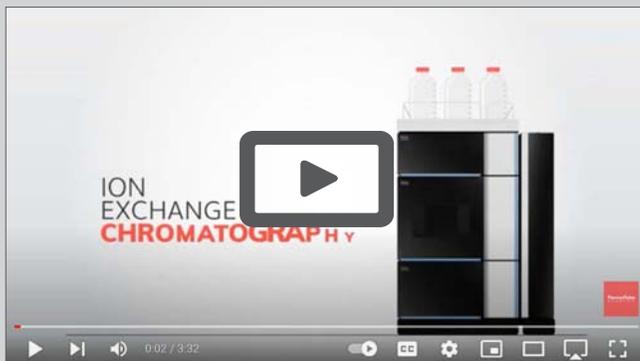
For charge variant analysis by LC-UV or LC-MS/MS **Thermo Scientific™ ProPac™ Elite WCX** and **Thermo Scientific™ MAbPac™ SCX-10** columns deliver outstanding resolution on a highly reproducible platform. When used in combination with our linear CX-1 pH gradient buffers, quickly develop

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

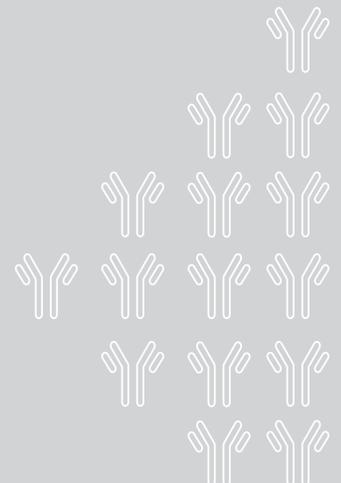


\*= if uncertain on which phase to choose start here



### Video:

Tips to improve your charge variant analysis by ion exchange





# ProPac Elite WCX column



## Additional reading

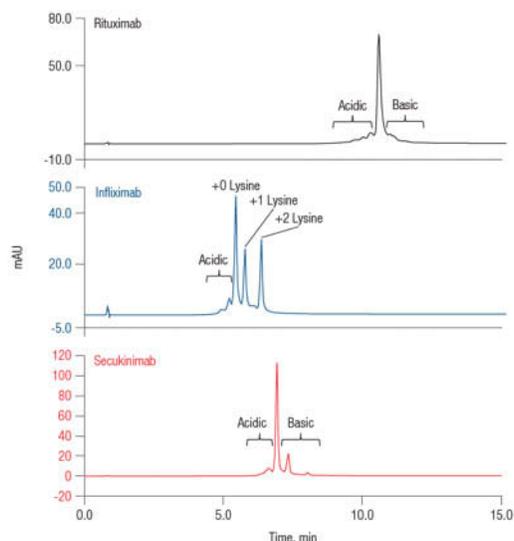
- **Application note:** Separation of IgG2 and IgG4 therapeutics using weak cation exchange chromatography
- **Application note:** Salt gradient analysis of IgG1 monoclonal antibodies using a 5 µm WCX chromatography column

Learn more at [thermofisher.com/biolc](https://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
	17.1	80	20
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	<a href="#">303028</a>	<a href="#">302973</a>
		100	<a href="#">303027</a>	<a href="#">302972</a>
	HPLC column	250	<a href="#">303026</a>	<a href="#">303025</a>

## ProPac Elite WCX kits

Description	Set contents	Column dimensions	Part. no.
ProPac Elite WCX	3 columns from 1 lot	4 × 150 mm	<a href="#">302976</a>
	3 columns from 3 lots		<a href="#">302977</a>
ProPac Elite WCX, analytical	3 columns from 1 lot	4 × 250 mm	<a href="#">303061</a>
	3 columns from 3 lots		<a href="#">303062</a>



