

# Columns for Biomolecules

## BioLC Column Lines



### Monoclonal Antibodies

#### MABPac

MABPac Protein A

MABPac SEC-1

MABPac SCX-10

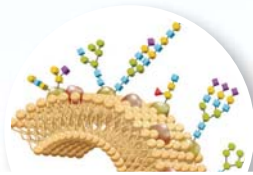
MABPac HIC

MABPac HIC-10

MABPac HIC-20

MABPac HIC-Butyl

MABPac RP



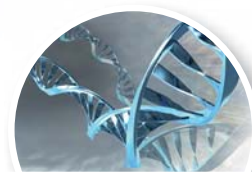
### Glycans

#### GlycanPac

Accucore Amide-HILIC

GlycanPac AXH-1

GlycanPac AXR-1



### Nucleic Acids

#### DNAPac

DNAPac PA100

DNAPac PA200

DNAPac RP

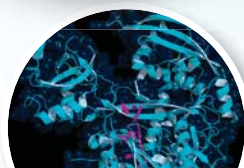
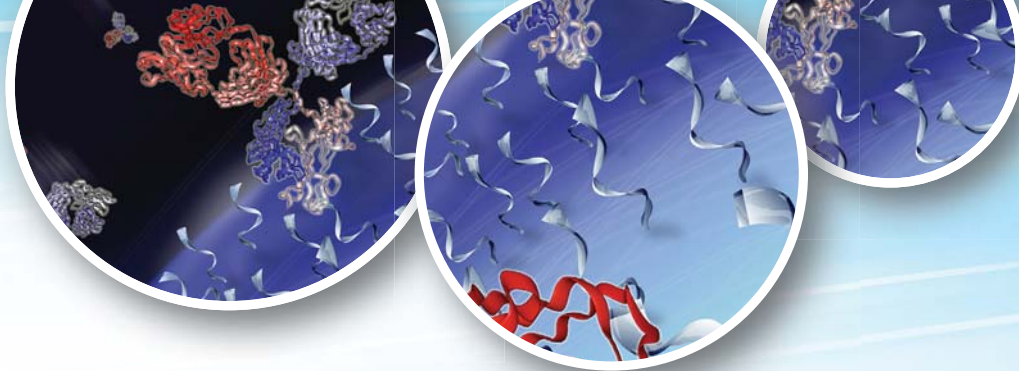
#### Associated products



