

# Columns for Biomolecules

## BioLC Column Lines



### Monoclonal Antibodies

#### MABPac

MABPac Protein A

MABPac SEC-1

MABPac SCX-10

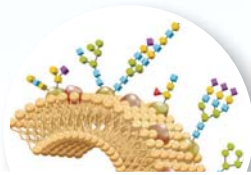
MABPac HIC

MABPac HIC-10

MABPac HIC-20

MABPac HIC-Butyl

MABPac RP



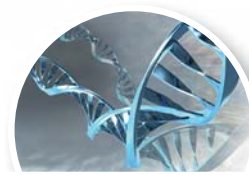
### Glycans

#### GlycanPac

Accucore Amide-HILIC

GlycanPac AXH-1

GlycanPac AXR-1



### Nucleic Acids

#### DNAPac

DNAPac PA100

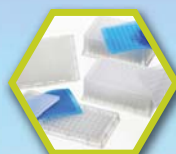
DNAPac PA200

DNAPac RP

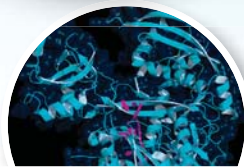
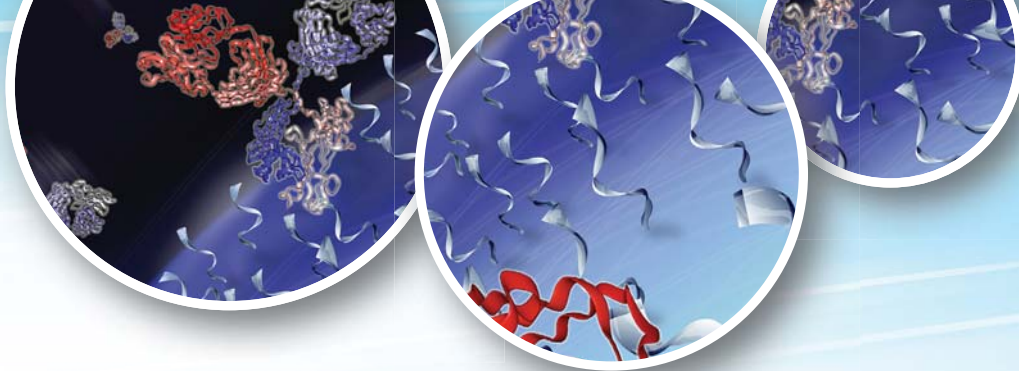
#### Associated products



pH Gradient Buffers



WebSeal Well Plates and Mats



**Proteins / Peptides**

**ProPac**

- ProPac Ion Exchange
- ProPac HIC Hydrophobic Interaction
- ProPac IMAC

**ProSwift/  
PepSwift**

- ProSwift Ion Exchange
- ProSwift Rev Phase
- PepSwift Rev Phase
- ProSwift Con A

**Others**

- Accucore 150
- BioBasic
- Acclaim 300

**Associated products**



SOLAμ SPE Plates



SMART Digest Kit



Viper Fingertight Fittings

# ProPac HPLC Columns

## ProPac WCX-10 and SCX-10

Weak and strong cation exchange columns with exceptionally high resolution and efficiency for separations of protein variants

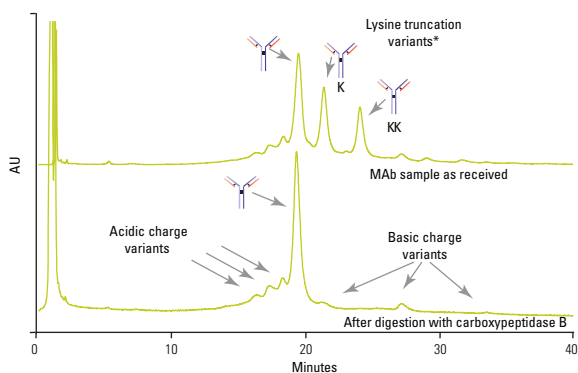
- Characterization and quality control assessment of monoclonal antibodies and other proteins
- Exceptionally high-resolution and high-efficiency separations
- Useful for characterization of related protein variants including deamidation and mAb lysine truncation variants
- ProPac WCX-10 contains carboxylate functional groups and ProPac SCX-10 contains sulfonate functional groups

ProPac WCX-10 and SCX-10 columns are non-porous particles that can resolve isoforms that differ by a single charged residue. A hydrophilic layer prevents unwanted secondary interactions, and a grafted cation exchange surface provides pH-based selectivity control and fast mass transfer for high-efficiency separation and moderate capacity.



