



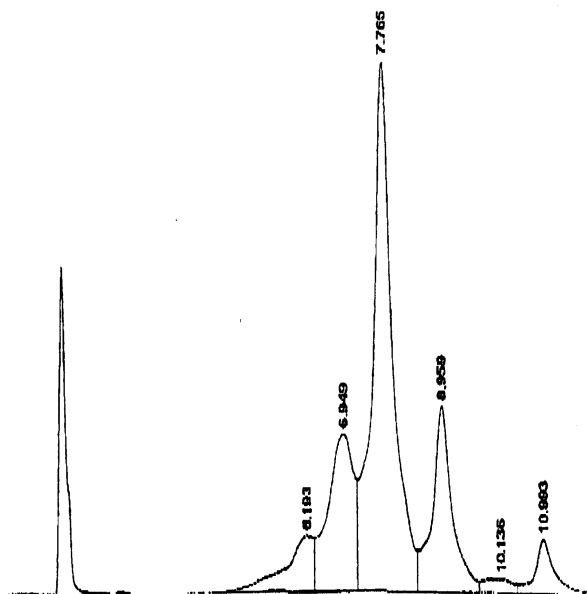
# PolyCAT A

## For Cation-Exchange

The PolyCAT A is made through a unique process for attaching Poly(aspartic acid) covalently to silica. Proteins elute from this polypeptide coating in sharp peaks with little tailing. Binding capacity and recovery are high as well. Operating conditions are similar to those used with other weak cation-exchange (WCX) materials (e.g. CM type). This cation exchange media can be used to separate by charge, or by polarity. Volatile mobile phases with high levels of organic solvents may be used.

### Noteable applications areas for the PolyCAT A:

- 1) PEGylated Proteins
- 2) Glycosylated forms of Proteins
- 3) Monoclonal Antibody Variants
- 4) Protein Variants, Iso ASP/Desamido forms
- 5) Phosphorylation variants of Histones, using mixed mode.
- 6) Phosphopeptides.
- 7) Hemoglobin analysis (Hb A1c and variants)
- 8) Proteins with isoelectric points above 6
- 9) Polypeptides with more than 3 basic residues.
- 10) Purification of very basic solutes by ion-exchange with a volatile mobile phase.



### Monoclonal IgG Sialylation Isoforms

Column; PolyCAT A, 100x2.1mm,  
5µm, 1000Å  
Gradient pH 6.5 to 7.5 with shallow  
KCL

Profile matched data from CZE  
and from SLab gel IEF



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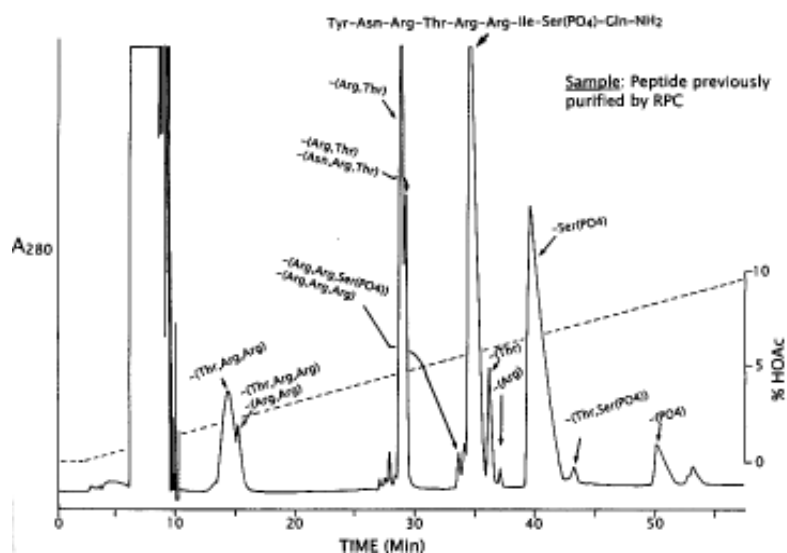
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## Crude Synthetic Phosphopeptide:

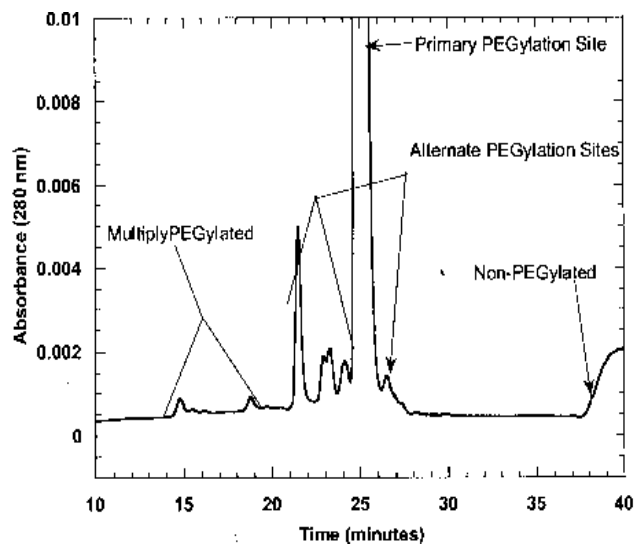
Numerous failure sequences may not be separated by reversed-phase, but the below chromatogram demonstrates the PolyCAT A, when using an acetic acid gradient, will yield a purified target peptide, with remarkable selectivity, superior to Reversed Phase.



## Crude Synthetic Phosphopeptide

Column PolyCAT A  
(catalog number 204CT0503)  
Gradient 0-25% B in 60', A) 10mM NH<sub>4</sub>OAc,  
pH 5.5. B) 40% HOAc. Flowrate 1 ml/min  
Detection 280nm

The sample was the main fraction collected from reversed-phase step. The product was purified satisfactorily at the cation exchange step. Selectivity is remarkable; deletion of a Thr- residue sufficed to afford nearly baseline resolution from the main product. The elution order was as expected in some cases; Loss of -PO<sub>4</sub> or Ser(PO<sub>4</sub>) would decrease electrostatic repulsion and increase retention time, while loss of two Arg- residues decreased retention. However, the loss of all three Arg- Residues had little effect on retention, while loss of a single Arg- actually increased retention. The indicated deletions were identified by ES-MS. Again, one cannot specify which particular residue is missing if there is more than one possibility.



## PEGylated Protein

PEGylated protein (20-30KD) showing alternate PEG sites clearly resolved. The minor peaks near the large peak are proteins where the PEG chain was attached to the lysine residues other than the one involved in the main product.

Column PolyCAT A, Catalog No. 204CT0510  
Conditions involve a salt gradient (NaCl) with  
20% Acetonitrile in both mobile Phases.



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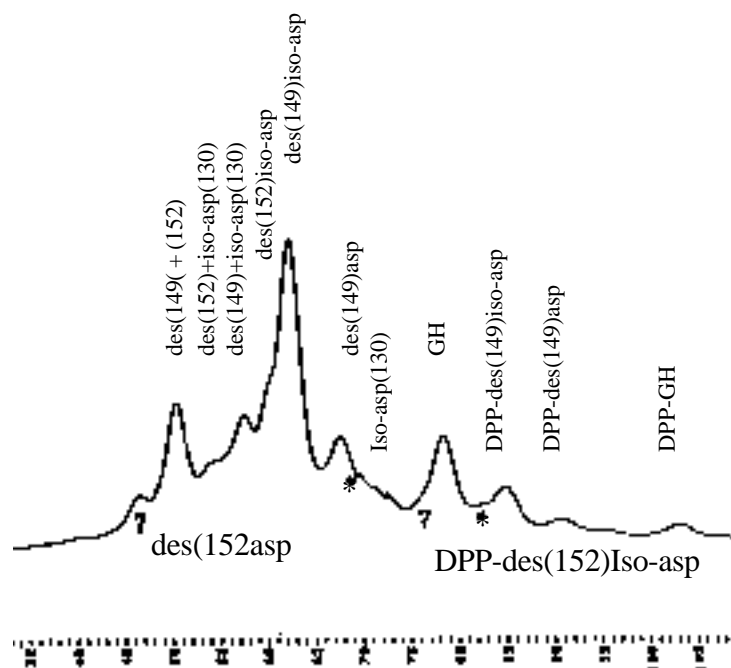
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## Protein Variant Analysis



Column : PolyCAT A,  
204CT0510  
Gradient: 130-145 mM Nh4-  
acetate, pH 4.0, with 40%  
MeCN; 30 deg

Cation exchange of a degraded GH sample with identified variants. With the exception of cyclic imide(149)GH and cyclic imide(152)GH, all variants involved in deamidation of ASN 149 and of ASN152, and in isomerization of ASP 130, have been identified. Note that "double derivatives" (i.e. deamidated des-PhePro-1,2 GH's etc.) have been identified as well. Two minor peaks (marked ?) have not been identified.

## Cation Exchange With High Organic Background...

### Recombinant -Bungerotoxin from P. Pastoris

Glycosylated, non Glycosylated (native, Truncated)

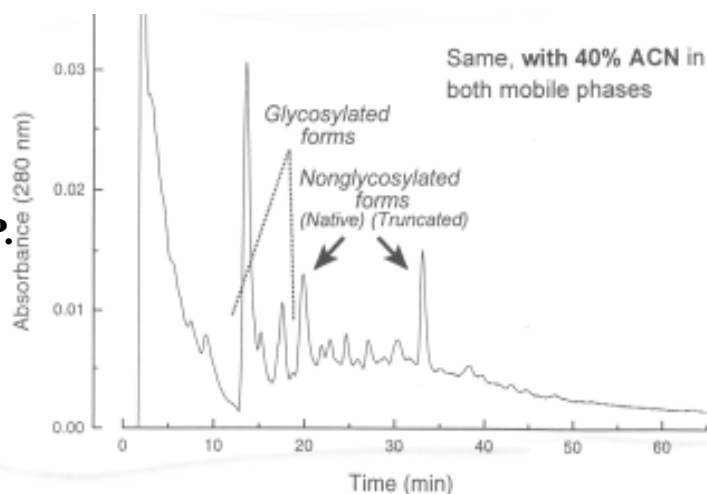
Column PolyCAT A

(cat. No. 204CT0503)

Mobile Phase: 60 ' linear gradient, 50-300

mM NH<sub>4</sub> OAc, pH 6.0

with 40% Organic background



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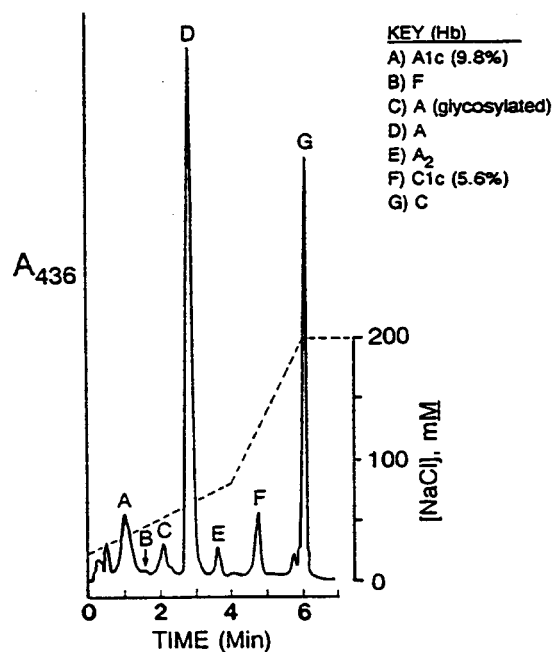
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## DIABETIC HEMOGLOBIN (C TRAIT)

COLUMN: PolyCAT A™, 35 x 4.6 mm (5 µm; 1000-Å)



COURTESY C.-N. OU & C. ROGNERUD  
(TEXAS CHILDREN'S HOSPITAL)

The PolyCAT A column has made it possible to separate hemoglobin variants both faster and with better selectivity. The chromatogram is on a 35x4.6mm fast column of PolyCAT A for this variant separation. Total turnaround time between samples is 8 minutes. Hb E and S traits are also confirmed on the PolyCAT A

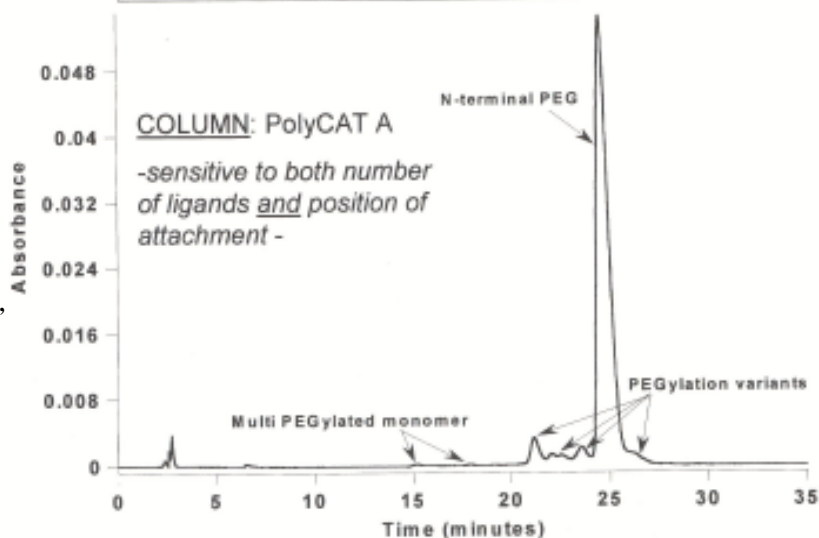
## PEGylated Variants

**PolyCAT A column sensitive to both number of PEGs and position of attachment.**

Column PolyCAT A 204CT0510 4/  
6x200mm, 5µm, 1000Å  
A: 20mM Sodium Acetate, pH 5,  
20% Acetonitrile  
B: 20mM Sodium Acetate pH 5, 1 M KCL,  
20% Acetonitrile

1 to 15% B in 30 minutes

## NEUROTROPHIC FACTOR: Polyethylene Glycol (PEG) Attached



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## CATION-EXCHANGE OF PEPTIDES WITH VOLATILE SOLVENTS

Ion-exchange is conveniently done with volatile solvents using PolyCAT A™, our weak cation-exchange (WCX) material. A gradient of acetic acid (HOAc) *uncharges* its carboxyl-groups, and even highly basic peptides are readily eluted, as in the example below. Strong cation-exchange (SCX) materials, such as our PolySULFOETHYL Aspartamide™, are generally too retentive to be used this way.

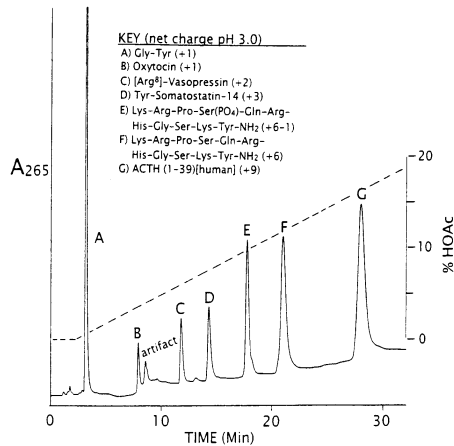
### ADVANTAGES:

- **Excellent selectivity:** complements reversed-phase HPLC (RPC).
- **Volatile solvent;** useful for mass spec, bioassays and sequencing.
- **Preparative advantages:**
  - high capacity
  - inexpensive
  - easy to dispose of solvent
  - peptides recovered in acetate salt form.
- **Works with very basic peptides.**

### DISADVANTAGE:

- **Detection:** UV/VIS limited to peptides containing Phe-, Tyr- or Trp-. No problem with other detectors or bioassays.

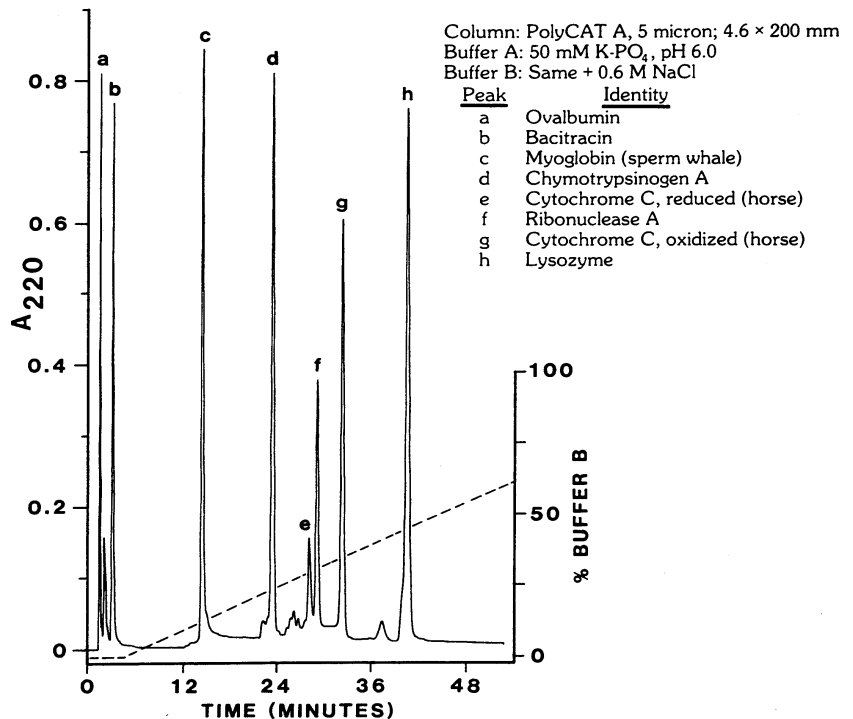
### CATION-EXCHANGE OF PEPTIDE STANDARDS ON PolyCAT A™ (acetic acid gradient)



Column: PolyCAT A, 200 x 4.6-mm (300-Å).  
 Gradient: 0-100% B in 80'. A) 10 mM NH<sub>4</sub>OAc, pH 5.5.  
 B) 50% HOAc. Flow rate: 1.0 ml/min.  
 Detection: A<sub>265</sub> = 0.1 AUFS.