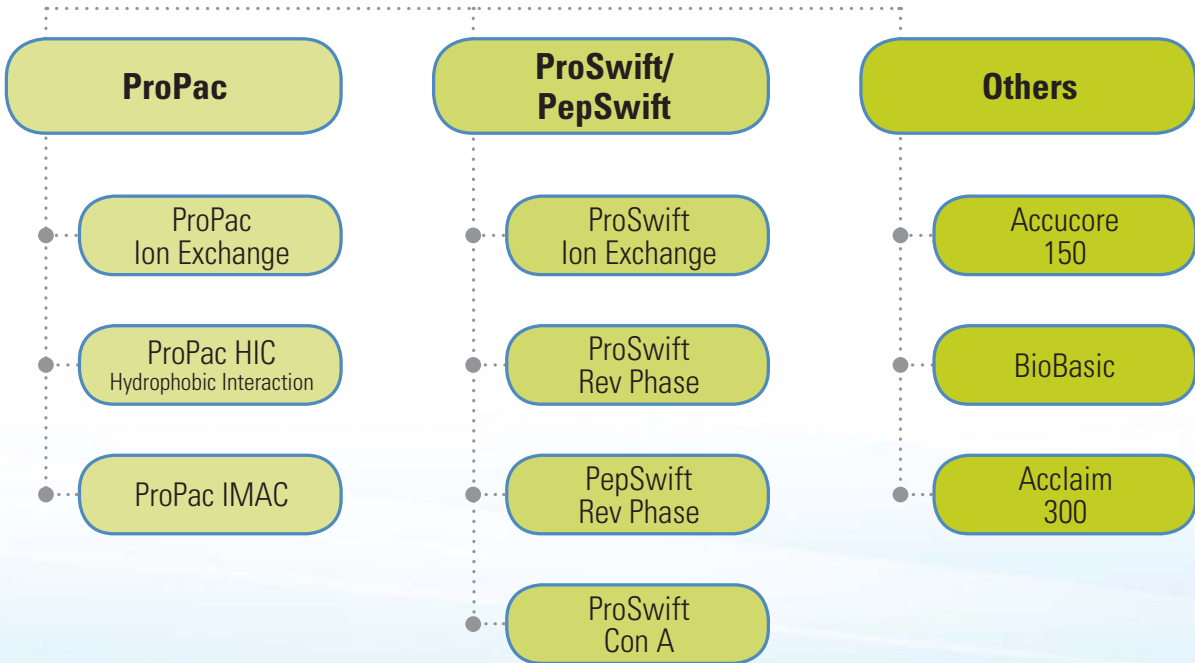
pH Gradient Buffers



WebSeal Well Plates and Mats



**Proteins / Peptides**



**Associated products**



SOLAμ SPE Plates



SMART Digest Kit



Viper Fingertight Fittings

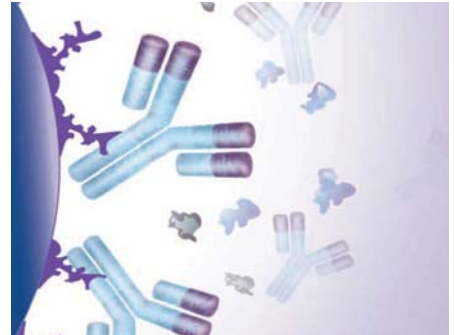
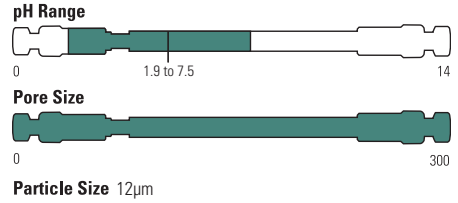
# MABPac HPLC and UHPLC Columns

## MABPac Protein A

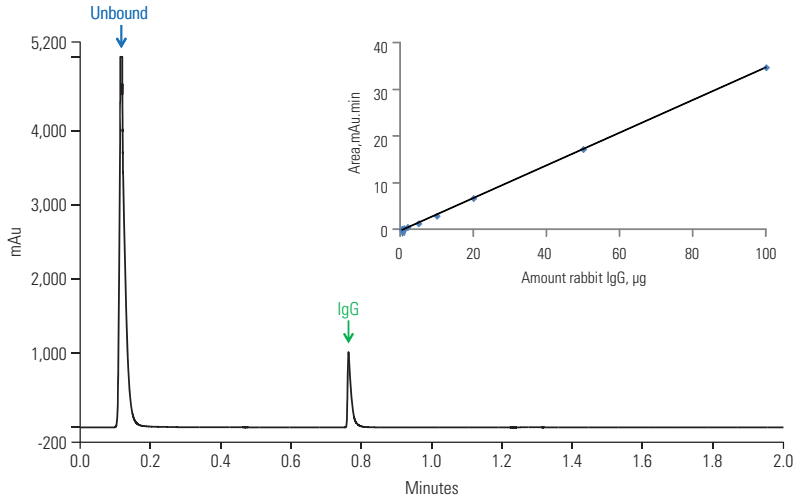
Fast mAb titer analysis

- High efficiency column
- Rugged, long column lifetime
- Excellent sample recovery
- Designed for ease of use and automation

Thermo Scientific™ MABPac™ Protein A is an affinity column designed to provide fast monoclonal antibody (mAb) titer analysis of samples such as harvest cell cultures (HCC). This HPLC column offers high throughput and accurate analysis through a combination of low back pressure and high efficiency. The MABPac Protein A column format allows rapid automation of loading, binding, elution and collection using Thermo Scientific biocompatible systems. The column is based on a novel non-porous polymeric resin consisting of a divinylbenzene core and a hydrophilic surface, optimized for affinity separation.