# 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.

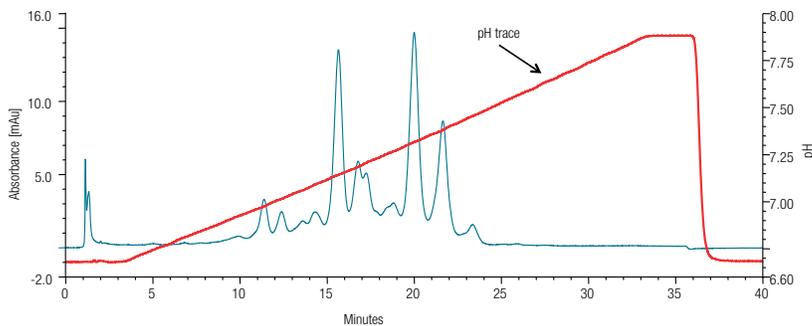
Thermo Scientific pH buffer concentrates can be purchased individually or as a pair, in quantities of 125 mL or 250 mL. For added convenience, the 125 mL buffers can also be bundled with columns in a number of specifically preconfigured kits.

- 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](https://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)



### Brochure:

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# pH gradient buffers

Continued



## pH gradient buffers

Description	Buffer bottle size		
	125 mL	250 mL	500 mL
Buffer			
CX-1 pH Gradient buffer A (pH 5.6)	<a href="#">083273</a>	<a href="#">085346</a>	<a href="#">302779</a>
CX-1 pH Gradient buffer B (pH 10.2)	<a href="#">083275</a>	<a href="#">085348</a>	<a href="#">302780</a>

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



### Video:

Fast, reproducible biopharmaceutical charge variant profiling





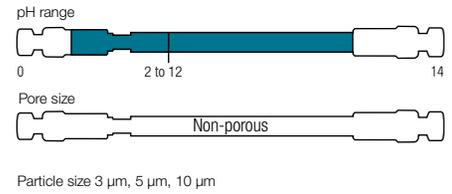
# MABPac SCX-10 column



## Additional reading

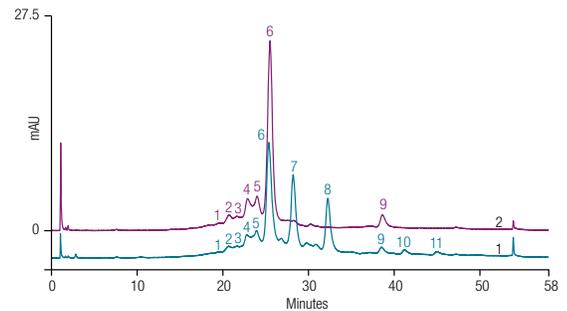
- **Application note:** A global pH-gradient based charge variant analysis directly coupled to HRAM-MS (CVA-MS) for mAb analysis
- **Application note:** High throughput, high resolution monoclonal antibody analysis with small particle size HPLC columns

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



## 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	—	<b>077907</b>	—
		50	—	<b>078656</b>	—
5	HPLC column	150	—	<b>085198</b>	—
		250	—	<b>078655</b>	—
10	Guard column	50	<b>075749</b>	<b>074631</b>	—
		50	—	<b>075603</b>	—
	HPLC column	150	—	<b>075602</b>	—
		250	<b>075604</b>	<b>074625</b>	<b>088784</b>

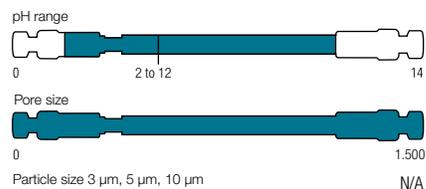


# MabPac SCX-10RS column

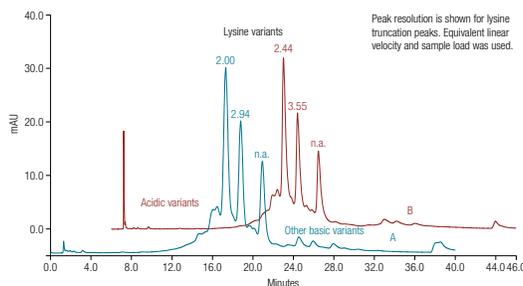


**Additional reading**

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



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

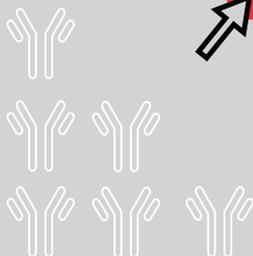


## MabPac SCX-10 RS columns

Particle size (μm)	Format	Length (mm)	2.1 mm ID	4.6 mm ID
5	UHPLC column	50	<a href="#">082675</a>	<a href="#">082674</a>
		150	<a href="#">088242</a>	<a href="#">085209</a>
		250	<a href="#">082515</a>	<a href="#">082673</a>