## Uncharging a Cation-Exchange column to separate very basic compounds.

## PROTEIN STANDARDS ON PolyCAT A™



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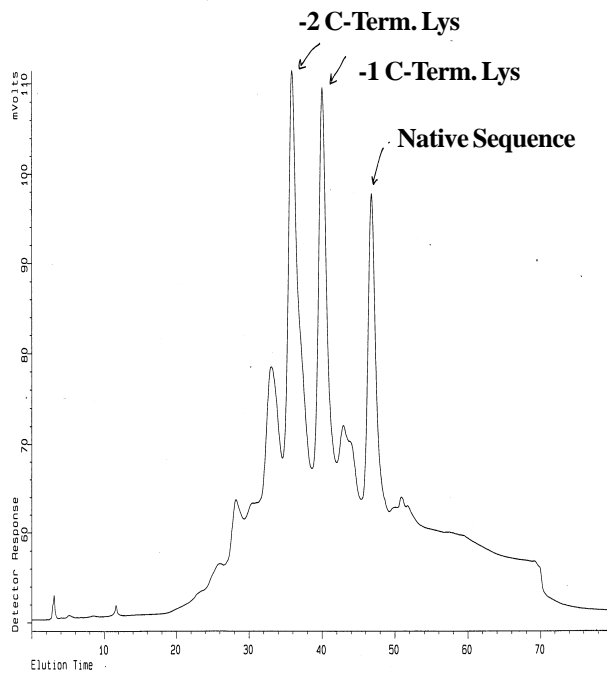
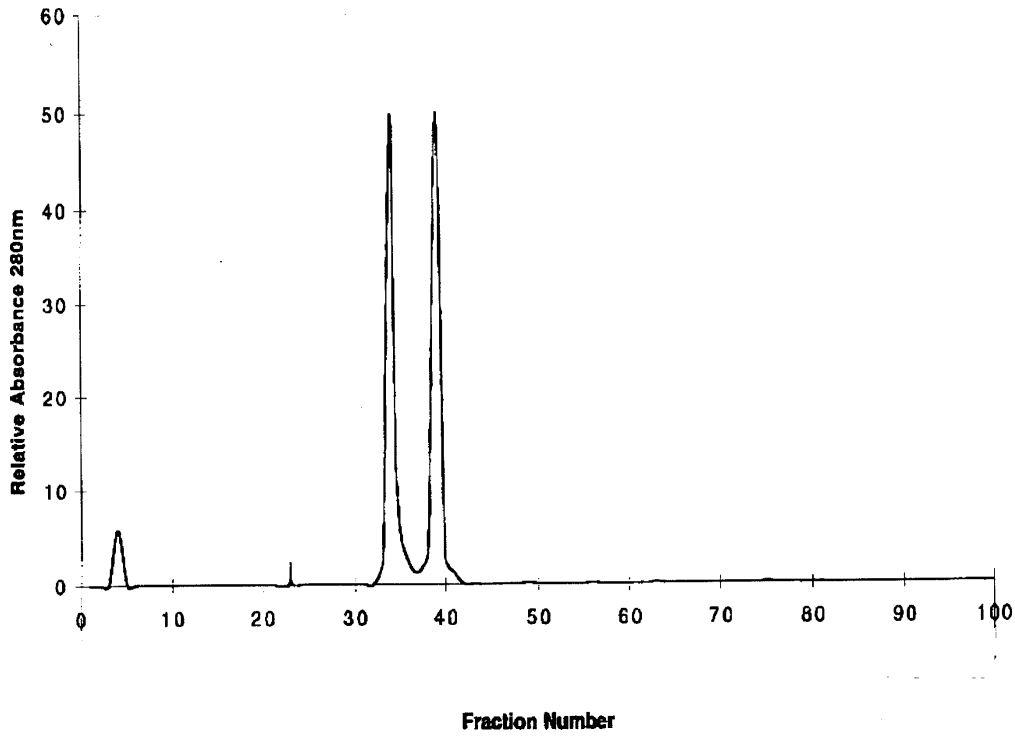
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**Two Fibrolase Isoforms ,  
eluted with increasing gradient  
of NaCl in MOPS; Column PolyCAT A**



**“Pure” Monoclonal  
Antibody  
Column PolyCATA,  
4.6x200mm, 5um, 1000A Pore**

**Buffer A: 9mM Sodium Phos-  
phate, pH 6.2 with 10% MeCN  
Buffer B: Buffer a plus 0.18M  
NaCl**



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# PolyHydroxyethyl Aspartamide for Hydrophilic Interaction Liquid Chromatography (HILIC)

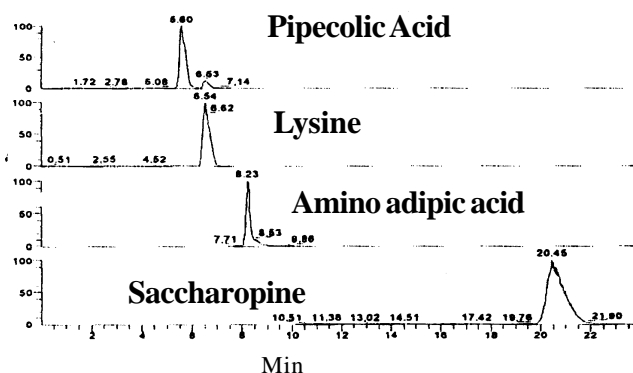
Hydrophilic Interaction Liquid Chromatography (HILIC) is a variation of normal-phase chromatography which can be performed with partially aqueous mobile phases. This permits normal phase separation of peptides, carbohydrates, nucleic acids, and many proteins. The elution order is least polar elutes first, the opposite of that in reversed-phase HPLC. The stationary phase in HILIC must be extremely polar. PolyLC has developed bonded phase specifically for this purpose; PolyHydroxyethyl A. It retains solutes almost solely on the basis of hydrophilic interaction. Volatile mobile phases can be used. HILIC exhibits retention proportional to the amount of organic solvent in the mobile phase. Typical HILIC mobile phases contain 65-90% organic in the initial conditions with the sample in the same. Gradient elution may be performed either by a decreasing organic level, or increasing salt gradient or both.

## When to use HILIC

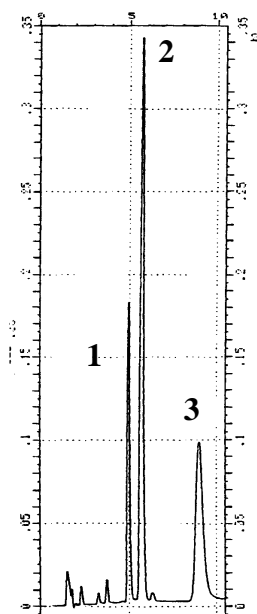
- Need a volatile mobile phase and Reversed Phase does not suffice
- Solutes too weakly or too strongly retained in the Reversed-Phase mode.
- Solutes which aggregate or are not soluble in aqueous mobile phase (i.e. Amyloid peptides)
- Solute differing in hydrophilic residues (i.e. Ser-)
- Complementary orthogonal mode of chromatography
- Removing electroeluted proteins from SDS, Coomassie blue, and salts.
- Elute molecules into Mass Spec detector

## Components of High-Lysine Corn

(M/S-M/S detection Finn LCQ (APCI Positive ion mode)  
Column; 204HY0501, 4.6x200mm, 5um 100A



Mobile Phase: .2% formic acid + 10mM ammonium Formate  
with 60% Acetonitrile  
0.8ml/min



Small Molecule  
Cosmetic  
Components

1) Urea  
2) Allantoin  
3) Lysidone  
Detection 200nm

Column; 204HY0501  
PolyHydroxyethyl A  
100A pore size



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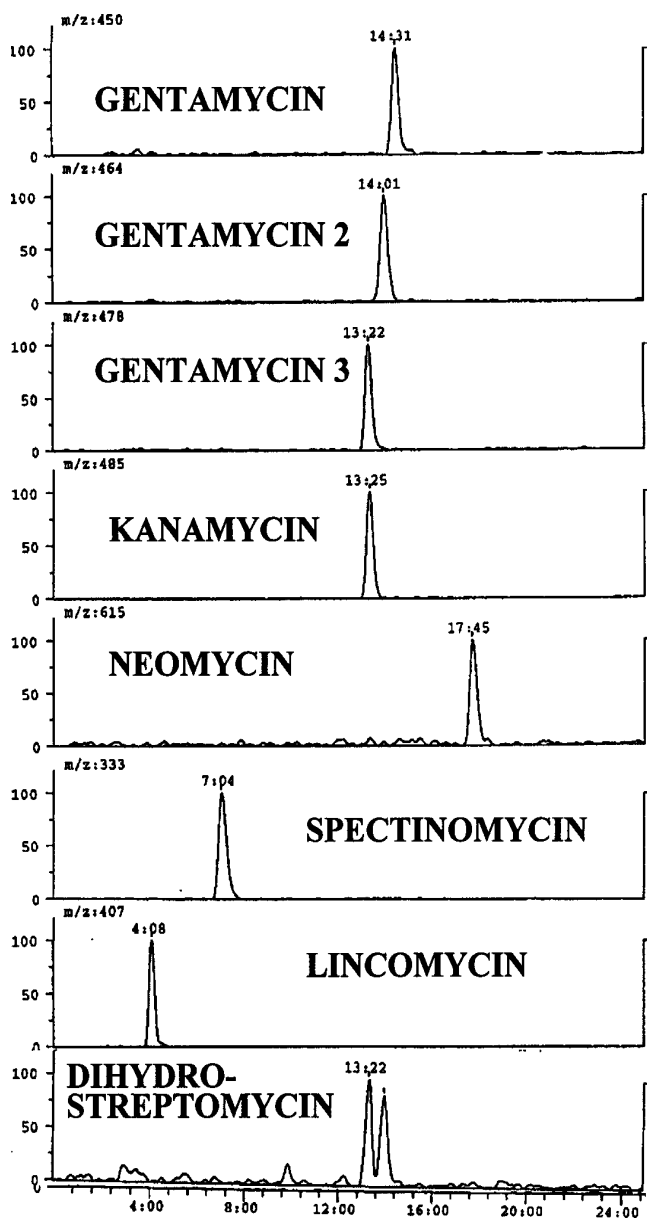
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# Aminoglycosides

Method especially suited for  
MS detection

Column; 204HY0510, 5um 1000A  
pore 4.6x200mm  
A: 80% Acetonitrile  
B: 80% water, 250mM Amonium  
acetate, pH 4.0, flow rate 1 ml/min  
15 min gradient Inj 50ul



This study demonstrates the capability of HILIC for the separation of Aminoglycoside residues. The method is especially suited to the Mass Spectrometric detection of these analytes, providing a high conclusive method with superior peak shape and sensitivity than most available methods.

Poster presented at Euroresidue IV (5/2000)Veldhoven, The Netherlands, Titled, "A Novel LC-MS compatible method for the analysis at residue levels of Aminoglycoside antibiotics" by M. McGrane et. al. RIKILT, The Netherlands



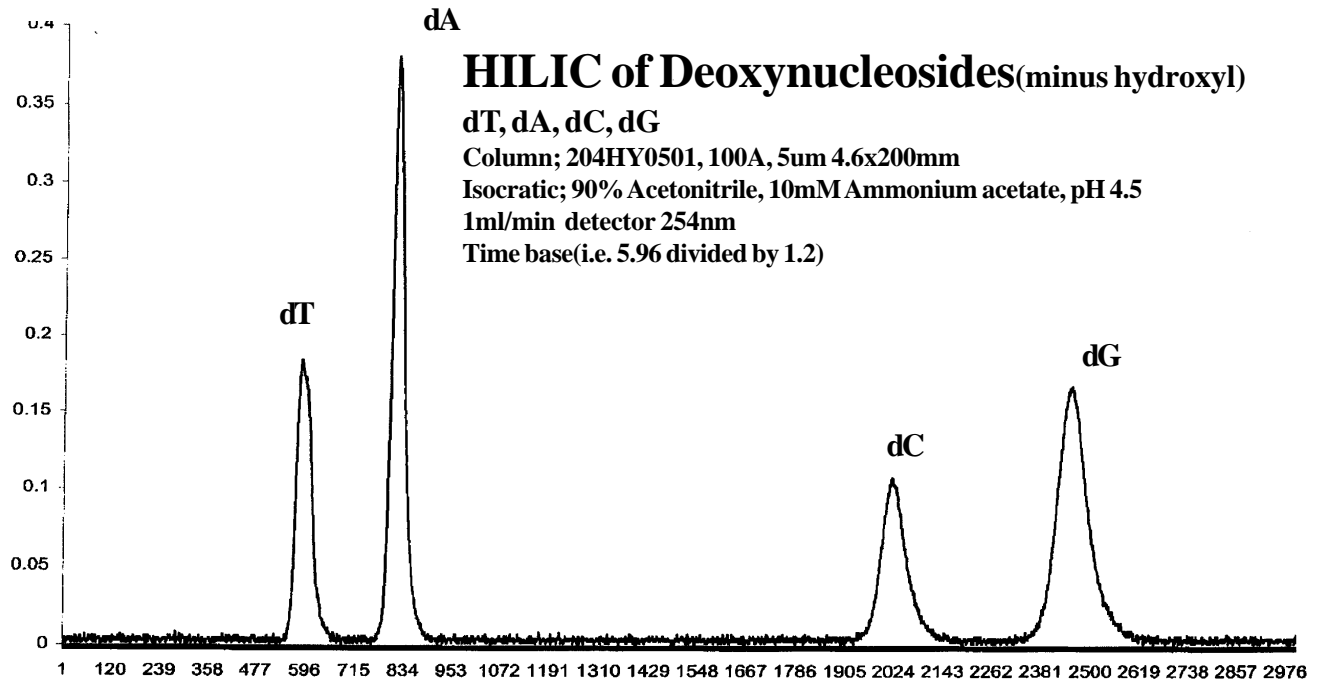
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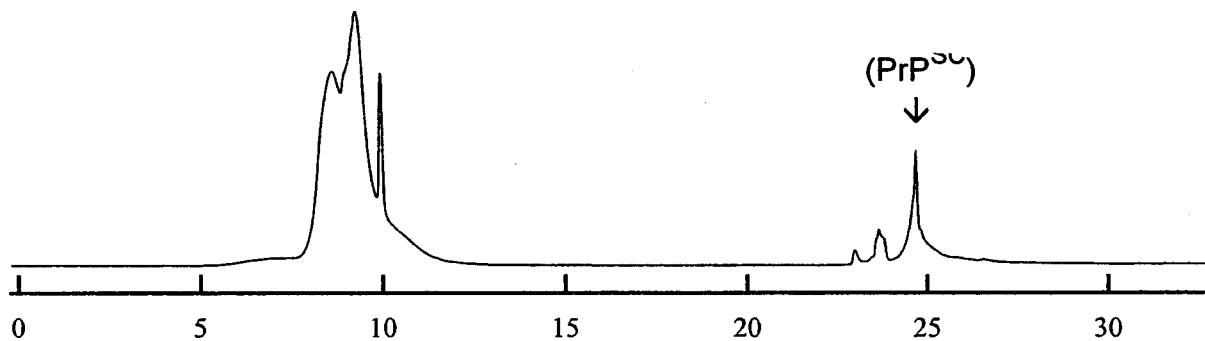


## PRION Isolation

HILIC permits the isolation of pure pathogenic prion protein (PrP<sup>Sc</sup>, etc) from extracts from Brain and other tissues of diseased animals. The protein is obtained free of detergent with recovery above 90% in a form that readily forms complexes with anti-prion antibodies. (3)

Column; 204HY0503, 4.6x200mm 5um, 300A

(3) M.J. Schmerr, A.J. Alpert, and A.L. Jenny, submitted to Journal of Chromatography



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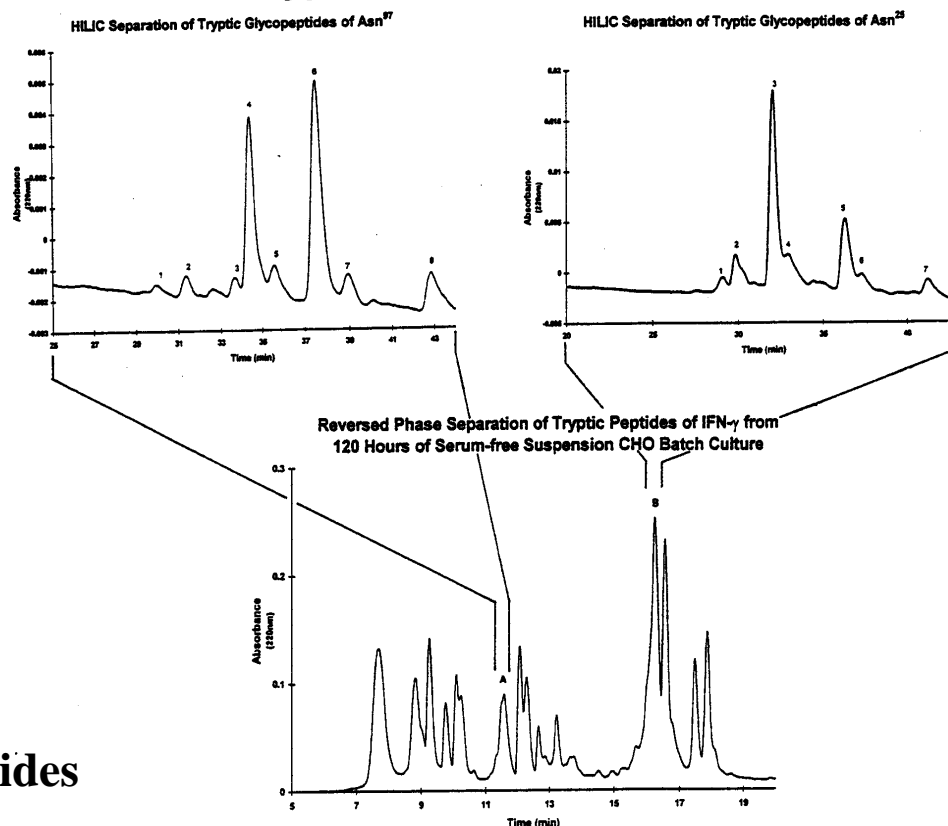
# RPC-HILIC Purification of Glycopeptides from a Tryptic Digest of Gamma Interferon

(120 Hours of Serum-free Suspension CHO Batch Culture)

Columns Vydac 218TP54 and Polyhydroxyethyl A 204HY0503

The two glycopeptide peaks in the RPC run were collected and re-run via HILIC. Each peak proved to consist of a family of peptides, all with the same peptide sequence but differing by a **single carbohydrate residue** from neighboring peptides. This is an example of the exceptional selectivity of HILIC for variations involving polar residues.