### Harvest cell culture titer analysis



### MABPac Protein A, 12µm, 35 x 4.0mm

Flow Rate:	2 mL/min
Mobile Phase A:	50mM Sodium Phosphate, 150mM NaCl, 5% acetonitrile, pH 7.5
Mobile Phase B:	50mM Sodium Phosphate, 150mM 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:	10µL
Detection:	280nm
Sample:	MAB B, 5mg/mL Harvest Cell Culture

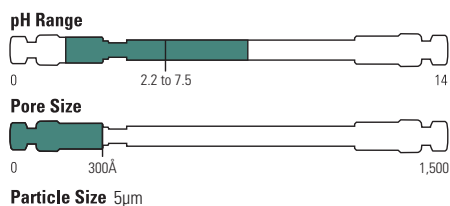
### MABPac Protein A

Particle Size (µm)	Format	Length (mm)	4.0mm ID
12	HPLC Column	35	<b>082539</b>



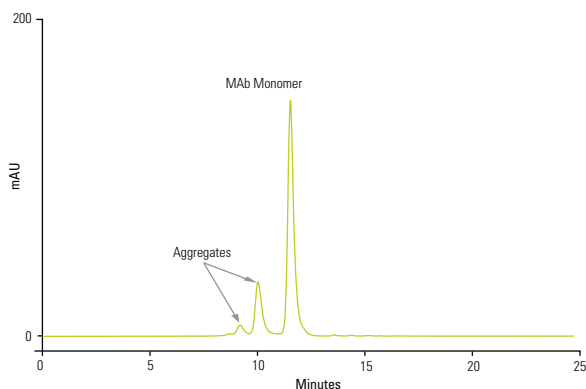
## MABPac SEC-1

A size exclusion chromatography (SEC) column specifically designed for the high-resolution separation and characterization of monoclonal antibodies (mAbs) and their aggregates



- Analysis of monoclonal antibodies (mAbs) and their aggregates
- Analysis of mAb Fab and Fc fragments, even using high and low salt concentrations
- Hydrophilic bonded layer for minimal undesired interactions between the biomolecules and the stationary phase
- Stable surface bonding leads to low column bleed and compatibility with MS, ELSD and Corona Charged Aerosol Detection (CAD)
- Separation range for globular proteins 10,000–1,000,000; exclusion limit for globular proteins >1,000,000

### Monoclonal antibody aggregate separation



#### MABPac SEC-1, 5µm, 300 x 4.0mm (PEEK)

Mobile Phase:	0.3 M NaCl in 50mM phosphate buffer pH 6.8
Temperature:	30°C
Flow Rate:	0.20mL/min
Injection Volume:	2µL
Detection:	UV, 280nm
Sample:	MAB (10mg/mL)

### MABPac SEC-1

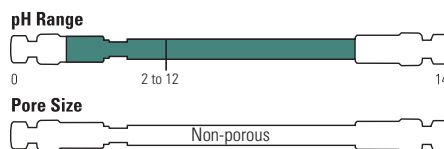
Particle Size (µm)	Format	Length (mm)	2.1mm ID	4.0mm ID	7.8mm ID
5	Guard Column	50	—	<b>074697</b>	—
	HPLC Column	150	<b>088790</b>	<b>075592</b>	—
		300	<b>088789</b>	<b>074696</b>	<b>088460</b>



## MABPac SCX-10

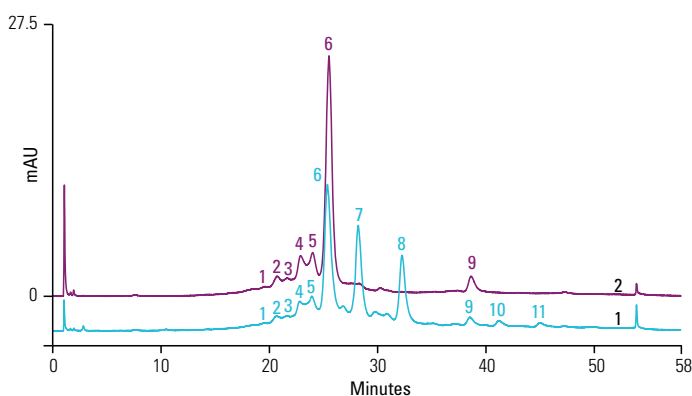
Strong cation exchange column designed specifically for the high-resolution, high efficiency charged variant analysis of monoclonal antibodies and associated variants

- Exceptionally high-resolution for monoclonal antibody charged variants separation
- Ideal for characterization and quality control assessment of monoclonal antibodies
- Unmatched column-to-column and lot-to-lot reproducibility
- Hydrophobic interactions greatly minimized
- Ideal for stability studies
- Meets the regulatory requirements for biopharmaceutical characterization