**Particle Size** 10µm

### MAb lysine truncation variants



#### ProPac WCX-10, 10µm, 250 x 4.0mm

Mobile Phase A: 20mM MES+ 115mM NaCl + 1mM EDTA, pH 5.5

Mobile Phase B: 20mM MES+ 145mM NaCl + 1mM EDTA, pH 5.5

Gradient:	t (min)	%E1	%E2
	0	100	0
	2	100	0
	40	0	100
	60	0	100

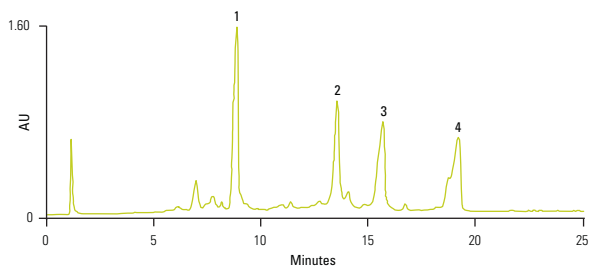
Flow Rate: 1.0mL/min

Detection: UV, 280nm

Sample: MAb

\* Peak assignment supported by data from R. J. Harris, et.al, *J.Chromatogr., A 1995,705, 129-134*, and Carboxypeptidase B digest.

### Hemoglobin variants



#### ProPac SCX-10, 10µm, 250 x 4.0mm

Mobile Phase A: 20mM Sodium phosphate, 4mM Potassium cyanide, pH 6

Mobile Phase B: 1 M Sodium chloride in water

Mobile Phase C: Water

Gradient:	Time	%A	%B	%C
	Init	50	0	50
	30 min	50	50	0

Flow Rate: 1mL/min

Injection Volume: 10µL

Detection: UV, 220nm

Sample: 1. Fetal hemoglobin  
2. Hemoglobin  
3. Sickle cell hemoglobin  
4. Hemoglobin C

## ProPac WCX-10 and SCX-10 *continued*

### ProPac WCX-10

Particle Size (µm)	Format	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
10	Guard Column	50	<b>063480</b>	<b>054994</b>	–	–
	HPLC Column	50	–	<b>074600</b>	–	–
		100	–	<b>088778</b>	–	–
		150	–	<b>088779</b>	–	–
		250	<b>063472</b>	<b>054993</b>	<b>063474</b>	<b>088766</b>

### ProPac SCX-10

Particle Size (µm)	Format	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
10	Guard Column	50	<b>063462</b>	<b>079930</b>	–	–
	HPLC Column	250	<b>063456</b>	<b>054995</b>	<b>063700</b>	<b>088769</b>

### ProPac Kits

Part Number	Phase Description	Set Contents	Column Dimensions
<b>088776</b>	ProPac WAX-10 Lot Select Column Set	3 columns from 1 lot of resin	250 x 4.0mm
<b>088777</b>	ProPac WAX-10 Lot Select Column Set	3 lots of resin, 1 column from each lot	250 x 4.0mm
<b>088774</b>	ProPac SAX-10 Lot Select Column Set	3 columns from 1 lot of resin	250 x 4.0mm
<b>088775</b>	ProPac SAX-10 Lot Select Column Set	3 lots of resin, 1 column from each lot	250 x 4.0mm
<b>088767</b>	ProPac WCX-10 Lot Select Column Set	3 columns from 1 lot of resin	250 x 4.0mm
<b>088768</b>	ProPac WCX-10 Lot Select Column Set	3 lots of resin, 1 column from each lot	250 x 4.0mm
<b>088772</b>	ProPac SCX-10 Lot Select Column Set	3 columns from 1 lot of resin	250 x 4.0mm
<b>088773</b>	ProPac SCX-10 Lot Select Column Set	3 lots of resin, 1 column from each lot	250 x 4.0mm