Data courtesy of j. Zhang & D. Wang (MIT)



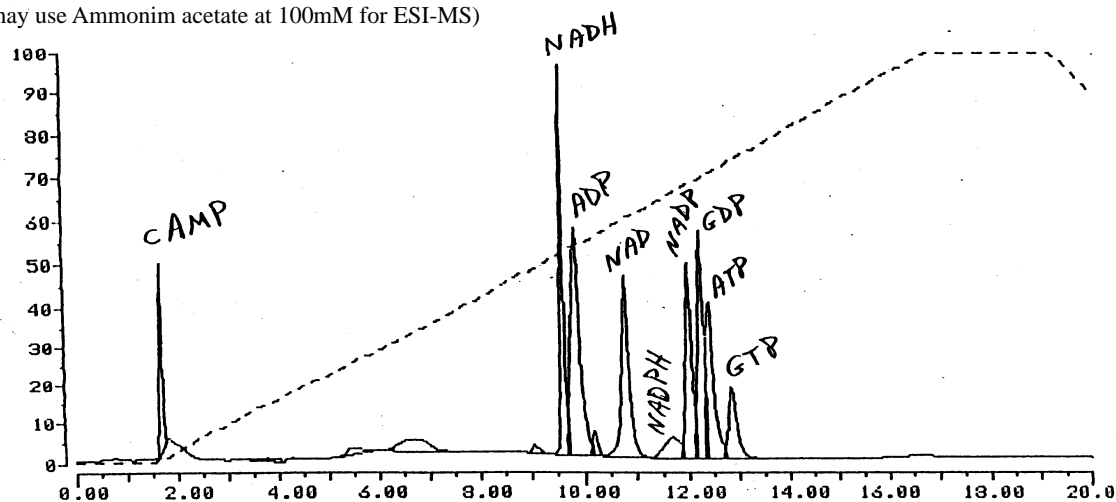
## HILIC of Nucleotides

Column; 204HY0502, 4.6x200mm, 5 $\mu$ m 200A

Gradient; 14° linear, 85-10% Acetonitrile, and 0-200mM

NaCl in 10mM TEAP, pH 6.0

(may use Ammonium acetate at 100mM for ESI-MS)



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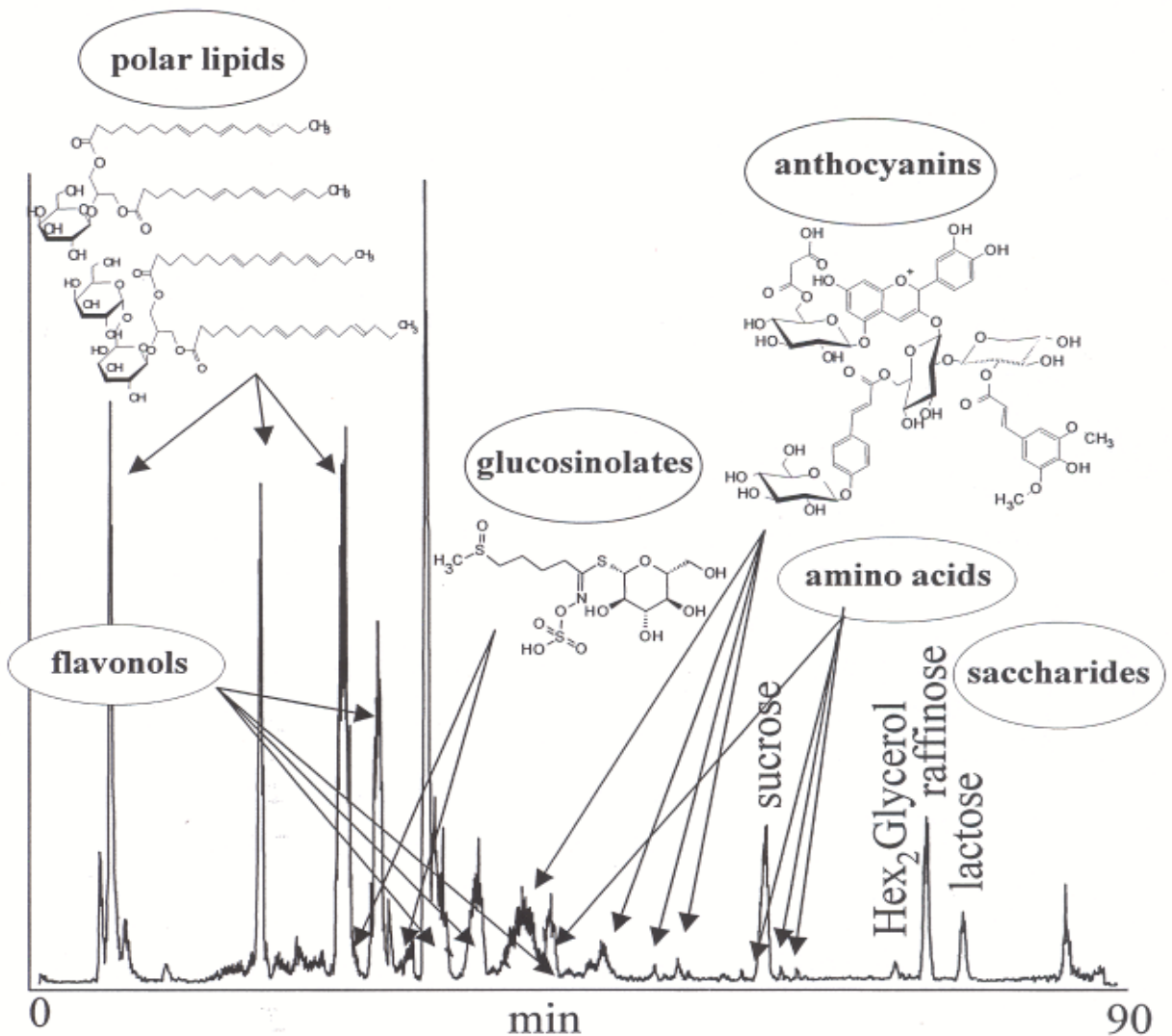
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# PROTEOMICS & Metabolomics

## HILIC-MS of Leaf Extract

Column; PolyHydroxyethylA 3 $\mu$ m, 100Å \Detection  
ESI-MS total ion current; m/z 25.0-2000.0

### *Arabidopsis thaliana* leaf extract



**HILIC-ESI-MS with a PolyHYDROXYETHYL A capillary  
(3  $\mu$ m, 100 Å), 150x0.32 mm Gradient: Decreasing ACN  
(Courtesy of V.V. Tolstikov, Max Planck Institute-Potsdam)**



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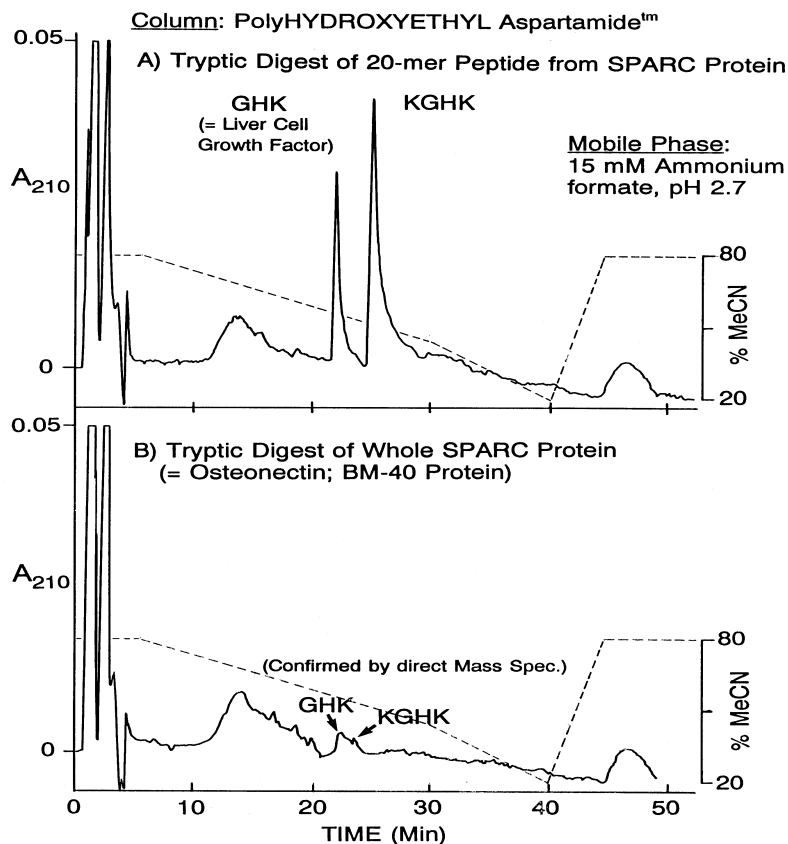
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## HILIC WITH A VOLATILE MOBILE PHASE



COURTESY TIM LANE (U. OF WASHINGTON)

## Hydrophilic Peptide

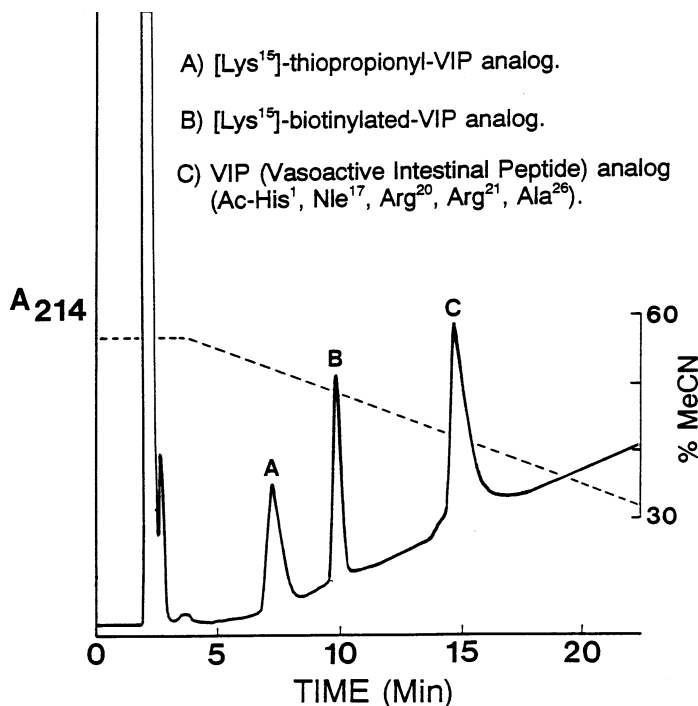
In the digest of Whole SPARC protein, the levels of peptides of interest were too low to yield discrete UV peaks. The use of volatile mobile phase permitted direct M/S analysis, which confirmed their presence.

Column: 204HY0501,  
4.6x200mm, 5µm 100A  
PolyHydroxyethyl A

## HILIC of VERY Hydrophobic Biotintylated Peptide

Using a Reversed Phase column, the components of this mixture were recovered with 5% yield. With HILIC recovery was quantitative and resolution complete

Column; PolyHydroxyethyl A  
200x4.6mm Cat. No. 204HY0503  
Gradient; Decreasing Acetonitrile  
with 50mM TEAP pH 2.8



(COURTESY ULRICH BICKEL & WM. PARDRIDGE, UCLA SCHOOL OF MEDICINE)



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# Size Exclusion (Aqueous) PolyHYDROXYETHYL A

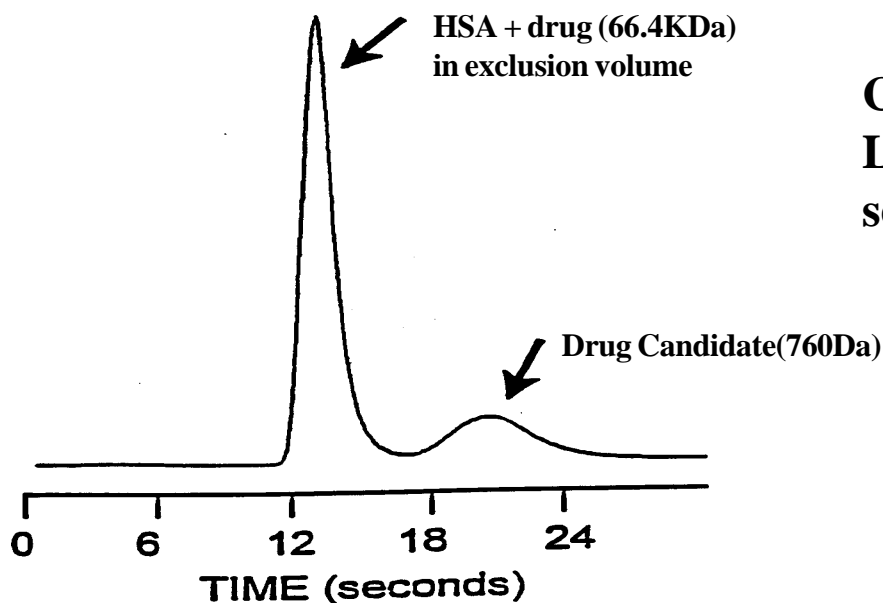
Each PolyHYDROXYETHYL A SEC column may be used in two different fractionation ranges, **merely by changing the mobile phase**. With conventional salt buffers, the fraction range is determined by the pore diameter of the packing. Nonspecific interaction with polypeptides are generally lower than with other SEC columns. If the mobile phase contains a denaturing agent (i.e. 50mM formic acid, or hexafluoro-2 Propanol(HFIP), then the sieving occurs between the polymer chains of the coating. This results in a dramatic shift of the fractionation range to lower values; solutes as small as formic acid can be separated by size. Moreover, these separations can be effected with volatile mobile phases for use with Mass specific and Light scatter detectors.

With our 60 A pore size column, the fractionation range is 20-600 daltons. This permits SEC of small solutes not possible heretofore. Examples include desalting a dipeptide, or separation of small solutes from a large excess of an even smaller derivatizing agent, and coupling reactions.

Use the PolyHYDROXYETHYL A SEC column for:

- 1) Routine SEC of proteins.
- 2) SEC of Polypeptides which exhibit nonspecific interaction or poor recovery from other SEC columns.
- 3) Resolution of the smallest peptides, Amino Acids and other solutes by size.
- 4) SEC in a volatile mobile phase for Mass Detection and Light Scatter Detection.
- 5) Desalting , including removal of derivatizing reagents.
- 6) Analysis of residual monomer content of a polymer..

For routine SEC applications, we recommend the 200x9.4mm columns which offer optimal separations at 0.5ml/min. Smaller columns can be used if the HPLC System can deliver low flow rates accurately (i.e. 120ul/min for the 4.6x200mm columns.)



**Combinatorial  
Library,  
screening in 24 Sec!**

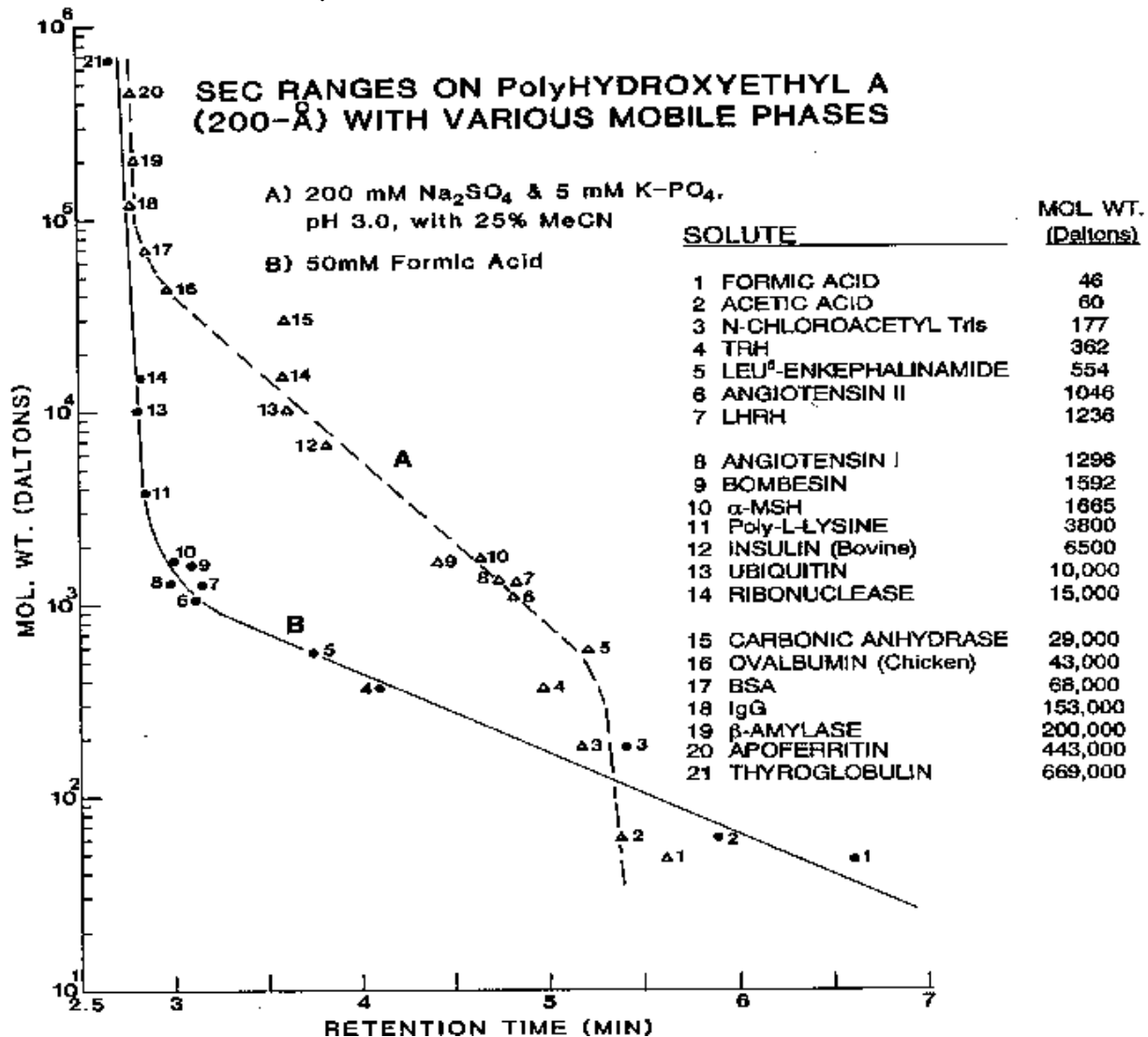
Column: 50x4.6mm; 5um;60A  
Mobile Phase; 50mM Na-PO<sub>4</sub>, pH 7.2 with 2% DMSO(v/v)  
Flow Rate; 2 ml/ml Detection 254A  
Sample; 10ul with 50uM of each solute  
Data courtesy of Krishna Kalghatigi, NeoGenesis Inc(Cambridge MA)