**Particle Size** 3µm, 5µm, 10µm

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



#### MABPac SCX-10, 5µm, 250 x 4.0mm

Mobile Phase A: 20mM MES (pH 5.6) + 60mM NaCl  
 Mobile Phase B: 20mM MES (pH 5.6) + 300mM NaCl  
 Gradient: 15–36% B in 50 min  
 Temperature: 30°C  
 Flow Rate: 1mL/min  
 Injection Volume: 5µL  
 Detection: UV at 280nm

Samples:  
 1. MAb B, 900µg in 100µL (no carboxypeptidase)  
 2. MAb B, 900µg in 100µL + carboxypeptidase, 50µg, 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

Particle Size (µm)	Format	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID
3	HPLC Column	50	–	<b>077907</b>	–
		150	–	<b>085198</b>	–
		250	–	<b>078655</b>	–
10	Guard Column	50	<b>075749</b>	<b>074631</b>	–
	HPLC Column	50	–	<b>075603</b>	–
		150	–	<b>075602</b>	–
		250	<b>075604</b>	<b>074625</b>	<b>088784</b>

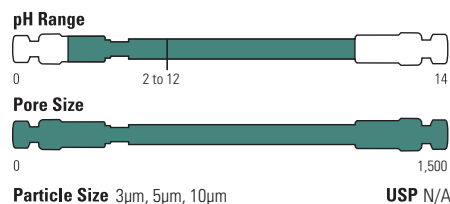


## MABPac SCX-10 RS

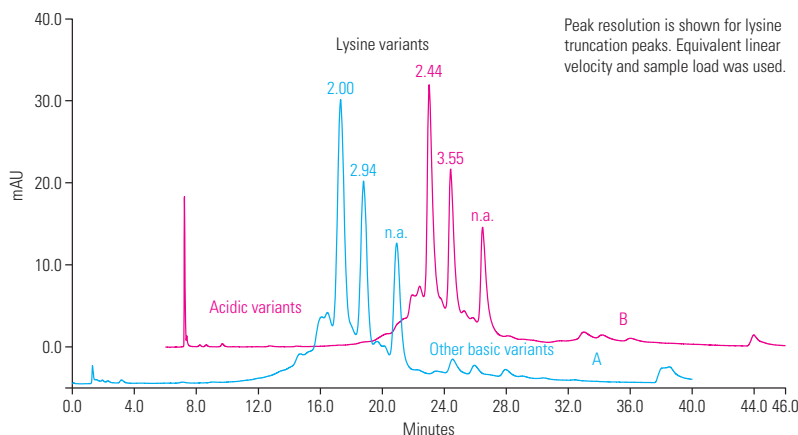
BioRS (Rapid Separation), strong cation exchange column designed for monoclonal antibodies and associated charged variants

- UHPLC, high throughput analysis
- Specially developed bio-inert PEEK lined stainless steel column hardware
- High pressure compatibility
- Suitable for operation up to 7,000 psi

Higher resolution and throughput of mAb charge variant UHPLC separations can be achieved using the MABPac SCX-10 RS strong cation-exchange phase with specially developed bio-inert PEEK lined stainless steel column hardware. These columns are designed to be used at higher UHPLC conditions to maximize the resolution of mAb variant separation. Higher pressure compatibility of the column hardware allows use of high flow rates for faster separation.



### Improved mAb resolution



#### MABPac SCX, 5µm, 250 x 4.6mm

Mobile Phase A:	20 mM MES pH 5.6 + 60 mM
Mobile Phase B:	20 mM MES pH 5.6 + 300 mM NaCl
Flow Rate:	1.5 mL/min
Injection Volume:	15µL
Sample:	MAB 5mg/mL
Chromatogram A:	Gradient: 33-53% B in 30 min
Chromatogram B:	Gradient: 33-53% in 20 min

### MABPac SCX-10 RS

Particle Size (µm)	Format	Length (mm)	2.1mm ID	4.6mm ID
5	UHPLC Column	50	<b>082675</b>	<b>082674</b>
		150	<b>088242</b>	<b>085209</b>
		250	<b>082515</b>	<b>082673</b>