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

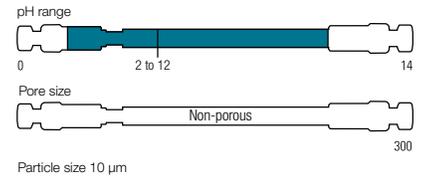




# ProPac SAX-1 column

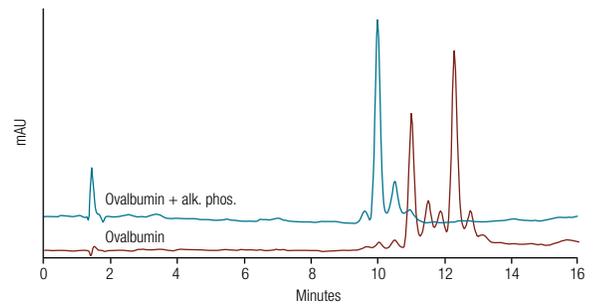


**Additional reading**  
Learn more at [thermofisher.com/biolc](https://www.thermofisher.com/biolc)



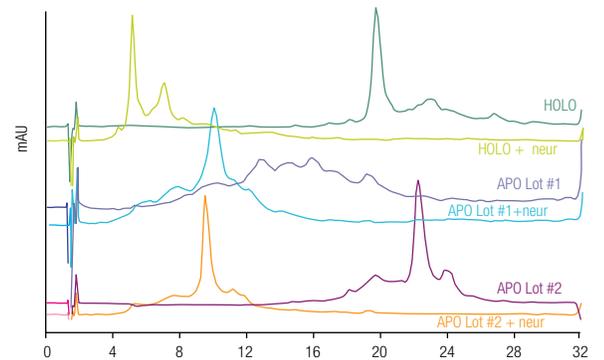
## Resolution of phosphorylation variants of ovalbumin

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



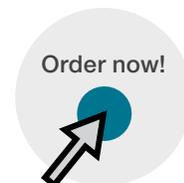
## Effect of sialylation on transferrin chromatography

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	<a href="#">063454</a>	<a href="#">054998</a>	–	–	–
	HPLC column	250	<a href="#">063448</a>	<a href="#">054997</a>	<a href="#">063703</a>	<a href="#">088770</a>	<a href="#">078990</a>





# 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.

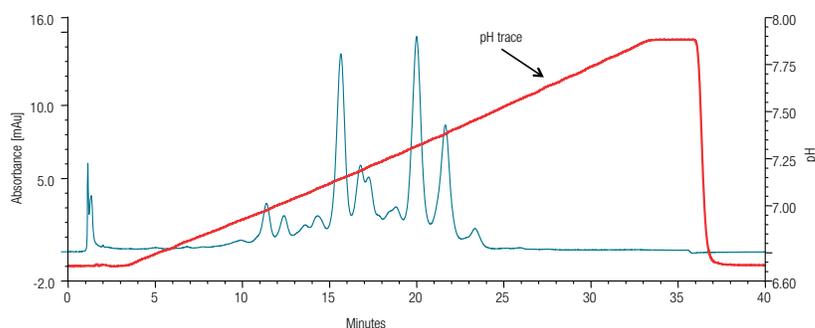
Thermo Scientific pH buffer concentrates can be purchased individually or as a pair, in quantities of 125 mL or 250 mL. For added convenience, the 125 mL buffers can also be bundled with columns in a number of specifically preconfigured kits.