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## SEC Ranges on 200A PolyHydroxyethyl A



### SEC Fractionation Ranges(Daltons)

Pore Diameter	Denaturing Mobile Phase (e.g. 50mM Formic acid)	Conventional Mobile Phase (Phosphate/Sulfate Buffer)
60A	40-600	40- ?
200A	40-1,600	200-25,000
300A	40-40,000	300-100,000
500A	40-150,000	400-300,000
1000A	40-1,000,000	1,000-2,000,000



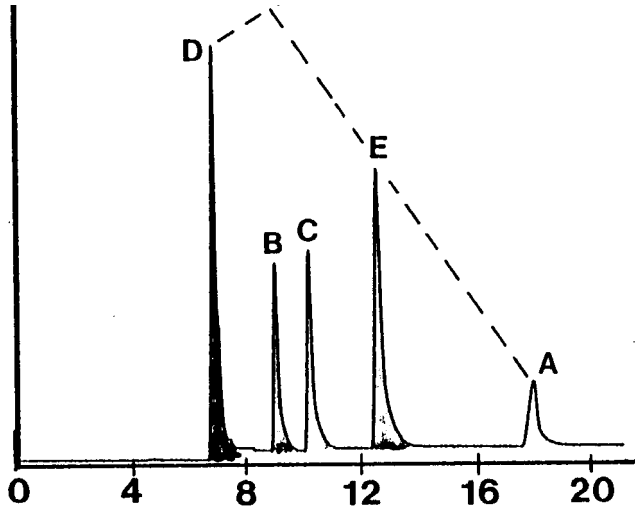
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## SEC of Amino Acids

Column; 209HY0502, 9.4x200mm, 5um 200A

Flow rate 1 ml/min

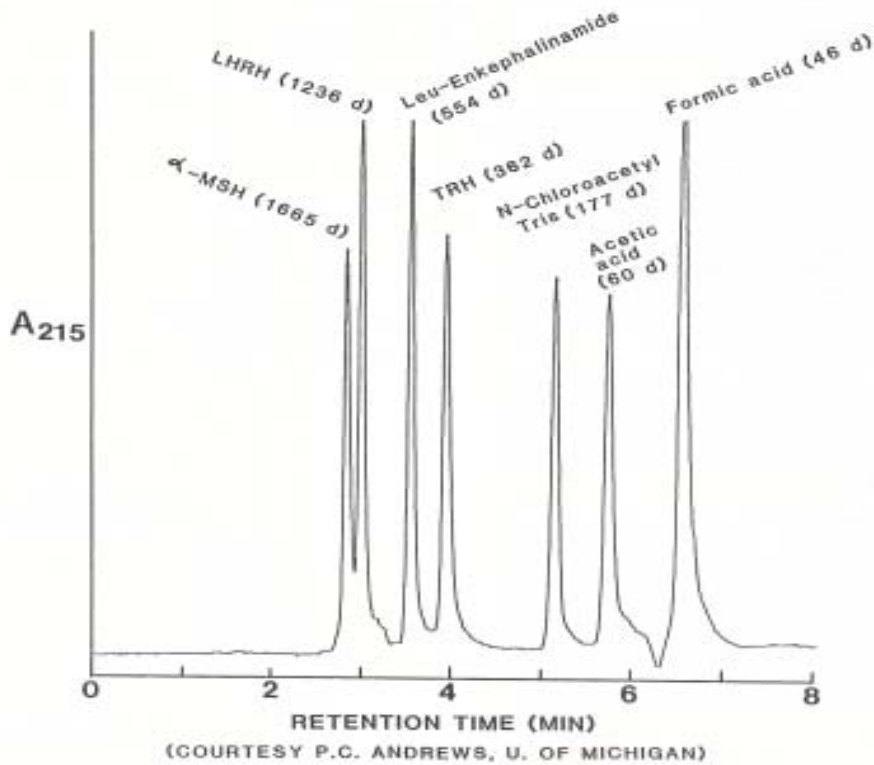
Detection A 215=.1AUFS

Mobile Phase; 10mM K-PO<sub>4</sub>, pH6.5 with  
50mM HFIP

Peaks, (A) Lys, (B) Gly, (C) Tyr, (D) Asp,  
(E) Trp

## PolyHYDROXYETHYL A, 200-Å

SEC with 50 mM Formic Acid



## SEC of Low Molecular Wt Standards

Column; 209HY0502,  
4.6x200mm, 5um, 200A pores  
flow rate 2.0 ml/min,  
Mobile phase; 20mM formic acid



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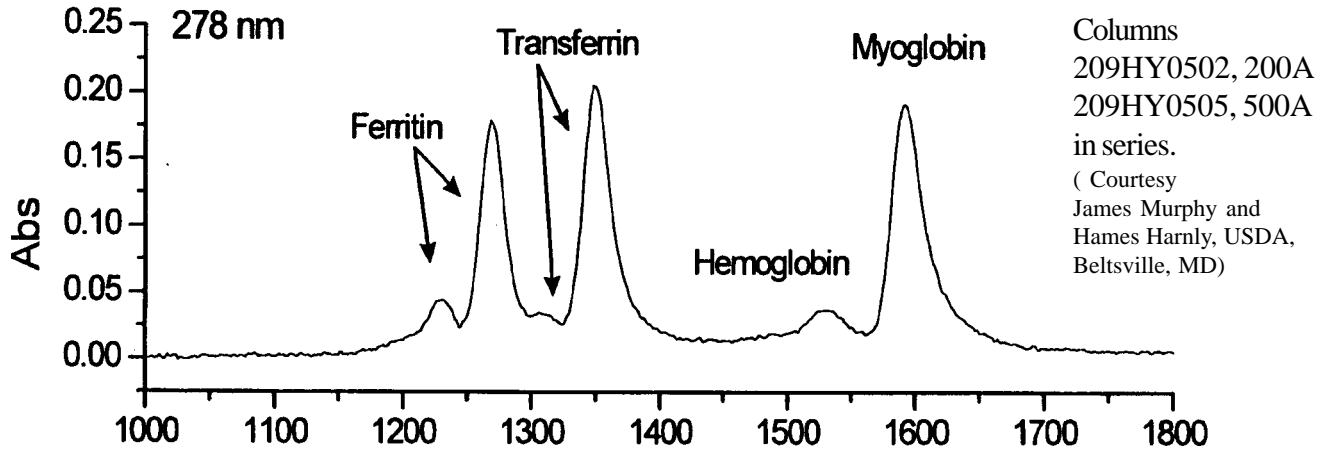
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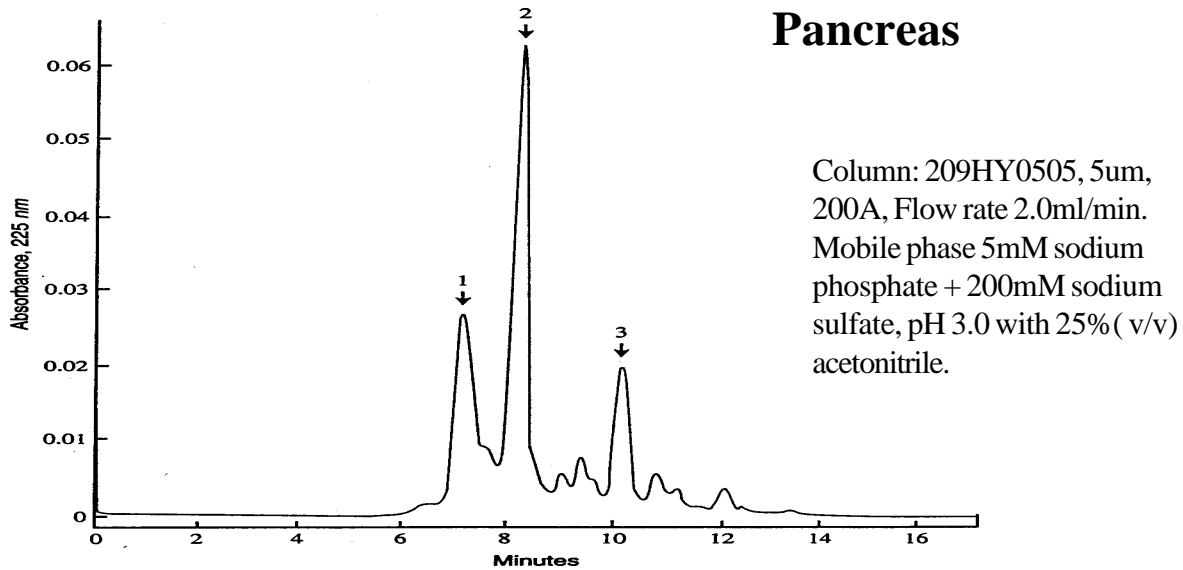
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## SEC of Iron-Containing Proteins in Meat



## SEC of Lamprey Pancreas



When performing SEC of peptides, one generally obtains the best correlation of retention times and molecular weights if the mobile phase is acidic and contains some organic solvent. Peaks: (1) Plasma lipid-binding protein(11,500Da); (2) Insulin(6241 Da), Glucagon (3900 Da) and Somatostatin-37(4052Da); and (3) Somatostatin-14(1623Da) ( Courtesy of P.C. Andrews, Univ of Michigan.)



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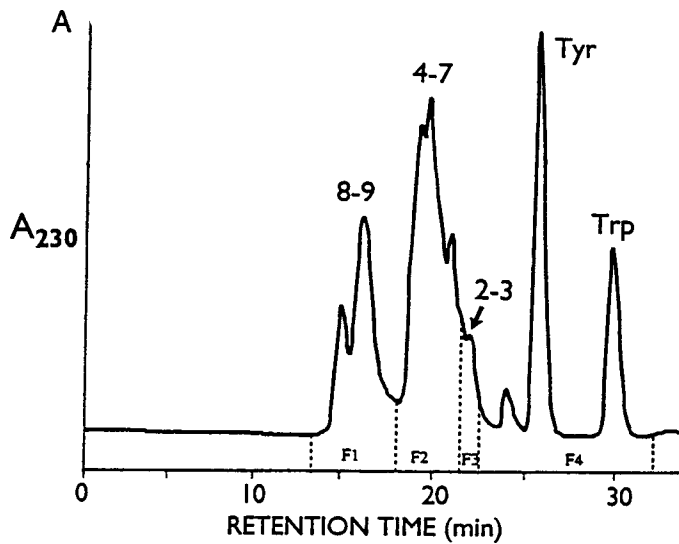
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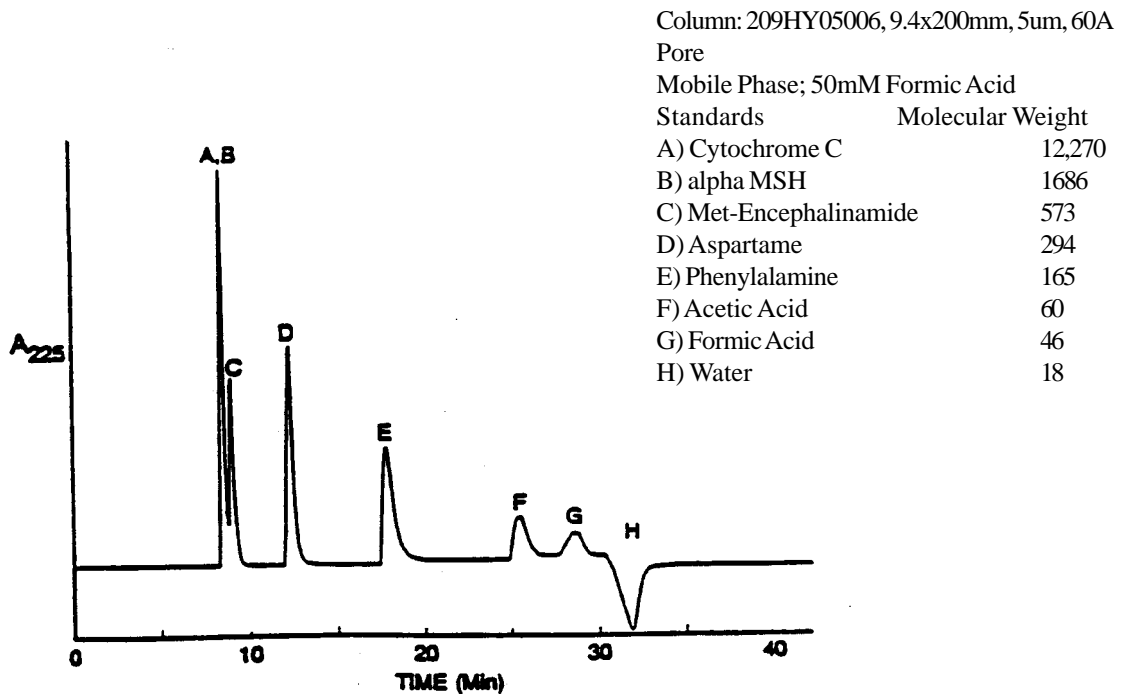
## SEC of Casein Hydrolyzate, (Pancreatin)



Column; 209HY0502,  
9.4x200mm, 5µm, 200A, Flow  
rate 0.5ml/min; Mobile phase  
50mM Formic acid.

Numbers above the peaks refer to the number of amino acid residues in the typical peptide in the indicated fraction. (Adapted from Silvestre et al. Copyright 1994, J Agric Food Chem, 42(1994) 2778)

## Small Solute SEC



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## PolySULFOETHYL Aspartamide- Strong Cation Exchange

This strong cation exchange (SCX) material was developed specifically for HPLC of peptides. At pH 2.7-3.0, peptides lose their (-) charges and have net (+) charge. They can be retained by a SCX column such as the PolySULFOETHYL A. With a salt gradient, peptides elute in order of increasing number of basic residues. The selectivity complements that of Reversed-Phase(RPC). The capacity is 5-10 fold greater than that of RPC and when used in series SCX and RPC will yield sequenceable peptides from most crude mixtures.

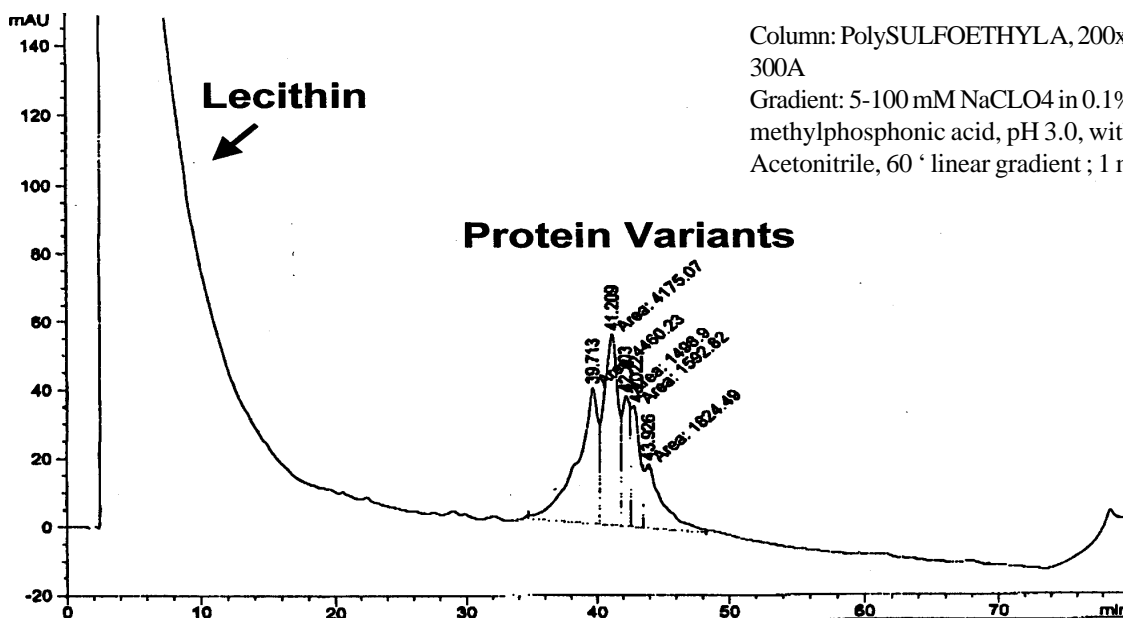
The hydrophilic aspartamide surface, when used with high organic mobile phases, allow mixed mode cation-exchange, combining SCX with hydrophilic interaction. Separation is achieved with electrostatic interaction and hydrophilic interaction.

### WHEN TO USE PolySULFOETHYL A:

- Mapping of peptides digests (tryptic, V-8, CNBR, etc) and isoforms.
- Purification of Synthetic peptides.
- Isolation of natural peptides from crude extracts.
- Specific isolation of disulfide-linked peptides from digests.
- Specific isolation of C-Terminal peptides.
- Assay of N- and C-terminal variant peptides and peptides with blocked termini.
- Quality control assay requiring a method orthogonal to RPC.