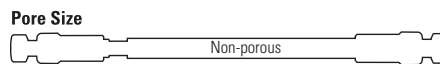


## ProPac SCX-20

Strong cation-exchange column for high-resolution protein separations

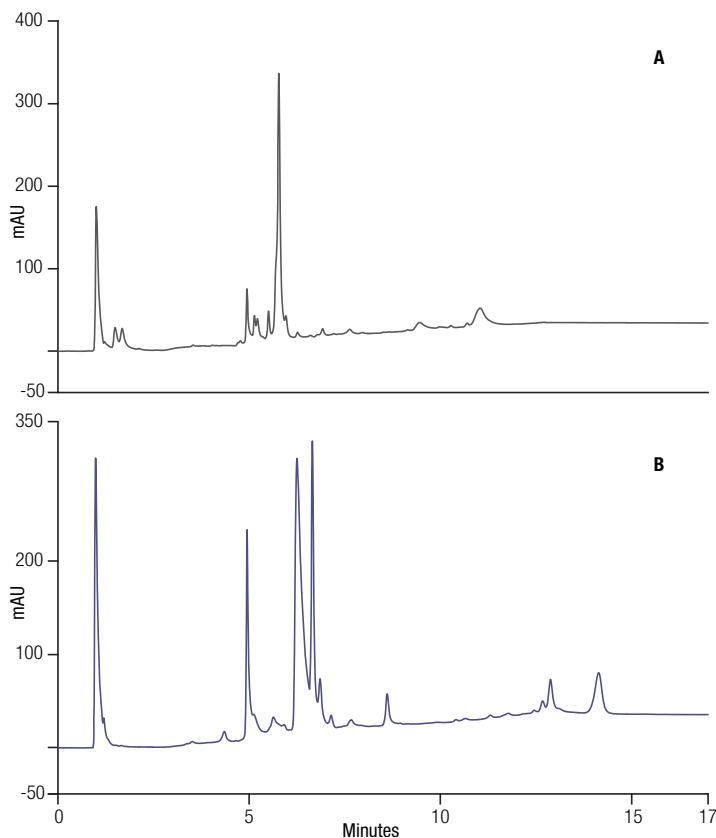
- Grafted cation-exchange surface provides pH-based selectivity control
- Fast mass transfer for high-efficiency separation

The ProPac SCX-20 column is designed specifically to provide high-resolution UHPLC separations of proteins. The stationary phase is composed of 10µm, non-porous, solvent compatible resin beads that are uniformly coated with a highly hydrophilic layer to reduce non-specific interactions between the bead surface and the biopolymer.



**Particle Size** 10µm

### Snake venoms from *Naja naja* and Russell's viper



**ProPac SCX-20, 5µm, 250 x 4.0mm**

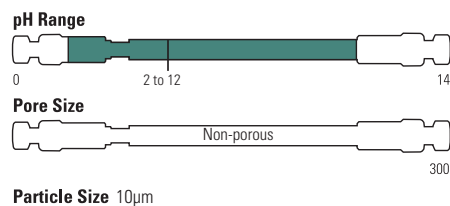
Mobile Phase A:	20mM Tris pH 7.3
Mobile Phase B:	0.5M NaCl in Eluent A
Gradient:	1–100% B in 10 min
Temperature:	30°C
Injection Volume:	10µL
Detection:	UV, 214nm
Samples:	A. Snake Venom ( <i>Naja naja</i> ) 1mg/mL
	B. Snake Venom (Russell's viper) 1mg/mL

### ProPac SCX-20

Particle Size (µm)	Description	Length (mm)	4.0mm ID
10	Guard Column	50	<b>074643</b>
	HPLC Column	250	<b>074628</b>

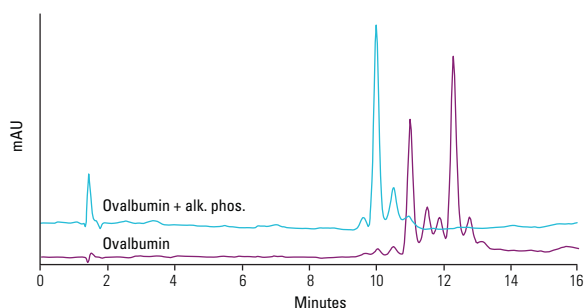
## ProPac WAX-10 and SAX-10

Weak and strong anion anion-exchange providing unequalled high resolution and efficiency in the separations of protein variants