- 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](https://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)



### Brochure:

See your protein therapeutics in high resolution



### Webinars:

Analytical and life science webinars live and on-demand



# 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)	<a href="#">083273</a>	<a href="#">085346</a>	<a href="#">302779</a>
CX-1 pH Gradient buffer B (pH 10.2)	<a href="#">083275</a>	<a href="#">085348</a>	<a href="#">302780</a>

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)	—	<a href="#">083274</a>	<a href="#">085349</a>
Gradient starter kit: includes both buffer A and buffer B + MABPac SCX-10	10 µm, 4 × 250 mm	<a href="#">083381</a>	—
Gradient high throughput kit: includes both buffer A and buffer B + MABPac SCX-10	5 µm, 4 × 50 mm	<a href="#">083378</a>	—
Gradient high resolution kit: includes both buffer A and buffer B + MABPac SCX-10	5 µm, 4 × 250 mm	<a href="#">083272</a>	—



### 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

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



### 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

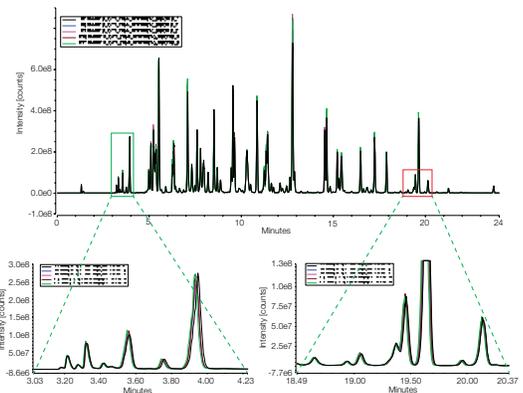
Learn more at [thermofisher.com/biolc](http://thermofisher.com/biolc)



## Overlay of 5 TIC traces from the SET injection sequence

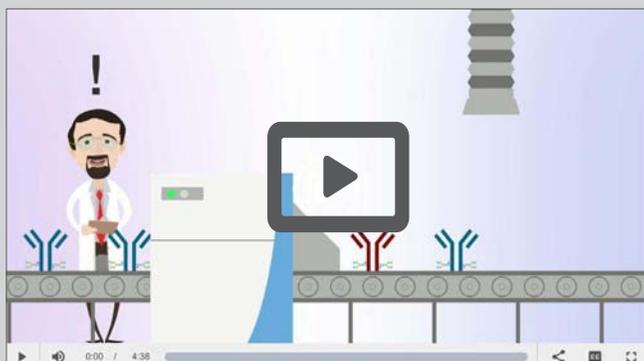
Hypersil GOLD VANQUISH C18 UHPLC column, 150 × 2.1 mm, 1.9 μm

Flow rate	0.25 mL/min
Mobile phase A	H <sub>2</sub> 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		<a href="#">25002-052130-V</a>
Hypersil GOLD VANQUISH	1.9	100	2.1	<a href="#">25002-102130-V</a>
		150		<a href="#">25002-152130-V</a>



### 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

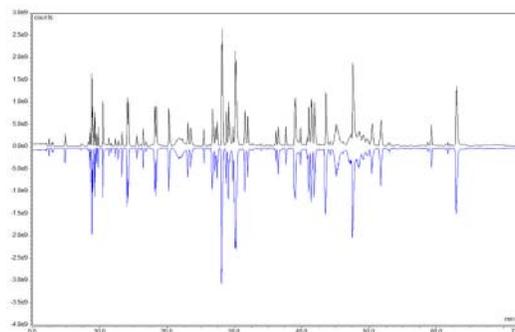
Learn more at [thermofisher.com/biolc](http://thermofisher.com/biolc)



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

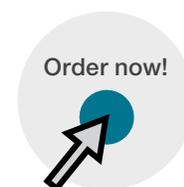
Accucore Vanquish C18+ UHPLC column, 1.5 µm, 2.1 × 150 mm (P/N 27101-152130)

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	<a href="#">27101-052130</a>
	100 mm	2.1	<a href="#">27101-102130</a>
	150 mm	2.1	<a href="#">27101-152130</a>