Most SCX strong cation exchangers use Sulfopropyl(-SP) groups. The hydrophobic interactions are significant with such groups, often resulting in poor recovery and efficiency with hydrophobic peptides. By contrast, PolySULFOETHYL A is based on sulfoethyl groups, and recovery of peptides is generally high and quantitative.

### Bovine Lung Surfactant Protein-Lecithin Strong Cation -Hydrophilic mixed mode



Column: PolySULFOETHYL A, 200x4.6mm, 5um, 300A

Gradient: 5-100 mM NaClO<sub>4</sub> in 0.1% methylphosphonic acid, pH 3.0, with 70% Acetonitrile, 60 ' linear gradient ; 1 ml/min



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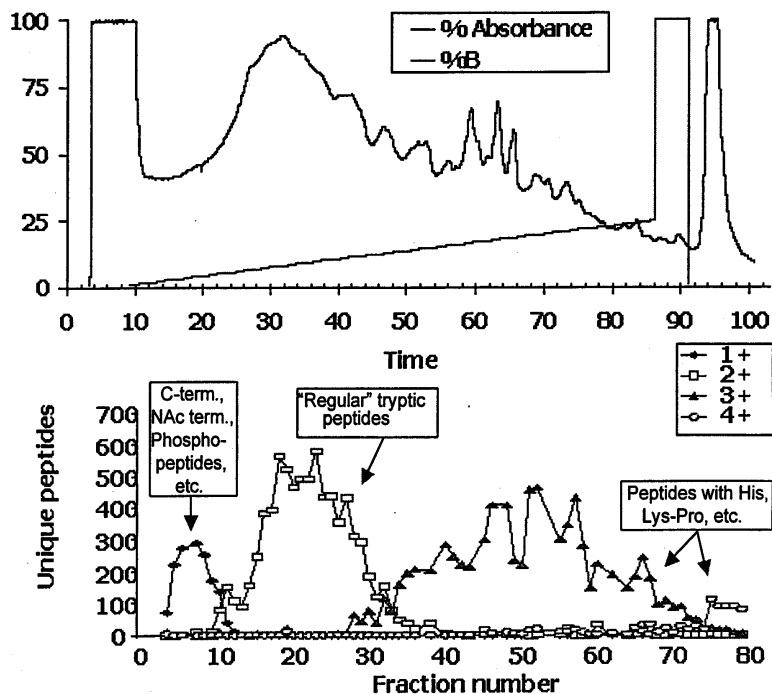
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## Charge vs. Retention 20

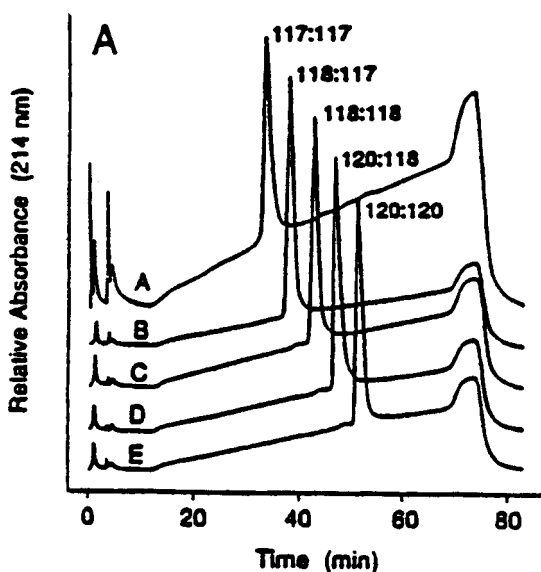


### Triptic Digest of HeLa Cell Nuclear Proteins

PolySULFOETHYLA is capable of pulling the +2 peptides away from the +1 peptides. This makes it possible to collect and identify peptides in the +1 group, which is enriched in phosphopeptides, C-terminal fragments, and other interesting peptides. Collecting fractions and re-running under the same conditions results in more successful identification of more peptides.

Column: Polysulfoethyl A, catalog number 202SE0502, 2x200mm, 5um, 200A  
 Courtesy of Steven Gygi, Harvard Medical School

### rhNerve Growth Factor (Dimers of C-Terminal Variants)



PolySULFOETHYLAspartamide can resolve large polypeptides that differ by a single residue. This makes it useful for quality control applications. The polypeptides in this example differ by single residues at the C-terminus.

Column: PolySULFOETHYLA  
 204SE0503, 200x4.6mm, 5um, 300A  
 Gradient: KCL gradient in K-PO4, pH 6.0 with MeCN  
 Courtesy C: Schmeltzer, (Genentech, Inc.)



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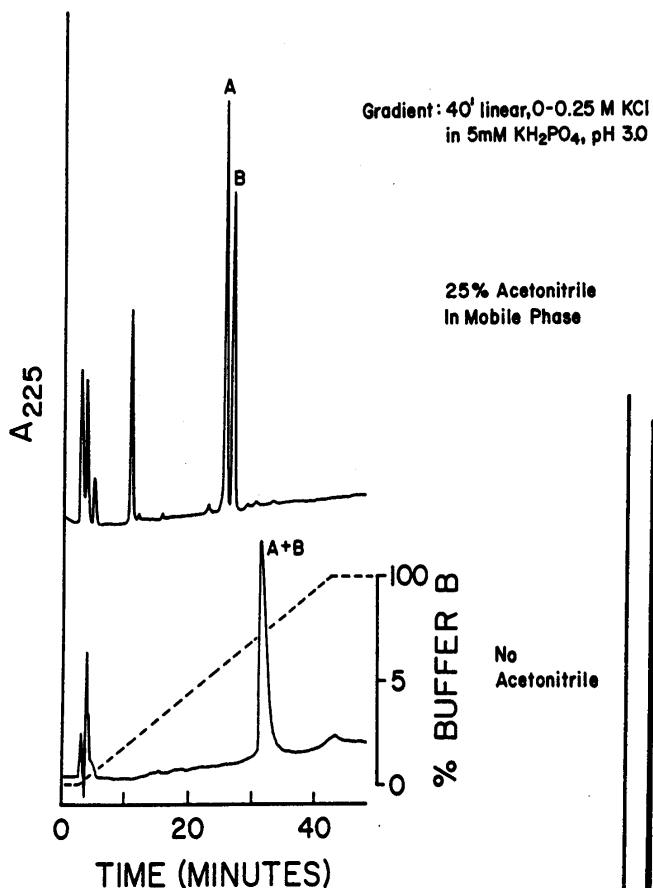
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## SUBSTANCE P ON PolySULFOETHYL A

A) Substance P, free acid

B) Substance P:



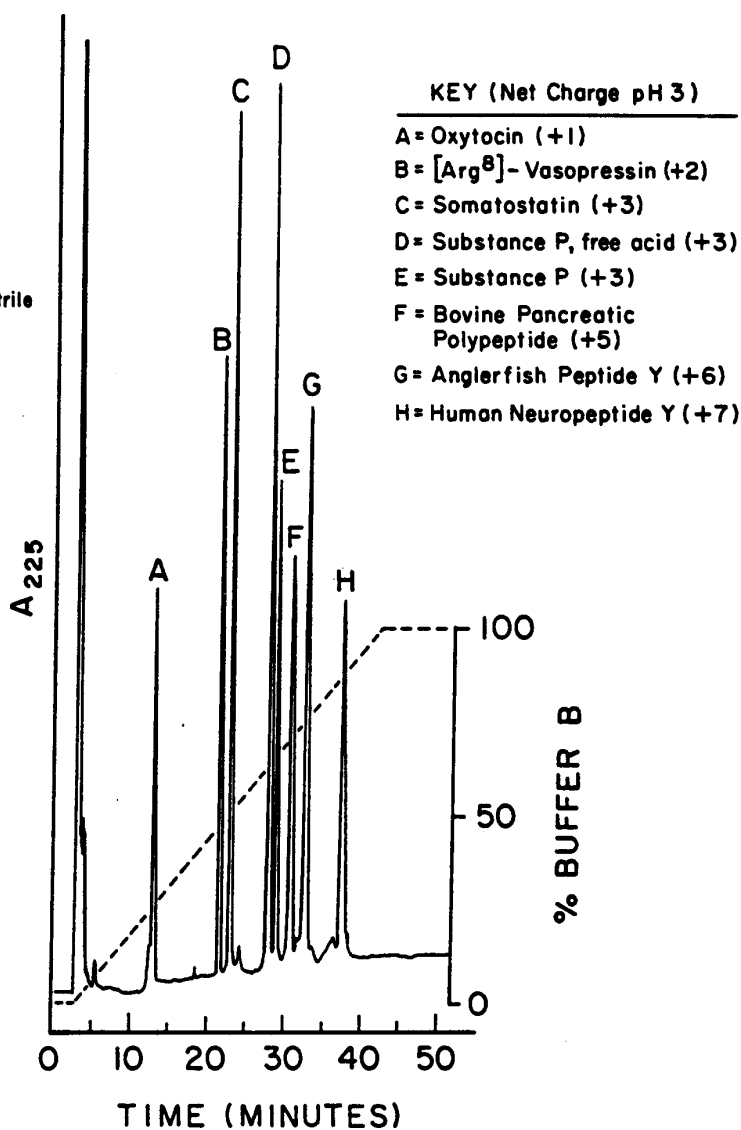
## Peptide Standards

Column; PolySULFOETHYL A, catalog  
number, 204SE0503, 5um, 300A,

A: 5mM potassium phosphate, pH 3.0

B: buffer A plus 0.25M potassium chloride,  
both buffers containing 25% v/v acetonitrile,  
flow rate 0.7ml/min, 50ul injected containing  
5ug of each peptide.

Effect of organic solvent on selectivity: Resolu-  
tion by strong cation-exchange chromatography  
of Substance P (peak B) from its free acid form  
(peak A). Column and conditions as described  
below.



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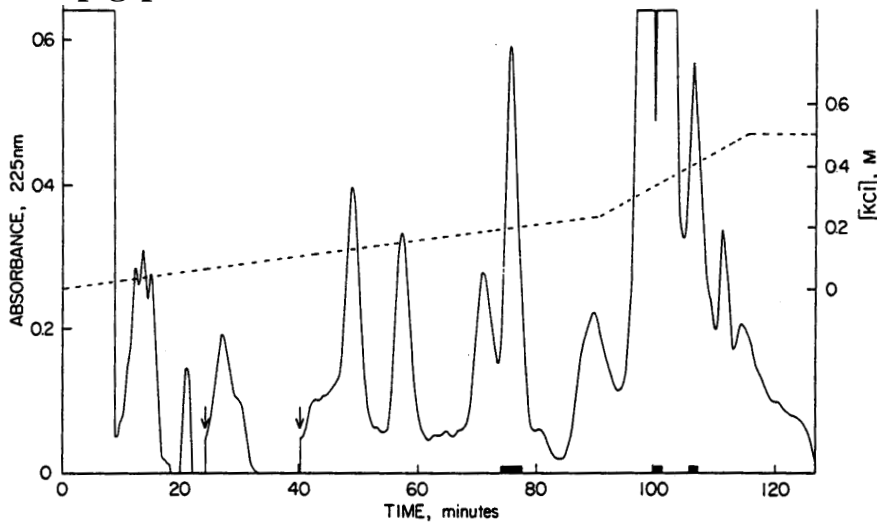
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## Preparative-Scale purification of polypeptides from an extract of 111 g of guinea pig pancreas



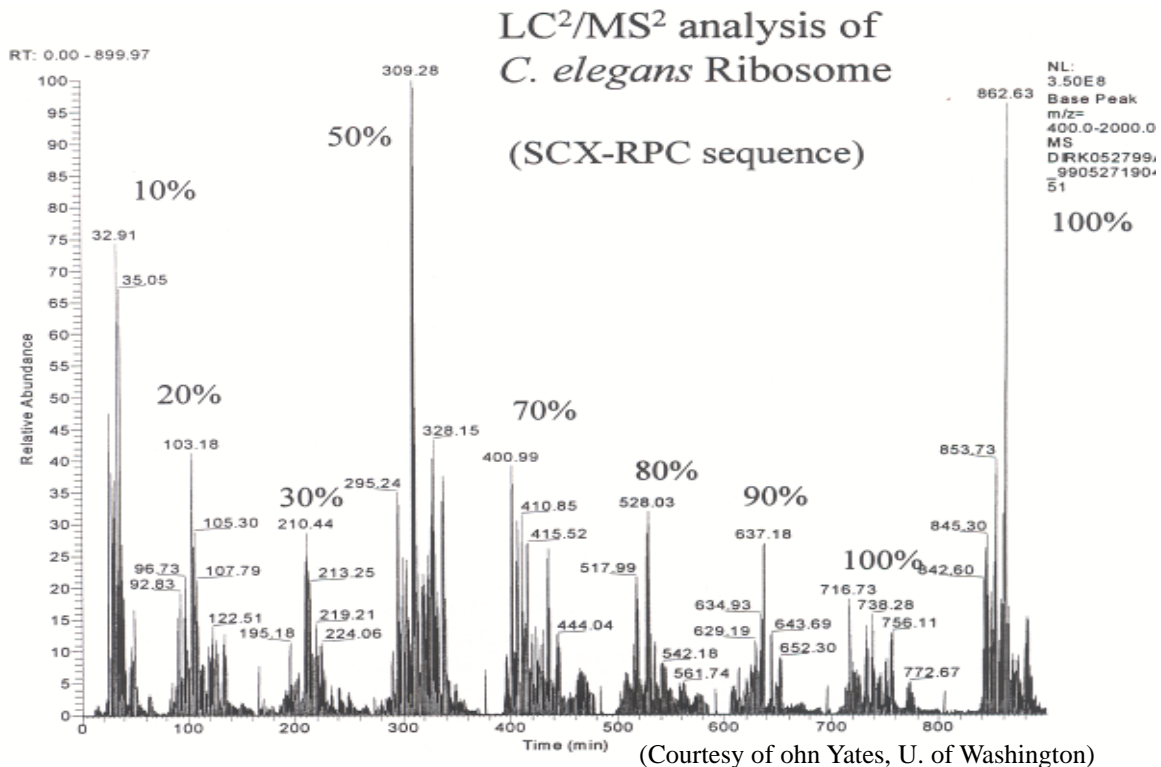
PolySULFOETHYLA;  
22x500mm, 15 $\mu$ m, 300A  
A: 5mM potassium phosphate,  
pH 3.0 with 25%  
(v/v) acetonitrile and a  
gradient of 0.5% potassium  
chloride as shown, flow rate  
30ml/min. Solid bars indicate  
fractions that were collected  
and rerun by RPC. (from  
Alpert, A.J. and Andrews, P.C.  
J. Chromatogr, 443, 85, 1988  
with permission.

## Proteome Analysis

### Triptic Digest of *C.elegans* Ribosome,

Strong Cation initial separation followed by RPC run as shown.

Step gradient of salt pulses are used to release sets of increasing basic peptides. Each set is resolved by RPC and analyzed by MS. 400-500 peptides in a sample can be identified this way



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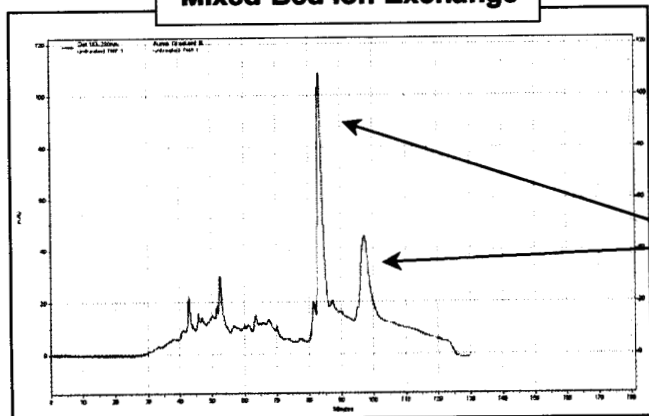
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## Dig Deep! Fractionate the Intact Proteins before Trypsinizing

Fractionating your proteins prior to bottom-up proteomics will significantly increase identification of proteins of low abundance. The reason is the same that accounted for the success of the Gygi group in identifying phosphopeptides: Distributing the low-abundance proteins into smaller sets will make it easier to identify their peptides, especially if they're separated from the proteins of high abundance. If the resulting increase in the number of fractions creates problems with throughput, then collect less fractions at the SCX step after trypsinization and more fractions prior to trypsinization. The following are examples of how one might implement this approach:

### Mixed-Bed Ion-Exchange



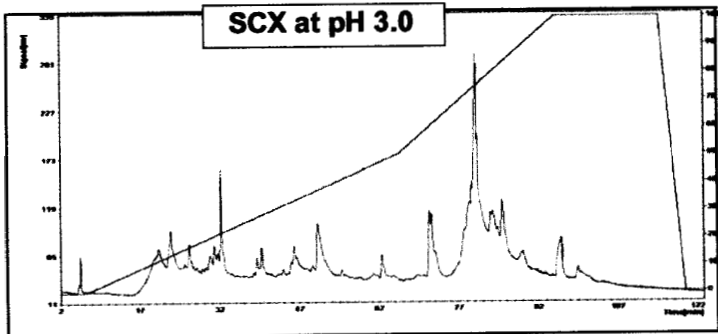
**SAMPLE:** Lysate of THP-1 Monocytes  
**COLUMN:** Anion- and cation-exchangers in series (PolyWAX LP & PolyCAT A; items# 104WX0510 & 104CT0510; 1000-Å).

NaClO<sub>4</sub> gradient, pH 6.

With mixed-bed ion-exchangers in series, all proteins are retained.

Two proteins are present in very high abundance. These should be collected in their own fractions so that their peptides don't mask those from low-abundance proteins. NOTE: Affinity columns designed for plasma proteins won't help here!