## pH Gradient Buffers

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

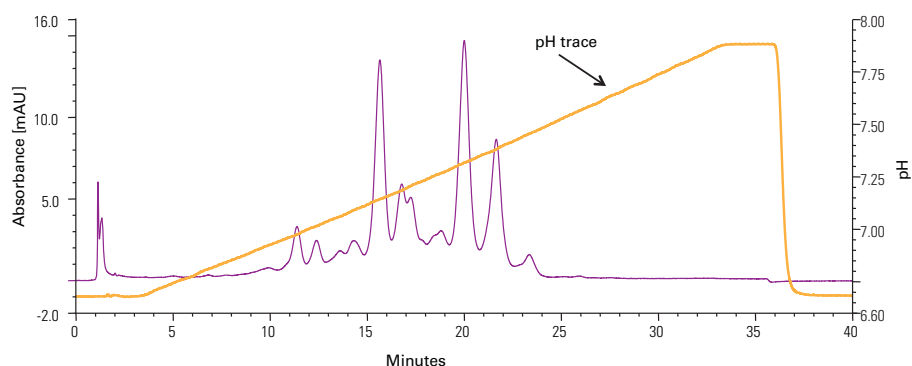


The Thermo Scientific pH gradient platform accelerates method development and facilitates method transfer to QA/QC for a wide range of protein and mAb charge variants through a generic LC-based approach to charge variant characterization.

- 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

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

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



### pH Gradient Buffers

Description	Buffer Bottle size	
	125mL	250mL
Buffer		
CX-1 pH Gradient Buffer A (pH 5.6)	<b>083273</b>	<b>085346</b>
CX-1 pH Gradient Buffer B (pH 10.2)	<b>083275</b>	<b>085348</b>

Kits	MAbPac SCX-10 Column format	Buffer Bottle size	
		125mL	250mL
Buffer			
Gradient Buffer Kit: Includes both Buffer A & Buffer B (available in either 125mL or 250mL size – one bottle each/ kit)	–	<b>083274</b>	<b>085349</b>
Gradient Starter Kit: Includes both Buffer A & Buffer B + MAbPac SCX-10	10µm, 4 × 250mm column	<b>083381</b>	-
Gradient High Throughput Kit: Includes both Buffer A & Buffer B + MAbPac SCX-10	5µm, 4 × 50mm column	<b>083378</b>	-
Gradient High Resolution Kit: Includes both Buffer A & Buffer B + MAbPac SCX-10	5µm, 4 × 250mm column	<b>083272</b>	-

## Monoclonal Antibody Characterization and Analysis Kits

### MAb Charge Variant Analysis IEX Column Kit

MAb Charge Variant Analysis IEX Column Kit includes two ion-exchange (IEX) specialty columns for mAb charge variants analysis. This kit is a convenient starter kit for researchers at the beginning of a mAb analysis projects, and facilitates the screening of two columns for determination of the best column for their specific monoclonal antibody sample.

Included in the Kit:

- ProPac WCX-10 Analytical column, 4 × 250mm (P/N 054993)
- MAbPac SCX-10 Analytical column, 4 × 250mm (P/N 074625)

#### MAb Charge Variants Kit

Description	Cat. No.
MAb Charge Variant Analysis IEX Column Kit	<b>076196</b>

### MAb Analysis IEX and SEC Column Kit

The MAb Analysis IEX and SEC Column Kit includes two columns: an ion-exchange (IEX) column and a size-exclusion (SEC) column. This kit is a convenient starter and column replacement kit for mAb analysis projects. It is useful for researchers at the beginning of mAb analysis projects, and facilitates the screening of aggregates and variants in two columns.

Included in the kit:

- MAbPac SCX-10 Analytical column, 4 × 250mm (P/N 074625)
- MAbPac SEC-1 Analytical column, 4 × 300mm (P/N 074696)

#### MAb Analysis Kit

Description	Cat. No.
MAb Analysis IEX and SEC Column Kit	<b>076197</b>





## MABPac HIC Family

The MABPac HIC column family is designed for separations of monoclonal antibodies (mAbs) and related biologics by hydrophobic interaction chromatography (HIC). These columns are designed to address the separation challenges as the result of heterogeneity, complexity and diversity of mAbs and related biologics.