- High-efficiency, high-resolution separations
- Useful for characterization and quality control assessment of closely-related protein variants
- Supports separation of proteins that differ by as little as one amino acid residue
- Neutral hydrophilic coat that eliminates protein-resin hydrophobic interactions
- Superior lot-to-lot and column-to-column reproducibility
- ProPac WAX-10 column contains a tertiary amine functional group and ProPac SAX-10 contains a quaternary amine functional group

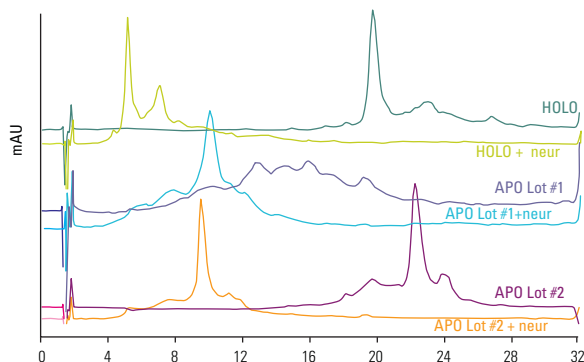
### Resolution of phosphorylation variants of ovalbumin



#### ProPac SAX-10, 10µm, 250 x 4.0mm

Mobile Phase A:	Water		
Mobile Phase B:	2.0 M NaCl		
Mobile Phase C:	0.1 M Tris/HCl (pH 8.5)		
Gradient:	Time	%A	%B %C
	0 min	80	0 20
	15 min	67.5	12.5 20
Flow Rate:	1.0mL/min		
Injection Volume:	30µL		
Detection:	UV, 214nm		
Sample:	Ovalbumin before and after alkaline phosphatase treatment		

### Effect of sialylation on transferrin chromatography



#### ProPac SAX-10, 10µm, 250 x 4.0mm

Mobile Phase A:	Water		
Mobile Phase B:	2.0 M NaCl		
Mobile Phase C:	0.2 M Tris/HCl (pH 9)		
Gradient:	Time	%A	%B %C
	0 min	87	3 10
	30 min	83	7 10
Flow Rate:	1.0mL/min		
Injection Volume:	50µL		
Detection:	UV, 214nm		
Samples:	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.		

### ProPac WAX-10

Particle Size (µm)	Format	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID
10	Guard Column	50	<b>063470</b>	<b>055150</b>	—	—
	HPLC Column	250	<b>063464</b>	<b>054999</b>	<b>063707</b>	<b>088771</b>

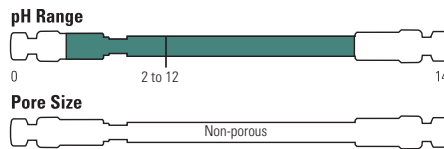
### ProPac SAX-10

Particle Size (µm)	Format	Length (mm)	2.0mm ID	4.0mm ID	9.0mm ID	22.0mm ID	4 x 50mm
10	Guard Column	50	<b>063454</b>	<b>054998</b>	—	—	—
	HPLC Column	250	<b>063448</b>	<b>054997</b>	<b>063703</b>	<b>088770</b>	<b>078990</b>

# ProPac PA1

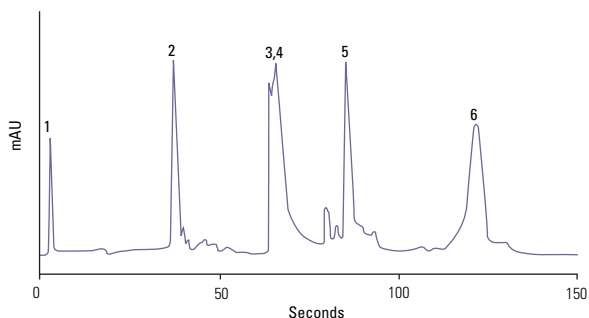
For hydrophilic anionic protein separations