### SCX at pH 3.0

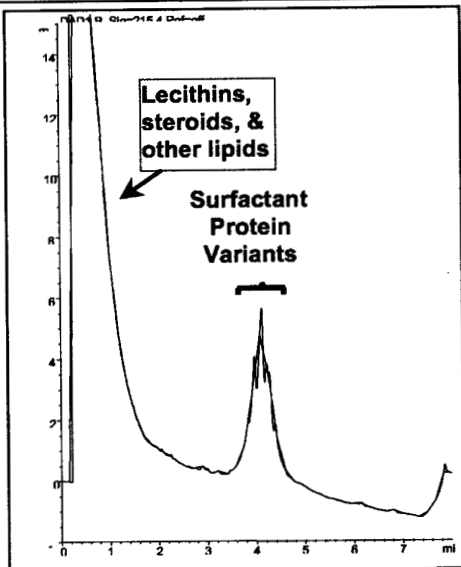


**SAMPLE:** Liver homogenate  
**COLUMN:** PolySULFOETHYL A, item# 204SE0510 (1000-Å)

NaCl gradient, pH 3, with 20% ACN/PrOH

An intriguing alternative. Like peptides, proteins have a net + charge at pH 3 and are retained in SCX. Be sure to use 1000-Å pore material; proteins are big molecules!

### SCX in organic solvent



**SAMPLE:** Lung surfactant protein in an emulsion with 500 parts lipid.  
**COLUMN:** PolySULFOETHYL A, item# 204SE0510 (1000-Å)

NaClO<sub>4</sub> gradient in 70% ACN, pH 3.

The same approach also works for water-insoluble proteins. It is necessary to add appreciable organic solvent and use chaotropes such as NaClO<sub>4</sub> and HFIP. Under these conditions, the column operates in a IEX-HILIC mixed mode. Neither lipids nor detergents are retained, but proteins are.



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# Hydrophobic Interaction Chromatography of Proteins and Peptides

**PolyPROPYL Aspartamide™**

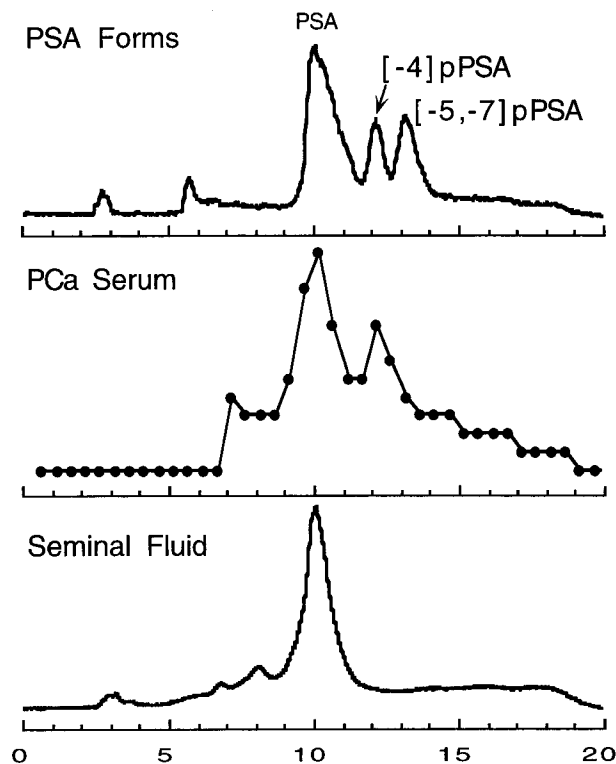
**PolyETHYL Aspartamide™**

**PolyMETHYL Aspartamide™**

These materials separate proteins on the basis of hydrophobic character, as does Reversed-Phase Chromatography. HIC uses totally aqueous buffers, maintaining tertiary structure and biological activity. Typically, a sample is eluted with a decreasing gradient of a salt such as sulfate or phosphate. Proteins elute in order of increasing surface hydrophobicity. Surfactants (e.g. CHAPS, octylglucoside) can be added to the mobile phase if necessary. The relative hydrophobic character of PolyPROPYLA, PolyETHYLA and PolyMETHYLA is 100, 60, and 15 respectively.

## WHEN TO USE HIC

- 1) Characterization of antibodies.
- 2) Purification of polypeptides such as glycopeptides and venoms.
- 3) Isolation of proteins from crude extracts.
- 4) Quality control assay using a method complementary to ion-exchange and Reversed-Phase.
- 5) Isolation of integral membrane proteins and their complexes.



## PSA Forms

**PSA Forms in prostate cancer (PCa) serum and seminal fluid.**

**Top Panel;** Profile of a mixture of PSA forms prepared with individually purified recombinant PSA as detected at A280. Recombinant active PSA was prepared from pPSA by treatment with 1% trypsin.

**Middle Panel;** PSA Forms in pooled PCa serum (63ng/ml total PSA) eluted from PSM773 immunoaffinity column. HIC-HPLC column fractions were analyzed by Tandem-MP free PSA assay. The Maximum peak height is 12ng/ml. PSA Activity at 12 minutes is consistent with (-4)pPSA

**Bottom Panel;** Seminal fluid PSA forms eluted from PSM773 immunoaffinity column as detected by A280. No precursor forms of PSA were detected.



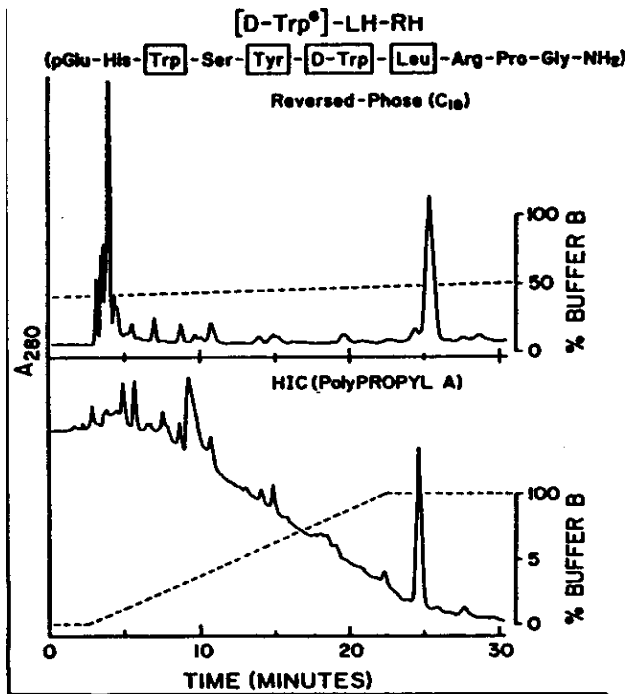
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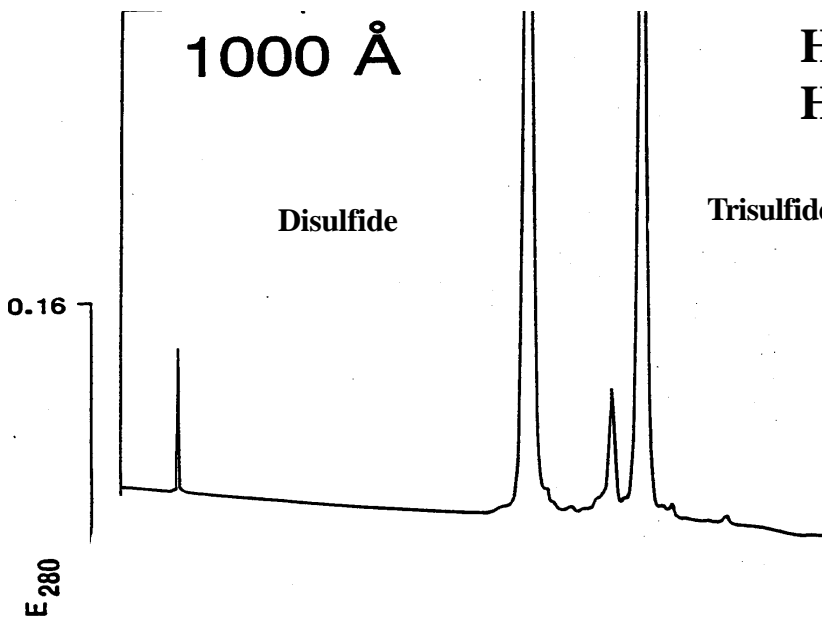
## HF Cleavage of synthetic{D-Trp<sup>6</sup>}- LHRH (peak at 25 minutes)

The Hydrophobic residues are in Boxes

Column: 204PR0503

A: 2M ammonium sulfate + .1M potassium phosphate, pH 7.0

B: .1M potassium phosphate, pH 7.0  
 gradient linear, 0-10% B in 20 minutes..7ml/min,  
 RPC Vydac 218TP104



## HGH( Human Growth Hormone)



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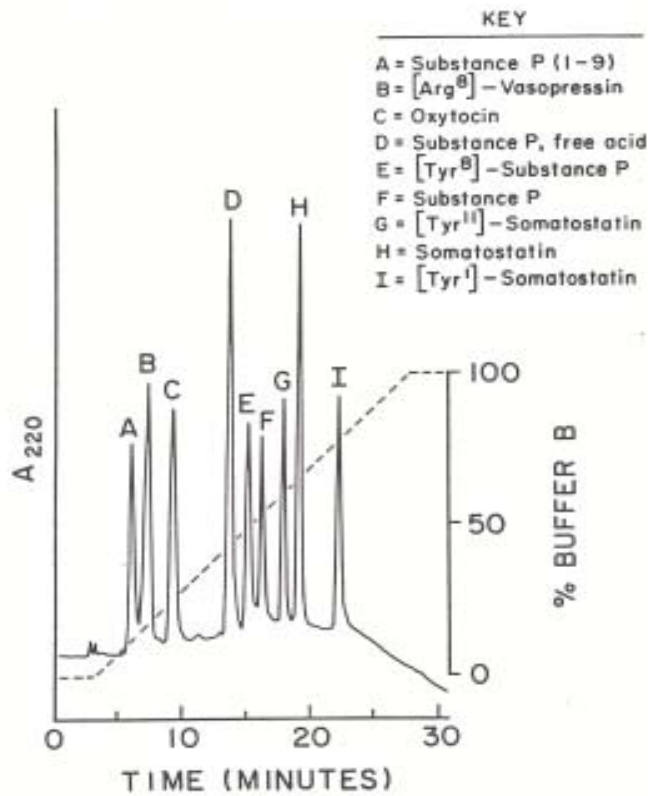
## Peptide Standards

Column: PolyPROPYLA, 5 $\mu$ m, 4.6x200mm

Buffer A: 2M Ammonium Sulfate+

25mM K-PO<sub>4</sub>, pH 6.5

Buffer B: 25mM K-PO<sub>4</sub>, pH 6.5



## High-Performance HIC of Proteins

Column: 204PR050, PolyPROPYLA

4.6x200mm 5 $\mu$ m, 300A

A: 1.8M ammonium sulfate + 0.1M potassium phosphate, pH 7.0

B: 0.1 M potassium phosphate, pH 7.0

Gradient 40 min linear, 0-100% buffer B

1 ml/min, detection 220 nm

### PEAKS

a= cytochrome

b=ribonuclease A

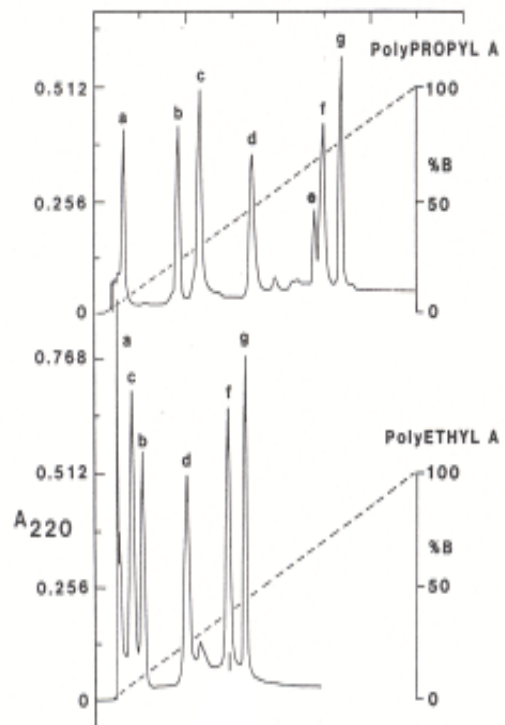
c= myoglobin

d= conalbumin

e= neochymotrypsin

f= alpha-chymotrypsin

g=alpha-chymotrypsinogen A



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## PolyWAX LP Anion-Exchange of Proteins

Most proteins have isoelectric points below 7, and are best purified or analyzed by anion-exchange chromatography. PolyWAX LP is a weak anion-exchange (WAX) material developed for chromatography of enzymes and other proteins. Selectivity is excellent, with high or quantitative recovery of applied activity. PolyWAX LP can be used in the mixed mode in the Hydrophilic -Anion exchange mode by adding some organic solvents in the mobile phase. This technique has been used for some membrane proteins. Most Anion-exchange materials based on polyethyleneimine(PEI) are prepared with the conventional branched polymer. PolyWAX LP is prepared with linear PEI, which confers greater selectivity and recovery. PolyWAX LP is also used for anion-exchange of acidic small molecules such as a red dye #2 and #40, benzoate and sorbate in fruit juice.

### LDH ISOENZYMES

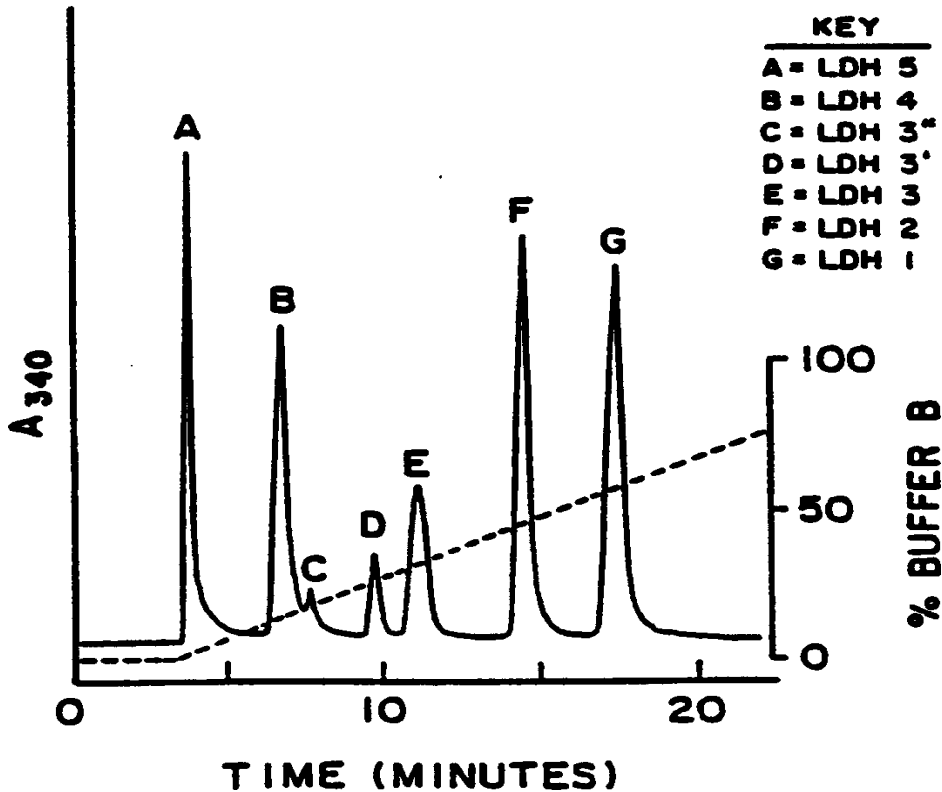
**Column:** PolyWAX LP, 5 micron; 4.6 x 100 mm

**Sample:** Rat kidney homogenate

**Detection:** Post-column reaction,  
lactate + NAD  $\rightarrow$  pyruvate + NADH

**Buffer A:** 20mM Tris-acetate, pH 7.9

**Buffer B:** Same + 0.5 M sodium acetate



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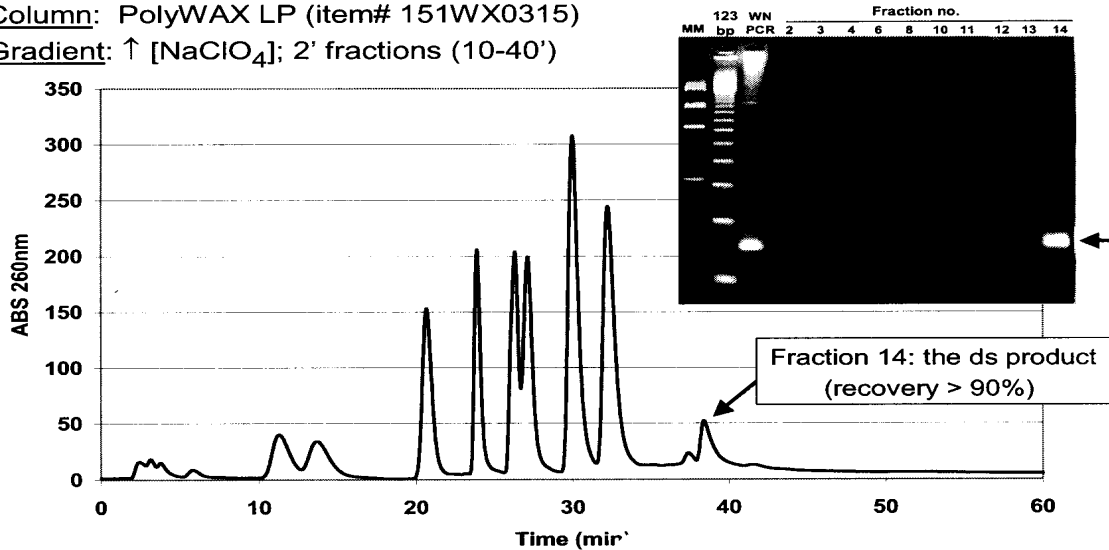
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## Double-Stranded DNA; PCR Reaction Mix (West Nile Virus template; 202-bp GC-rich product)