# 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.

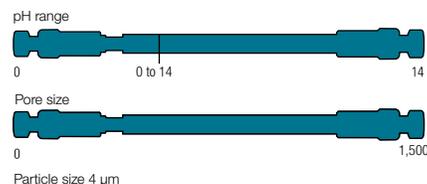


## DNAPac RP column



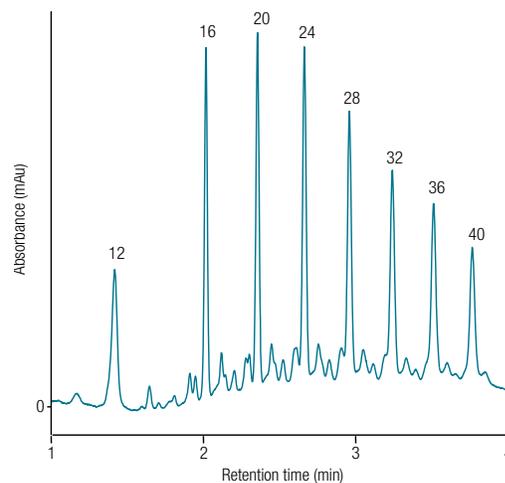
### Additional reading

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



### 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 ( $\mu\text{m}$ )	Format	Length (mm)	2.1 mm ID	3.0 mm ID
4	Guard cartridges (2/pk)	10	<a href="#">088925</a>	<a href="#">088921</a>
	HPLC column	50	<a href="#">088924</a>	<a href="#">088920</a>
		100	<a href="#">088923</a>	<a href="#">088919</a>
—	Guard cartridge holder	—	<a href="#">069580</a>	<a href="#">069580</a>



### 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

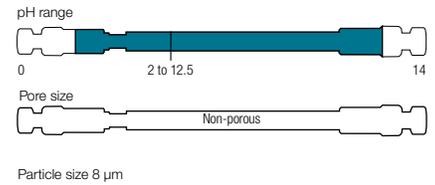


# DNAPac PA200 column



## Additional reading

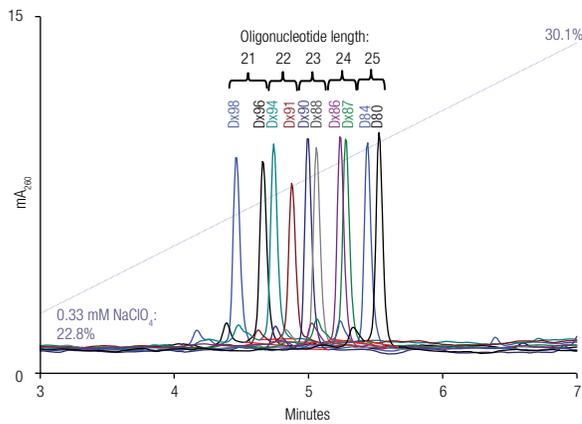
Learn more at [thermofisher.com/biolc](https://thermofisher.com/biolc)



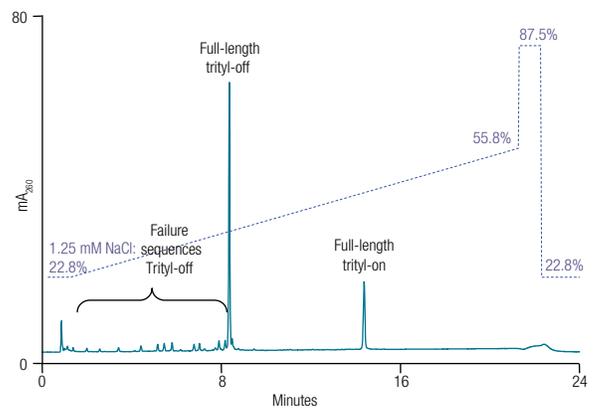
## DNAPac PA200, 8 µm, 250 x 4.0 mm

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

## Separation of oligonucleotides by length

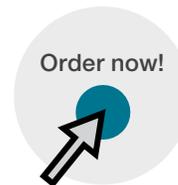


## Target, failure and trityl-on oligonucleotides



## 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	<a href="#">063423</a>	<a href="#">062998</a>	<a href="#">063419</a>	<a href="#">088780</a>
	HPLC column	250	<a href="#">063425</a>	<a href="#">063000</a>	<a href="#">063421</a>	<a href="#">088781</a>