- Good for hydrophilic proteins and peptides
- Ideal for high-resolution separations of proteins with pI values from 3 to 11
- Available in semipreparative format
- Pellicular packing ensures high-efficiency and fast mass transport



Particle Size 10µm

### Gradient separation of protein standards



**Column: ProPac PA1, 10µm, 50 x 4.0mm**  
 Mobile Phase: 10 to 350mM NaCl in 1.0mM Tris, pH 8.2  
 Flow Rate: 5mL/min  
 Detection: UV, 280nm  
 Analytes: 1. Horseheart Myoglobin 33µg  
 2. Contaminant -  
 3,4. Conalbumin 66  
 5. Ovalbumin 66  
 6. Soybean Trysin Inhibitor 66



### ProPac PA1

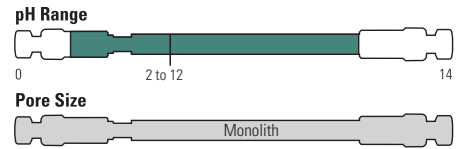
Particle Size (µm)	Format	Length (mm)	4.0mm ID	9.0mm ID
10	Guard Column	50	<b>039657</b>	—
	HPLC Column	250	<b>039658</b>	<b>040137</b>

# ProSwift IEX

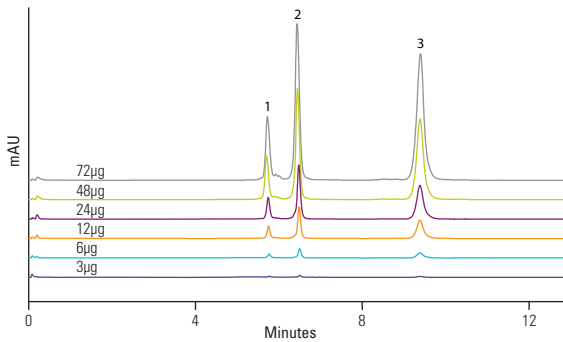
Monolith IEX columns for high-resolution and fast protein analysis

- High resolution
- High loading capacity
- Fast analysis
- Wide range of operational flow rates
- Excellent stability over a wide pH range
- Outstanding reproducibility and ruggedness

ProSwift polymer monolith (poly(Meth)acrylate) media are uniquely suited for separation of proteins. Each monolith is a single cylindrical, sponge-like polymer rod containing an uninterrupted, interconnected network of flow-through channels of a specific pore size. These large channels combined with the monolith's nonporous surfaces result in fast mass-transfer, high-resolution, and fast protein separations. The unique globular morphology of the polymer medium provides its high capacity.



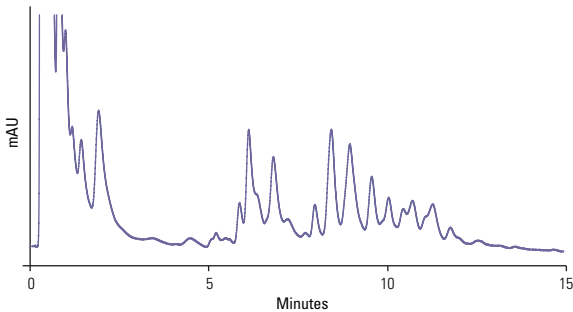
## Dynamic protein loading capacity of ProSwift WCX-1S 50 x 1.0mm



### ProSwift WCX-1S, 50 x 1.0mm

Mobile Phase A:	10mM Sodium phosphate (pH 7.6)
Mobile Phase B:	1 M NaCl in eluent A
Gradient:	0% B for 2 min, 0–85% B in 7.5 min, 85% B for 3 min
Temperature:	30°C
Flow Rate:	0.2mL/min
Injection Volume:	1–24µL
Detection:	UV, 280nm
Sample:	Protein mix, 1mg/mL each
Analytes:	1. Ribonuclease A 2. Cytochrome C 3. Lysozyme