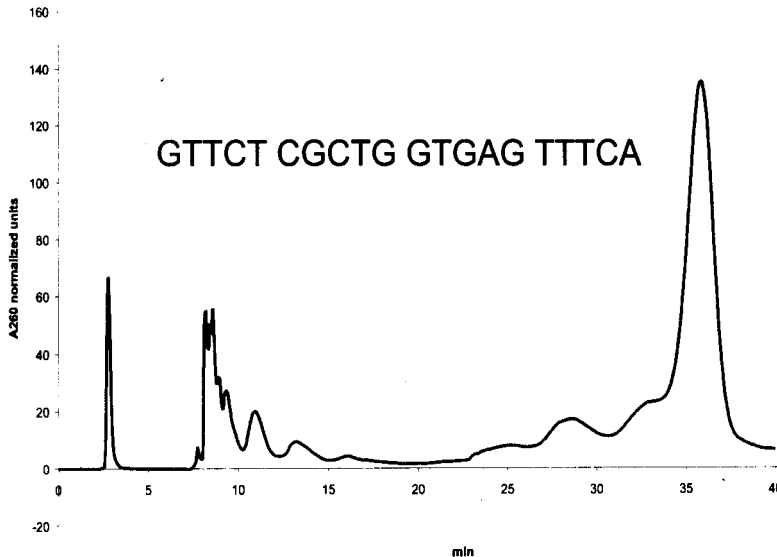
Column: PolyWAX LP (item# 151WX0315)

Gradient:  $\uparrow$  [NaClO<sub>4</sub>]; 2' fractions (10-40')



courtesy of Raquel Hernandez and Steevenson Nelson (North Carolina St Univ)

## Crude phosphorothioate: *Good selectivity for failure sequences*



COLUMN: 104WX0315

Flow rate: 0.5 ml/min

Temp: Ambient

Sample: 1.7  $\mu$ g/25  $\mu$ l

Mobile Phase: A) 25 mM

Tris, pH 8, with 30% ACN

B) 1 M NaClO<sub>4</sub> in A

Gradient: 0-3': 0% B

3-4': 0-60% B

4-34': 60-100% B

34-38': 100% B



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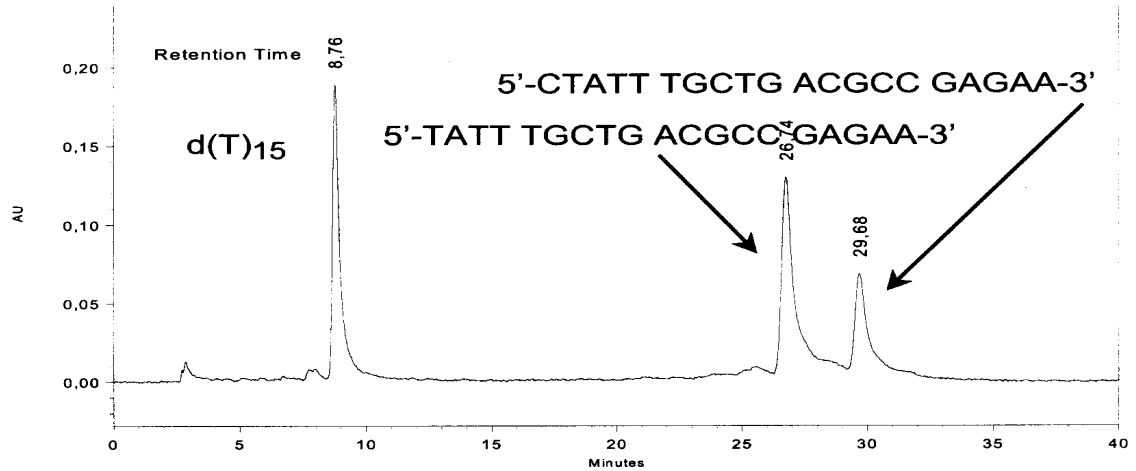
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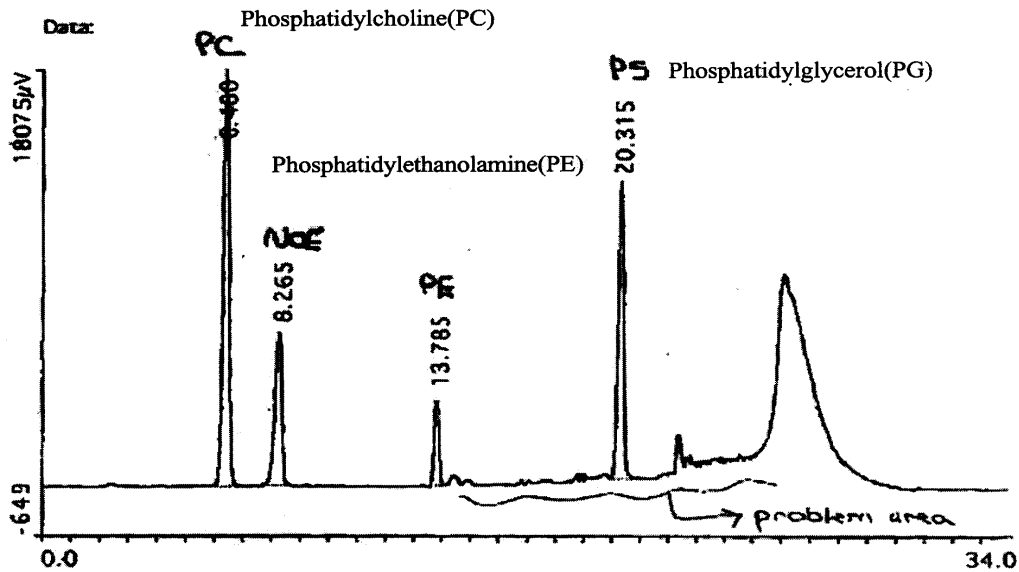
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## Oligonucleotides by Size



Column: PolyWAX LP, 100x4.6mm, 3 $\mu$ m, 1500A (#104WX0315)  
 Mobile phase: A) 25mM Tris-HCL, pH 8.0, with 30% ACN; B) Same + 1M NaCl  
 Gradient: 60-100B in 50'. Flow rate 0.5ml/min. Temp 60 C, Detection A260

## Phospholipids by HILIC on Anion Exchanger PolyWAX LP



Column: PolyWAX LP ,Catalog number 204WX0503, 4.6x200mm, 5 $\mu$ m, 300A

Buffer A: 95% Acetylnitrile, 5mM Ammonium formate(straight from bottle, filtered)  
 Buffer B: 50% Acetylnitrile , with 5mM Ammonium formate,  
 pH does not need to be adjusted, but will be around pH 6.5, and the buffers can be pre-mixed then run  
 gradient from 100% A to 100B.  
 Detector: ELSD at 115C



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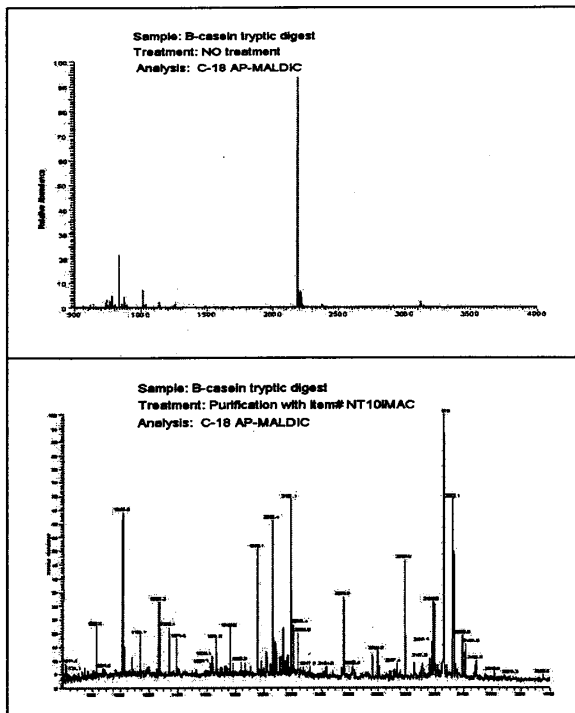
# Lab-in-a-Tip™

**Lab-in-a-Tip is a New Concept for:  
Sample Cleanup, Enzyme Reactions, Affinity Chromatography, Binding Assays &  
Many More Applications**

## NuTip™

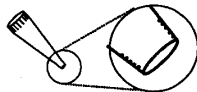
Sample volumes of 0.1 – 10µl and 10-200µl

NuTips are revolutionary SPE cartridges in which the chromatography material is embedded in the inner surface of a pipette tip. This maximizes the surface area in contact with the sample. The lack of polymers or glue for embedding the material avoids potential problems with contamination or tip-to-tip differences in permeability.



### Binding Capacity of Different Products

Product	Capacity*	Amt of Material*
NuTip 0.1-10µl	1µg	0.03mg
NuTip 10-200µl	2 µg	0.12mg
TopTip 1-10µl	200µg	5mg
TopTip 10-200µl	500 µg	12mg

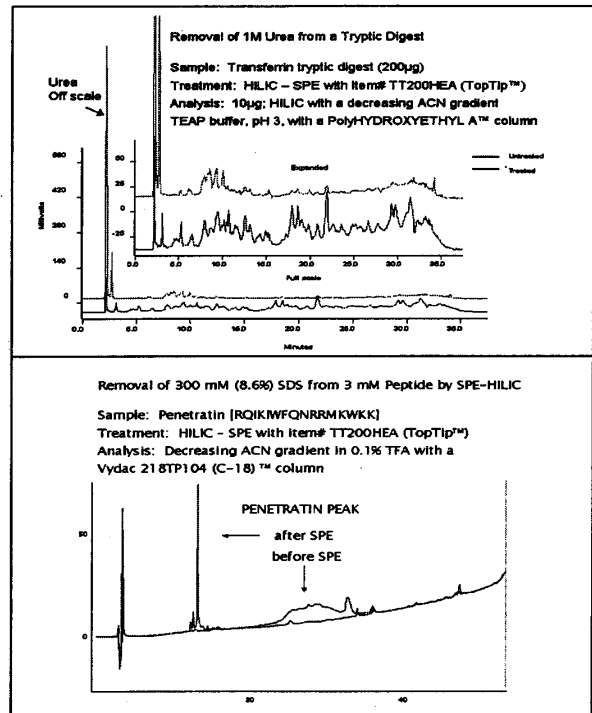


\* Capacity and amt of material may vary depending on solutes used and the density of the packing material. Above table is based on C-18 coated silica (300Å)[density=0.5cc/g] and peptide standards.

## TopTip™

Sample volumes of 1 – 10µl and 10 – 200µl

TopTips are revolutionary filterless SPE cartridges based on a pipette tip with a 1-2 µm slit at the bottom. This slit permits liquid to pass through but retains the chromatographic material (20-30 µm) in the tip. TopTips eliminate the need for a filter; thus, no dead volume. Contains just your desired chromatography material; nothing else!



### Packing Materials Available for Both Tips

Silica, C-4, C-8, C-18, graphitic carbon, WCX, SCX, WAX, SAX, polymer-based hydrophobic (POROS), gel filtration, and hydrophilic interaction (HILIC).

- \*Faster sample preparation
- \*Minimal sample loss
- \*No contamination due to a supporting matrix
- \*Manipulation of volumes as small as 1µl
- \*Cleaner samples



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## Lab-in-a-Tip Price list

Chromatographic Media	NuTip (0.1-10 ml)	NuTip (10-200 µl)	TopTip (1-10 µl)	TopTip (10-200 µl)	SyringeTip
	Pack of 96	Pack of 96	Pack of 96	Pack of 96	Pack of 96
	Part No. / Price	Part No. / Price	Part No. / Price	Part No. / Price	Part No. / Price
Silica	NT10SI / \$125.00	NT200SI / \$145.00	TT10SI / \$165.00	TT200SI / \$175.00	STSI / \$145.00
C-18	NT10C18 / \$125.00	NT200C18 / \$145.00	TT10C18 / \$165.00	TT200C18 / \$175.00	STC18 / \$145.00
C-08	NT10C08 / \$125.00	NT200C08 / \$145.00	TT10C08 / \$165.00	TT200C08 / \$175.00	STC08 / \$145.00
C-04	NT10C04 / \$125.00	NT200C04 / \$145.00	TT10C04 / \$165.00	TT200C04 / \$175.00	STC04 / \$145.00
CN	NT10CN / \$125.00	NT200CN / \$145.00	TT10CN / \$165.00	TT200CN / \$225.00	STCN / \$145.00
NH2	NT10NH2 / \$125.00	NT200NH2 / \$145.00	TT10NH2 / \$165.00	TT200NH2 / \$225.00	STNH2 / \$145.00
Carbon (HyperCarb)	NT10CAR / \$155.00	NT200CAR / \$185.00	TT10CAR / \$195.00	TT200CAR / \$265.00	STCAR / \$145.00
C18 + Carbon (HyperCarb)	NT10MC18 / \$155.00	NT200MC18 / \$185.00	TT10MC18 / \$195.00	TT200MC18 / \$265.00	STMC18 / \$145.00
Titania	NT10TIO / \$155.00	NT200TIO / \$185.00	TT10TIO / \$195.00	TT200TIO / \$265.00	STTIO / \$145.00
POROS RP-1	NT10PR1 / \$155.00	NT200PR1 / \$185.00	TT10PR1 / \$195.00	TT200PR1 / \$265.00	STPR1 / \$145.00
POROS RP-2	NT10PR2 / \$155.00	NT200PR2 / \$185.00	TT10PR2 / \$195.00	TT200PR2 / \$265.00	STPR2 / \$145.00
POROS weak anion exchanger	NOT AVAILABLE	NOT AVAILABLE	TT10PWA / \$165.00	TT200PWA / \$225.00	NOT AVAILABLE
POROS strong anion exchanger	NOT AVAILABLE	NOT AVAILABLE	TT10PSA / \$165.00	TT200PSA / \$225.00	NOT AVAILABLE
POROS strong cation exchanger	NOT AVAILABLE	NOT AVAILABLE	TT10PSC / \$165.00	TT200PSC / \$225.00	NOT AVAILABLE
POROS IMAC	NT10IMAC / \$155.00	NT200IMAC / \$195.00	TT10IMAC / \$195.00	TT200IMAC / \$265.00	STIMAC / \$145.00
PolyCAT A	NT10CAT / \$125.00	NT200CAT / \$145.00	TT10CAT / \$165.00	TT200CAT / \$225.00	STCAT / \$145.00
PolyHYDROXYETHYL A (HILIC)	NT10HEA / \$125.00	NT200HEA / \$145.00	NT10HEA / \$165.00	TT200HEA / \$225.00	STHEA / \$145.00
PolySULFOETHYL A (SCX)	NT10SSA / \$125.00	NT200SSA / \$145.00	TT10SSA / \$165.00	TT200SSA / \$225.00	STSSA / \$145.00
SDS-Removal	NT10SDS / \$125.00	NT200SDS / \$145.00	TT10SDS / \$165.00	TT200SDS / \$225.00	NOT AVAILABLE
PolyWAX LP (WAX)	NT10WAX / \$125.00	NT200WAX / \$145.00	TT10WAX / \$165.00	TT200WAX / \$225.00	STWAX / \$145.00
<b>Affinity Media</b>					
Silica IMAC	NT10SIMAC / \$155.00	NT200SIMAC / \$195.00	TT10SIMAC / \$195.00	TT200SIMAC / \$265.00	STSIMAC / \$145.00
Ni	NT10NIA / \$165.00	NT200NIA / \$195.00	TT10NIA / \$195.00	TT200NIA / \$265.00	STNIA / \$185.00
Fe	NT10FEA / \$165.00	NT200FEA / \$195.00	TT10FEA / \$195.00	TT200FEA / \$265.00	STFEA / \$185.00
Ga	NT10GAA / \$165.00	NT200GAA / \$195.00	TT10GAA / \$195.00	TT200GAA / \$265.00	STGAA / \$185.00
Ca	NT10CAA / \$165.00	NT200CAA / \$195.00	TT10CAA / \$195.00	TT200CAA / \$265.00	STCAA / \$185.00
Protein A	NT10PROA / \$165.00	NT200PROA / \$225.00	TT10PRA / \$225.00	TT200PRA / \$295.00	NOT AVAILABLE
Protein G	NOT AVAILABLE	NOT AVAILABLE	TT10PRG / \$255.00	TT200PRG / \$295.00	NOT AVAILABLE
Lectin: ConA	NOT AVAILABLE	NOT AVAILABLE	TT10CONA / \$255.00	TT200CONA / \$295.00	NOT AVAILABLE
Lectin: WGA	NOT AVAILABLE	NOT AVAILABLE	TT10WGA / \$355.00	TT200WGA / \$455.00	NOT AVAILABLE
<b>Immobilized Enzymes</b>					
Trypsin	NT10TRY / \$165.00	NT200TRY / \$225.00	TT10TRY / \$265.00	TT200TRY / \$365.00	NOT AVAILABLE
Trypsin (porozyme)	NOT AVAILABLE	NOT AVAILABLE	TT10PRZ / \$345.00	TT200PRZ / \$485.00	NOT AVAILABLE
Trypsin + C-18	NT10C18TRY / \$165.00	NT200C18TRY / \$225.00	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE
Trypsin + Carbon	NT10CARTRY / \$165.00	NT200CARTRY / \$225.00	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE
Sialidase	NOT AVAILABLE	NOT AVAILABLE	TT10SIA / \$355.00	TT200SIA / \$555.00	NOT AVAILABLE
<b>Gel-Filtration Media</b>					
G-10	NOT AVAILABLE	NOT AVAILABLE	TT10G10 / \$95.00	TT200G10 / \$95.00	NOT AVAILABLE
G-25	NOT AVAILABLE	NOT AVAILABLE	TT10G25 / \$95.00	TT200G25 / \$95.00	NOT AVAILABLE
G-50	NOT AVAILABLE	NOT AVAILABLE	TT10G50 / \$95.00	TT200G50 / \$95.00	NOT AVAILABLE
P-2	NOT AVAILABLE	NOT AVAILABLE	TT10P2 / \$95.00	TT200P2 / \$95.00	NOT AVAILABLE
P-4	NOT AVAILABLE	NOT AVAILABLE	TT10P4 / \$95.00	TT200P4 / \$95.00	NOT AVAILABLE