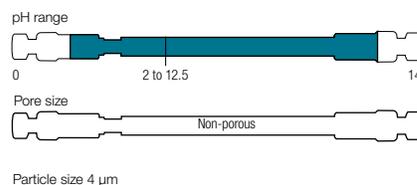
# DNAPac PA200 RS column



## 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](http://thermofisher.com/biolc)



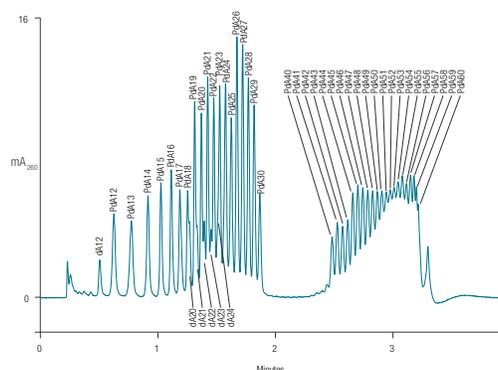
## Partial resolution of 46 oligonucleotides

### 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

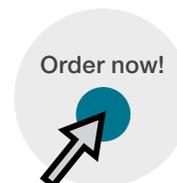
\*CV = column volumes

\*\*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	<a href="#">082508</a>
		150	<a href="#">082509</a>
		250	<a href="#">082510</a>





# DNASwift SAX-1S column



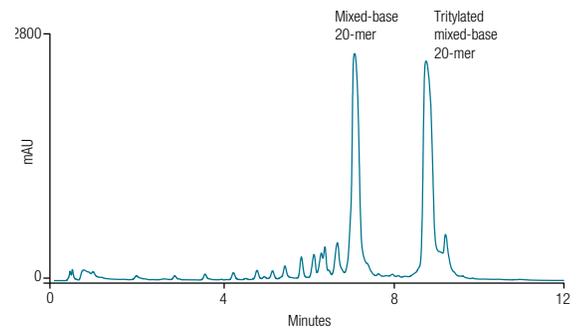
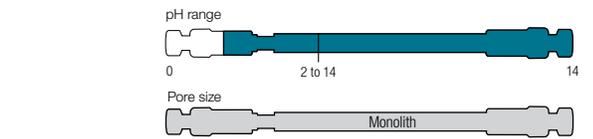
## Additional reading

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



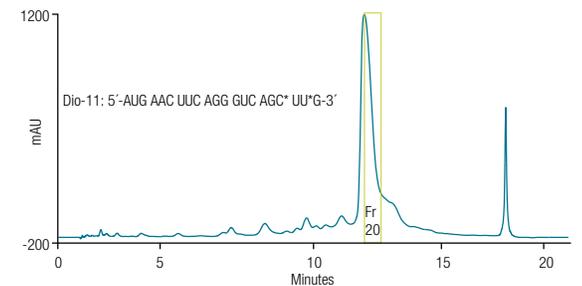
## Tritylated oligonucleotide

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**

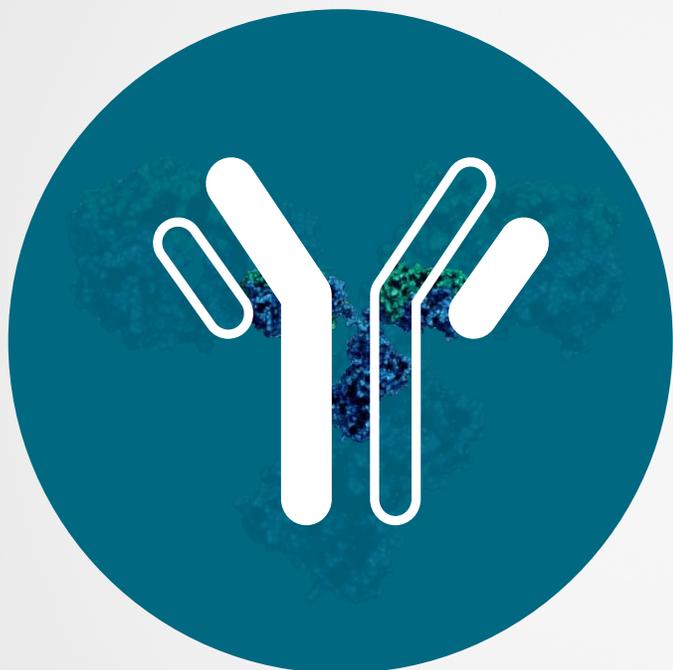
Analytical and life science webinars live and on-demand



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

[thermofisher.com/nibr](http://thermofisher.com/nibr)



Expect reproducible results with sample prep, columns and vials



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