## Protein separation



### ProSwift WAX-1S, 50 x 1.0mm

Mobile Phase A:	10mM Tris, pH 7.6
Mobile Phase B:	1 M NaCl in 10mM Tris, pH 7.6
Gradient:	5 to 55% of B in 13 min, hold for 2 min
Temperature:	30°C
Flow Rate:	0.2mL/min
Injection Volume:	1.3µL
Detection:	UV, 280nm
Sample:	1.25mg/mL <i>E. coli</i> protein

## ProSwift IEX

Functional Group	Length (mm)	1.0mm ID	4.6mm ID
WAX-1S	50	<b>066642</b>	<b>064294</b>
WCX-1S	50	<b>066643</b>	<b>064295</b>
SAX-1S	50	<b>068459</b>	<b>064293</b>
SCX-1S	50	<b>071977</b>	<b>066765</b>

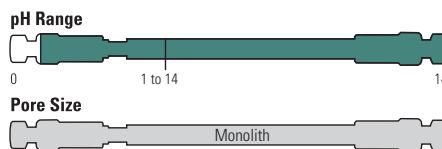


## ProSwift RP

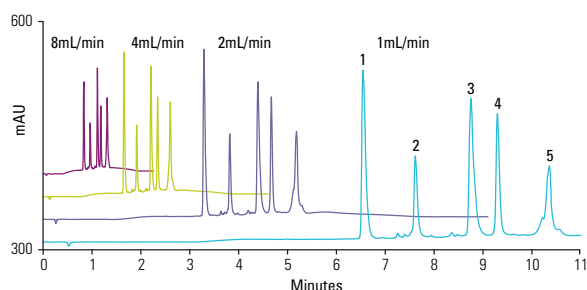
Reversed-phase monolith columns that uniquely provide the advantages of high resolution at exceptionally high flow rates for fast protein separations and analysis

- High resolution at high speed
- Highest operational flow rates available
- High throughput and improved productivity
- Excellent stability over a wide pH range of 1 to 14
- Outstanding reproducibility and ruggedness
- High stringent wash compatible, for example, 1 M NaOH
- High loading capacity

ProSwift polymer reversed-phase monolith media are (polystyrene-co-DVB) uniquely suited for the separation of proteins. Each monolith is a single cylindrical polymer rod containing an uninterrupted, interconnected network of flow-through channels of a specific pore size; ranging from small channel (1S), medium size channels (2H & 4H) to very large channel (3U) sizes. These channels and the monolith's nonporous surfaces result in fast mass transfer for high-resolution and fast protein separations. The channels also produce low backpressure, allowing the use of higher linear velocities with minimal loss of resolution.



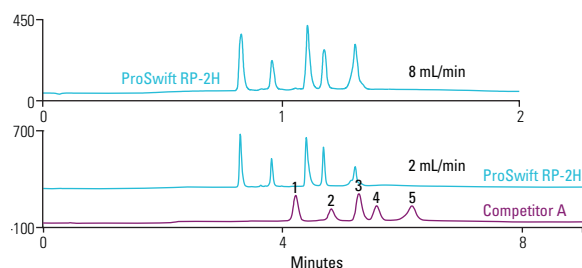
### Proteins



#### ProSwift RP-2H, 50 x 4.6mm

Mobile Phase A:	DI H <sub>2</sub> O/CH <sub>3</sub> CN (95:5; V/V) + 0.1% TFA
Mobile Phase B:	DI H <sub>2</sub> O/CH <sub>3</sub> CN (5:95; V/V) + 0.1% TFA
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
Flow Rate:	1, 2, 4, or 8 mL/min
Injection Volume:	5 µL
Detection:	UV, 214nm
Sample:	Mixture of five proteins
Analytes:	1. Ribonuclease A 1.5mg/mL 2. Cytochrome C 0.5mg/mL 3. BSA 1.5mg/mL 4. Carbonic anhydrase 0.9mg/mL 5. Ovalbumin 1.5mg/mL