- Advanced column chemistry designed for separating mAbs and related biologics
- Broad selectivity coverage for most challenging separations of mAbs
- Excellent bio-compatibility
- High column efficiency
- Rugged column packing

### Applications

The MABPac HIC-10 is the column of choice for intact mAbs/proteins and mAb aggregates while the MABPac HIC-20 is suited to resolve mAb fragments, oxidized mAbs and bispecific mAbs. When it comes to ADCs, MABPac HIC-Butyl is ideal for cysteine-conjugated ADC while MABPac HIC-10 and MABPac HIC-20 have proven useful for several cysteine proprietary ADC molecules, as shown below.

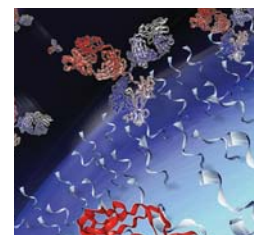
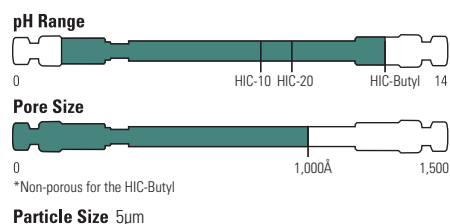
### MABPac HIC Selection Guide

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	+++	++++	++

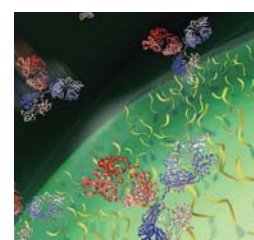
Greater number of ++++ denotes greater suitability

### MABPac HIC Family

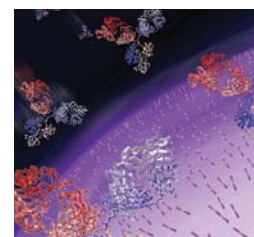
Description	Particle Size (µm)	Format	Length (mm)	4.6mm ID
MABPac HIC-10	5	Guard Cartridges (2/pk)	10	<b>088482</b>
		HPLC Column	100	<b>088480</b>
			250	<b>088481</b>
MABPac HIC-20	5	Guard Cartridges (2/pk)	10	<b>088555</b>
		HPLC Column	100	<b>088553</b>
			250	<b>088554</b>
MABPac HIC-Butyl	5	Guard Cartridges (2/pk)	10	<b>088559</b>
		HPLC Column	100	<b>088558</b>
Guard Cartridge Holder				<b>069580</b>



MABPac HIC-10

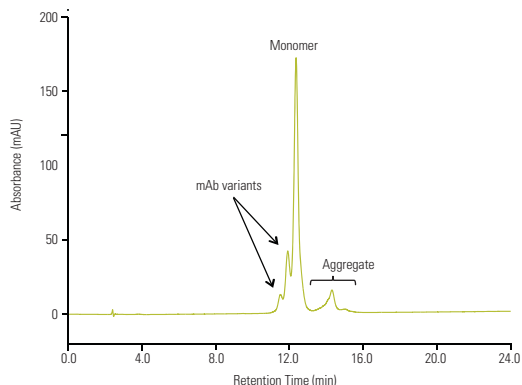


MABPac HIC-20



MABPac HIC-Butyl

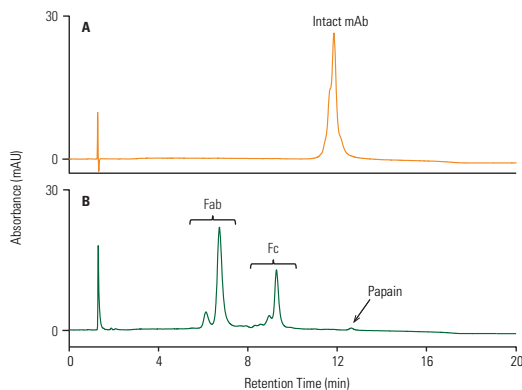
### Separation of mAb Aggregates



#### MABPac HIC-10, 5µm, 100 x 4.6mm

Mobile Phase A:	2 M ammonium sulfate, 100mM sodium phosphate, pH 7.0	
Mobile Phase B:	100mM sodium phosphate, pH 7.0	
Gradient:	Time (min)	%A %B
	-5.0	60 40
	0.0	60 40
	1.0	60 40
	29.0	0 100
	34.0	0 100
Temperature:	20°C	
Flow Rate:	0.5mL/min	
Injection Volume:	10µL	
Detection:	UV, 280nm	
Sample:	Monoclonal antibody (4mg/mL)	