### Competitive comparison



#### ProSwift RP-2H, 50 x 4.6mm Competitor A, 15µm, 100 x 4.6mm

Mobile Phase A:	DI H <sub>2</sub> O/CH <sub>3</sub> CN (95:5; V/V) + 0.1% TFA
Mobile Phase B:	DI H <sub>2</sub> O/CH <sub>3</sub> CN (5:95; V/V) + 0.1% TFA
Gradient:	2 mL/min: 1-75% B in 6 min 8 mL/min: 1-75% B in 1. min
Temperature:	30°C
Flow Rate:	2 or 8 mL/min
Injection Volume:	5 µL
Detection:	UV, 214nm
Sample:	Mixture of five proteins
Analytes:	1. Ribonuclease A 1.5mg/mL 2. Cytochrome C 0.5mg/mL 3. BSA 1.5mg/mL 4. Carbonic anhydrase 0.9mg/mL 5. Ovalbumin 1.5mg/mL

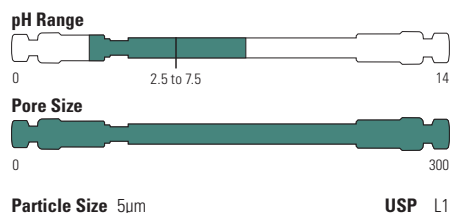
### ProSwift RP

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

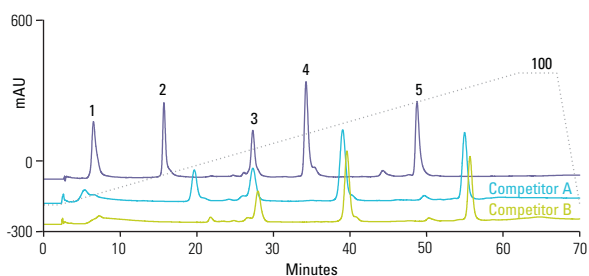
## ProPac HIC-10

Hydrophobic Interaction Chromatography columns for the high-resolution separation of proteins and peptides

- High-resolution HPLC separation of proteins, protein variants and peptides
- Proteins are separated under non-denaturing conditions
- High protein loading capacity for protein purification applications
- Wide range of applications
- Based on 5µm ultra high purity spherical silica gel particles with 300Å pores



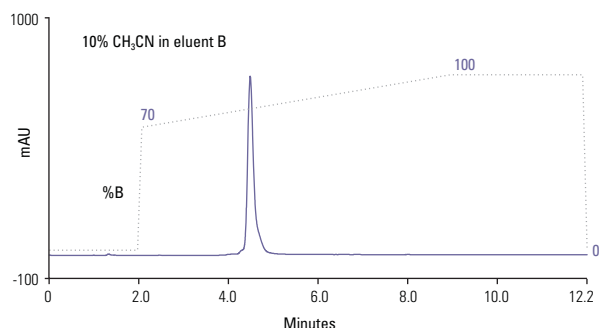
### Protein mixture



#### ProPac HIC-10, 5µm, 75 x 7.8mm Competitors A and B, 75 x 7.5mm

Mobile Phase A:	2 M (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> in 0.1 M NaH <sub>2</sub> PO <sub>4</sub> (pH 7.0)
Mobile Phase B:	0.1 M NaH <sub>2</sub> PO <sub>4</sub> (pH 7.0)
Flow Rate:	1.0mL/min
Injection Volume:	20µL
Detection:	UV, 214nm
Sample:	Mixture of proteins (1mg/mL each final after 1:1 dilution with mobile phase A)
Analytes:	1. Cytochrome c 2. Myoglobin 3. Ribonuclease A 4. Lysozyme 5. Chymotrypsinogen

### Monoclonal antibody



#### ProPac® HIC-10, 5µm 100 x 4.6mm

Mobile Phase A:	0.5 M (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> in 0.1 M NaH <sub>2</sub> PO <sub>4</sub> (pH 7.0)
Mobile Phase B:	0.1 M NaH <sub>2</sub> PO <sub>4</sub> (pH 7.0)
Gradient:	70–100% B in 15 min
Flow Rate:	1mL/min
Injection Volume:	5µL (25µg)
Detection:	UV, 214nm
Sample:	MAB 50µL (50mg/mL) + 450µL Eluent B

### ProPac HIC-10

Particle Size (µm)	Format	Length (mm)	2.1mm ID	4.6mm ID	7.8mm ID
5	HPLC Column	75	–	–	<b>063665</b>
		100	<b>063653</b>	<b>063655</b>	–
		250	–	<b>074197</b>	–