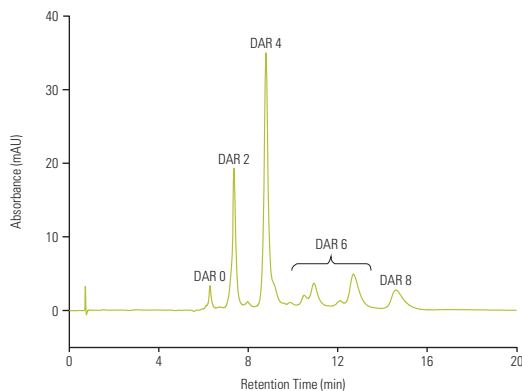
### Separation of mAb Fragments



#### MABPac HIC-20, 5µm, 100 x 4.6mm

Mobile Phase A:	2 M ammonium sulfate, 100mM sodium phosphate, pH 7.0	
Mobile Phase B:	100mM sodium phosphate, pH 7.0	
Gradient:	Time (min)	%A %B
	-5.0	60 40
	0.0	60 40
	1.0	60 40
	15.0	0 100
	20.0	0 100
Temperature:	30°C	
Flow Rate:	1.0mL/min	
Injection Volume:	Intact mAb: 5µL Papain digest: 12µL	
Detection:	UV, 280nm	
Sample:	a. Intact mAb (2.5mg/mL) b. Papain digest (1mg/mL)	

### Separation of Antibody Drug Conjugates (ADCs)



#### MABPac HIC-Butyl, 5µm, 100 x 4.6mm

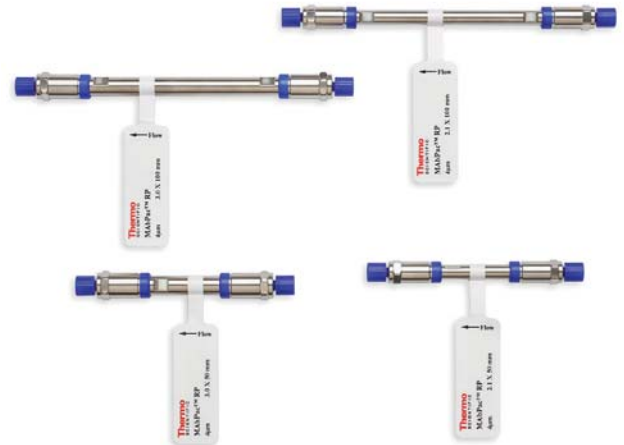
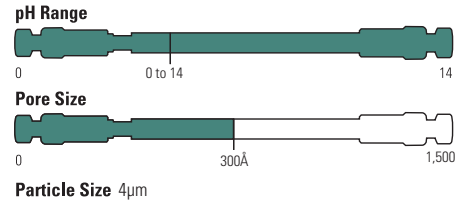
Mobile Phase A:	1.5 M ammonium sulfate, 50mM sodium phosphate, pH 7.0/ isopropanol (95:5 v/v)	
Mobile Phase B:	50mM sodium phosphate, pH 7.0/ isopropanol (80:20 v/v)	
Gradient:	Time (min)	%A %B
	-5.0	100 0
	0.0	100 0
	1.0	100 0
	15.0	0 100
	20.0	0 100
Temperature:	25°C	
Flow Rate:	1.0mL/min	
Injection Volume:	5µL	
Detection:	UV, 280nm	
Sample:	Cys-conjugated ADC mimic (5mg/mL)	

# MABPac RP

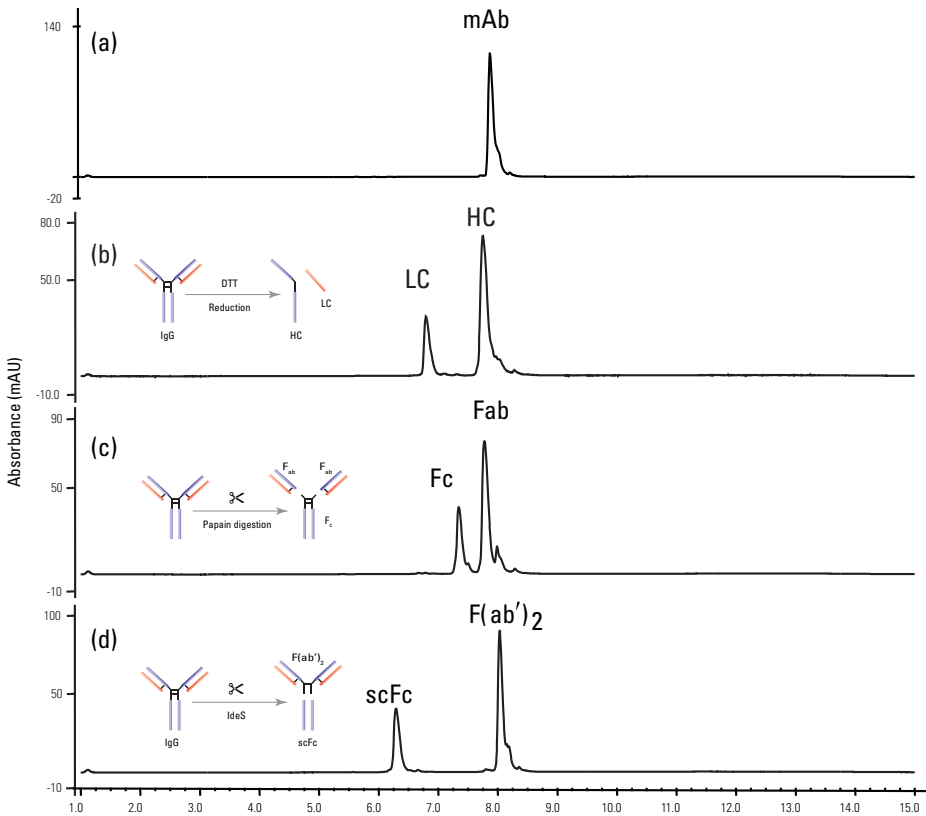
High resolution accurate mass determination of monoclonal antibody variants, antibody drug conjugates (ADC) and proteins

- Superior resolution power for monoclonal antibodies and related substances
- High efficiency with low carry-over
- Excellent MS compatibility
- Wide operating pH range: 0 – 14
- High temperature stability: up to 110°C
- High throughput

The Thermo Scientific™ MABPac™ RP is a reverse phase (RP) liquid chromatography column designed for mAb characterization. Highly efficient separations can be achieved for mAbs and their variants, light chain (LC) and heavy chain (HC), Fc and Fab fragments, scFc and F(ab')<sub>2</sub> fragments. The unique column chemistry provides stability under wide pH range, high temperature, and organic mobile phases and is fully compatible with both UV and MS detection.



## mAb and mAb Fragments Analysis



**MABPac RP, 4µm, 50 x 3.0mm**

Mobile Phase A: H<sub>2</sub>O/FA/TFA (99.88 : 0.1:0.02 v/v/v)

Mobile Phase B: MeCN/H<sub>2</sub>O/FA/TFA (90: 9.88 :0.1:0.02 v/v/v/v)

Gradient:	Time (min)	%A	%B
	0.0	80	20
	1.0	80	20
	11.0	55	45
	12.0	55	45
	14.0	80	20
	12.0	80	20

Temperature: 80°C

Flow Rate: 0.5mL/min

Injection Volume: 5µL

Detection: UV, 280nm

Sample:

- (a) trastuzumab (5mg/mL)
- (b) trastuzumab + DTT (4mg/mL)
- (c) trastuzumab + Pepsin (2mg/mL)
- (d) trastuzumab + IdeS (2mg/mL)

## MABPac RP

Particle Size (µm)	Format	Length (mm)	2.1mm ID	3.0mm ID
4	Guard Cartridges (2/pk)	10	<b>088649</b>	<b>088646</b>
	HPLC Column	50	<b>088648</b>	<b>088645</b>
		100	<b>088647</b>	<b>088644</b>
	Guard Cartridge Holder		<b>069580</b>	<b>069580</b>