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WWW.WesternAnalytical.com

**CAPILLARIES - Ea**

**PolyCAT A**

**PolyETHYL A**


**PolyMETHYL A**

Particle Size - 5µm

CT

ET

ME

Å Available 

-03, -10, -15

-03, -10

-03, -10

50mm x 150µm	050.15CT05	450.00	050.15ET05	450.00	050.15ME05	450.00
100mm x 150µm	100.15CT05	500.00	100.15ET05	500.00	100.15ME05	500.00
150mm x 150µm	150.15CT05	550.00	150.15ET05	550.00	150.15ME05	550.00

50mm x 300µm	050.30CT05	450.00	050.30ET05	450.00	050.30ME05	450.00
100mm x 300µm	100.30CT05	500.00	100.30ET05	500.00	100.30ME05	500.00
150mm x 300µm	150.30CT05	550.00	150.30ET05	550.00	150.30ME05	550.00

Particle Size 3µm

COLUMNS -Ea

Å Available 

-03, -10, -15

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50 x 1.0mm	051CT03--	450.00				
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100 x 2.1mm	102CT03--	540.00				
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35 x 4.6mm	3.54CT03--	420.00				
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100 x 4.6mm	104CT03--	540.00				
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100 x 9.4mm	109CT03--	1060.00				
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Particle Size - 5µm

Å Available 

-02, -03, -10

-03, -10

-03, -10

50 x 1.0mm	051CT05--	450.00	051ET05--	450.00	051ME05--	450.00
150 x 1.0mm	151CT05--	580.00	151ET05--	580.00	151ME05--	580.00

35 x 2.1mm	3.52CT05--	380.00	3.52ET05--	380.00	3.52ME05--	380.00
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100 x 2.1mm	102CT05--	455.00	102ET05--	455.00	102ME05--	455.00
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200 x 2.1mm	202CT05--	540.00	202ET05--	540.00	202ME05--	540.00
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50 x 4.0mm	054.0CT05-	395.00	054.0ET05-	395.00	054.0ME05	395.00
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100 x 4.0mm	104.0CT05-	455.00	104.0ET05-	455.00	104.0ME05	455.00
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35 x 4.6mm	3.54CT05--	380.00	3.54ET05--	380.00	3.54ME05--	380.00
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50 x 4.6mm	054CT05--	395.00	054ET05--	395.00	054ME05--	395.00
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100 x 4.6mm	104CT05--	455.00	104ET05--	455.00	104ME05--	455.00
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200 x 4.6mm	204CT05--	540.00	204ET05--	540.00	204ME05--	540.00
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100 x 9.4mm	109CT05--	850.00	109ET05--	850.00	109ME05--	850.00
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200 x 9.4mm	209CT05--	1060.00	209ET05--	1060.00	209ME05--	1060.00
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250 x 9.4mm	259CT05--	1120.00	259ET05--	1120.00	259ME05--	1120.00
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250 x 21mm	2521CT05--	3450.00	2521ET05--	3450.00	2521ME05-	3450.00
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Particle Size - 12µm

Å Available 

-03, -15

-03, -15

-03, -15

200 x 4.6mm	204CT12--	320.00	204ET12--	320.00	204ME12--	320.00
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200 x 9.4mm	209CT12--	760.00	209ET12--	760.00	209ME12--	760.00
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250 x 9.4mm	259CT12--	840.00	259ET12--	840.00	259ME12--	840.00
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250 x 21mm	2521CT12--	2380.00	2521ET12--	2380.00	2521ME12-	2380.00
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250 x 50.8mm	2550CT12--	8880.00	2550ET12--	8880.00	2550ME12-	8880.00
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Capillary Columns

Particle Size - 5µm

Å Available 

WX

GL

HY

-01, -03, -10

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-006, -01, -02, -03, -05, -10

50mm x 150µm	050.15WX05--	450.00	050.15GL0500	450.00	050.15HY05--	450.00
100mm x 150µm	100.15WX05--	500.00	100.15GL0500	500.00	100.15HY05--	500.00
150mm x 150µm	150.15WX05--	550.00	150.15GL0500	550.00	150.15HY05--	550.00

50mm x 300µm	050.30WX05--	450.00	050.30GL0500	450.00	050.30HY05--	450.00
100mm x 300µm	100.30WX05--	500.00	100.30GL0500	500.00	100.30HY05--	500.00
150mm x 300µm	150.30WX05--	550.00	150.30GL0500	550.00	150.30HY05--	550.00

COLUMNS

Particle Size 3µm

Å Available 

-03, -10, -15

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-006, -01, -03, -05, -15

50 x 1.0mm	051WX03--	450.00	051GL0300	450.00	051HY03--	450.00
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100 x 2.1mm	102WX03--	540.00	102GL0300	540.00	102HY03--	540.00
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35 x 4.6mm	3.54WX03--	420.00	3.54GL0300	420.00	3.54HY03--	420.00
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100 X 4.6mm	104WX03--	540.00	104GL0300	540.00	104HY03--	540.00
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100 x 9.4mm	109WX03--	1060.00	109GL0300	1060.00	109HY03--	1060.00
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Particle Size - 5µm

Å Available 

-01, -03, -05, -10

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-006, -01, -02, -03, -05, -10

50 x 1.0mm	051WX05--	450.00	051GL0500	450.00	051HY05--	450.00
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150 x 1.0mm	151WX05--	580.00	151GL0500	580.00	151HY05--	580.00
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35 x 2.1mm	3.52WX05--	380.00	3.52GL0500	380.00	3.52HY05--	380.00
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100 x 2.1mm	102WX05--	455.00	102GL0500	455.00	102HY05--	455.00
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200 x 2.1mm	202WX05--	540.00	202GL0500	540.00	202HY05--	540.00
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50 x 4.0mm	054.0WX05--	395.00	054.0GL0500	395.00	054.0HY05--	395.00
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100 x 4.0mm	104.0WX05--	455.00	104.0GL0500	455.00	104.0HY05--	455.00
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35 x 4.6mm	3.54WX05--	380.00	3.54GL0500	380.00	3.54HY05--	380.00
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50 x 4.6mm	054WX05--	395.00	054GL0500	395.00	054HY05--	395.00
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100 x 4.6mm	104WX05--	455.00	104GL0500	455.00	104HY05--	455.00
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200 x 4.6mm	204WX05--	540.00	204GL0500	540.00	204HY05--	540.00
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100 x 9.4mm	109WX05--	850.00	109GL0500	850.00	109HY05--	850.00
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200 x 9.4mm	209WX05--	1060.00	209GL0500	1060.00	209HY05--	1060.00
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250 x 9.4mm	259WX05--	1120.00	259GL0500	1120.00	259HY05--	1120.00
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250 x 21mm	2521WX05--	3450.00	2521GL0500	3450.00	2521HY05--	3450.00
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Particle Size - 12µm

Å Available 

-03, -15

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-006, -01, -03, -15

200 x 4.6mm	204WX12--	320.00	204GL1200	320.00	204HY12--	320.00
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200 x 9.4mm	209WX12--	760.00	209GL1200	760.00	209HY12--	760.00
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250 x 9.4mm	259WX12--	840.00	259GL1200	840.00	259HY12--	840.00
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250 x 21mm	2521WX12--	2380.00	2521GL1200	2380.00	2521HY12--	2380.00
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250 x 50.8mm	2550WX12--	8880.00	2550GL1200	8880.00	2550HY12--	8880.00
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## CAPILLARIES - Ea


## PolySULFOETHYL A

## PolyPROPYL A

Particle Size - 5µm

SE

PR

Å Available 


-02, -03, -10

-03, -10

50mm x 150µm	050.15SE05--	450.00	050.15PR05--	450.00
100mm x 150µm	100.15SE05--	500.00	100.15PR05--	500.00
150mm x 150µm	150.15SE05--	550.00	150.15PR05--	550.00

50mm x 300µm	050.30SE05--	450.00	050.30PR05--	450.00
100mm x 300µm	100.30SE05--	500.00	100.30PR05--	500.00
150mm x 300µm	150.30SE05--	550.00	150.30PR05--	550.00

## COLUMNS -Ea

Å Available 

-03, -15

-15

50 x 1.0mm	051SE03--	450.00	051PR03--	450.00
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100 x 2.1mm	102SE03--	575.00	102PR03--	540.00
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35 x 4.6mm	3.54SE03--	430.00	3.54PR03--	420.00
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100 X 4.6mm	104SE03--	575.00	104PR03--	540.00
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100 x 9.4mm	109SE03--	1140.00	109PR03--	1060.00
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Particle Size - 5µm

Å Available 

-02, -03, -10

-03, -10

50 x 1.0mm	051SE05--	450.00	051PR05--	450.00
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150 x 1.0mm	151SE05--	580.00	151PR05--	580.00
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35 x 2.1mm	3.52SE05--	390.00	3.52PR05--	380.00
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100 x 2.1mm	102SE05--	495.00	102PR05--	455.00
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200 x 2.1mm	202SE05--	575.00	202PR05--	540.00
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50 x 4.0mm	054.0SE05--	415.00	054.0PR05--	395.00
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100 x 4.0mm	104.0SE05--	495.00	104.0PR05--	455.00
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35 x 4.6mm	3.54SE05--	390.00	3.54PR05--	380.00
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50 x 4.6mm	054SE05--	415.00	054PR05--	395.00
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100 x 4.6mm	104SE05--	495.00	104PR05--	455.00
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200 x 4.6mm	204SE05--	575.00	204PR05--	540.00
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100 x 9.4mm	109SE05--	950.00	109PR05--	850.00
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200 x 9.4mm	209SE05--	1140.00	209PR05--	1060.00
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250 x 9.4mm	259SE05--	1200.00	259PR05--	1120.00
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250 x 21mm	2521SE05--	3600.00	2521PR05--	3450.00
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Particle Size - 12µm

Å Available 

-03, -15

-03, -15

200 x 4.6mm	204SE12--	330.00	204PR12--	320.00
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200 x 9.4mm	209SE12--	810.00	209PR12--	760.00
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250 x 9.4mm	259SE12--	890.00	259PR12--	840.00
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250 x 21mm	2521SE12--	2600.00	2521PR12--	2380.00
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250 x 50.8mm	2550SE12--	10800.00	2550PR12--	8880.00
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		PolyCAT A		PolyETHYL A		PolyMETHYL A	
<b>*BULK MATERIAL</b>							
3µm - Price Per Gram	BMCT03--	100.00		---		---	
5µm - Price Per Gram	BMCT05--	60.00	BMET05--	60.00	BMME05--	60.00	
12µm - Price Per Gram	BMCT12--	12.00	BMET12--	12.00	BMME12--	12.00	

SOLID PHASE EXTRACTION							
SPE'S	SPECT1203	60.00/ pk of 10 ea	SPEET1203	60.00/ pk of 10 ea	SPEME1203	60.00/ pk of 10 ea	
	SPECT1215	60.00/ pk of 10 ea					

Javelin Guard Cartridges each							
10 x 1.0mm	J11GCCT05--	70.00	J11GCET05--	70.00	J11GCME05--	70.00	
10 x 2.1mm	J22GCCT03--	80.00	---	---	---	---	
10 x 2.1mm	J22GCCT05--	70.00	J22GCET05--	70.00	J22GCME05--	70.00	
10 x 4.0mm	JGCCT03--	80.00	---	---	---	---	
10 x 4.0mm	JGCCT05--	70.00	JGCET05--	70.00	JGCME05--	70.00	
20 x 4.0mm	J024GCCT----	160.00	---	---	---	---	

		PolyWAX LP		PolyGLYCOPLEX		PolyHYDROXYETHYL A	
<b>*BULK MATERIAL</b>							
3µm - Price Per Gram	BMWX03--	100.00	BMGL0300	100.00	BMHY03--	100.00	
5µm - Price Per Gram	BMWX05--	60.00	BMGL0500	60.00	BMHY05--	60.00	
12µm - Price Per Gram	BMWX12--	12.00	BMGL1200	12.00	BMHY12--	12.00	

SOLID PHASE EXTRACTION							
SPE'S	SPEWX1201	60.00/ pk of 10 ea	SPEGL1200	60.00/ pk of 10 ea	SPEHY1201	60.00/ pk of 10 ea	
	SPEWX1203	60.00/ pk of 10 ea			SPEHY1203	60.00/ pk of 10 ea	
	SPEWX1215	60.00/ pk of 10 ea					

Javelin Guard Cartridges Each							
10 X 1.0mm, 5µm	J11GCWX05--	70.00	J11GCGL0500	70.00	J11GCHY05--	70.00	
10 x 2.1mm, 3µm	J22GCWX03--	80.00	---	---	J22GCHY03--	80.00	
10 x 2.1mm, 5µm	J22GCWX05--	70.00	J22GCGL0500	70.00	J22GCHY05--	70.00	
10 x 4.0mm, 3µm	JGCWX03--	80.00	JGCGL0300	80.00	JGCHY03--	80.00	
10 x 4.0mm, 5µm	JGCWX05--	70.00	JGCGL0500	70.00	JGCHY05--	70.00	
20 x 4.0mm	---ASK---		---	---	---	---	

		PolyPROPYL A		PolySULFOETHYL A	
<b>*BULK MATERIAL</b>					
3µm - Price Per Gram	BMPR03--	100.00	BMSE03--	110.00	
5µm - Price Per Gram	BMPR05--	60.00	BMSE05--	70.00	
12µm - Price Per Gram	BMPR12--	12.00	BMSE12--	15.00	

Solid Phase Extraction	SPEPR1203	60.00/ pk of 10 ea	SPESE1203	60.00/ pk of 10 ea
SPE'S				

*JAVELIN GUARD CARTRIDGES - F							
10 x 1.0mm, 5µm	J11GCPR05--	70.00	J11GCSE05--	75.00			
10 x 2.1mm, 3µm	---	---	J22GCSE03--	85.00			
10 x 2.1mm, 5µm	J22GCPR05--	70.00	J22GCSE05--	75.00			
10 x 4.0mm, 3µm	JGCPR03--	80.00	JGCSE03--	85.00			
10 x 4.0mm, 5µm	JGCPR05--	70.00	JGCSE05--	75.00			
20 x 4.0mm	---	---	---	---	---	---	---

Javelin SDS Removal Cartridges - Ea							
10 x 1.0mm		J11SDS	70.00				
10 x 2.1mm		J2SDS	70.00				
20 x 2.1mm	w/ Waters detail	J2SDS-2W	75.00				
10 x 4.0mm		J4SDS	70.00				
20 x 4.0mm		J4SDS-2	75.00				
20 x 4.0mm	w/ Waters detail	J4SDS-2W	75.00				

## Applications By Compound

202-bp GC-rich product	28	GHK peptide	13	Pegylated protein	3
acetic acid	15	Glucagon	17	Pegylated Variants	5
Acetic acid	16	Glucosinolates	12	Penylalamine	18
acetic acid	18	Glycopeptides	11	Pepecp;ocAcod	8
Allantoin	8	Glycosolated Protein	4	Peptide standards	6
Alpha MSH	15	Growth Hormone	4	Phosphatidylcholine	29
Alpha MSH	16	HeLa Cell nuclear proteins	20	Phosphatidylethanolamine	29
Alpha MSH	18	Hemoglobin	17	Phosphatidylglycerol	29
alpha-chymotrypsinogen A	26	Hemoglobin (C Trait)	5	Phospho Peptide	3
alpja-chymotrypsin	26	HGH Isoforms	4	Phospho Peptides	23
Amino Acids	12	Human Growth Hormone	25	Phospholipid	29
Amino Acids	16	human neuropeptide	21	Phosphorotioate	28
Amino Adipic acid	8	Human Serum antibody	14	Plasma lipid-binding protein	17
Aminoglycosides	9	IgG	15	Polar lipids	12
angiotensin 1	15	IgG Sialylation Isoforms	2	poly-L-Lysine	15
Anglefish peptide	21	Insulin	17	Polypeptides, preparative	22
Anthocyanins	12	insulin bovine	15	PRION	10
apoferritin	15	Intact protein	21	Protein standards	6
Arabidopsis Thaliana	12	Kanamycin	9	Protein Variant	4
Arg(8) Vasopressin	23	KGHK peptide	13	PSA	24
Arg(8) Vasopressin	26	Lamprey Pancreas	17	rh Nerve Growth Factor	20
Aspartamine	18	LDH Isoenzymes	27	ribonuclease A	26
Bacitracin	6	Leaf Extract	12	ribonuclease A	15
Beta Amylase	15	Lecithin	19	Ribosome ; C elegans Ribosome	22
Biotinylated -VIP analog	13	Lecithins	23	saccharides	12
bombesin	15	Leu-Enkephalinamide	15	Saccharopine	8
Bovine lung surfactant protein	19	Leu-Enkephalinamide	16	Somatostatin	26
bovine Pancreatic Polypeptide	21	LHRH	25	Somatostatin	21
bsa	15	LHRH	16	somatostatin(Tyr1)	26
Bungerotoxin from P Pastoris	4	lincomycin	9	somatostatin(Tyr11)	26
carbonic anhydrase	15	Lipids	23	Somatostatin-14	17
Casein Hydrolyzate	18	liver Homogenate	23	Somatostatin-37	17
Chymotrypsinogen A	6	Lung Surfactant Protein	23	spectinomycin	9
Combinatorial Library	14	Lysidone	8	Sterols	23
Conalbumin	26	Lysine	8	Substance P	23
Cytochrome	26	Lysozyme	6	Substance P	26
Cytochrome C	18	Met-Enkephalinamide	18	Substance P free acid	23
d(T)15	29	Monoclonal Antibody	7	Substance P free acid	26
Deosynucleosides	10	Myoglobin	26	substance P(tyr 8)	23
Diabetec hemoglobin	5	Myoglobin	17	substance P(tyr 8)	26
dihydrostreptomycin	9	n-chloroacetyl tris	15	THP-1 Monocytes Lysate	23
Ferritin	17	N-Chloroacetyl tris	16	thyroglobulin	15
Fibrolase Isoforms	7	Neochymotrypsin	26	Transferrin	17
Flavonols	12	neomycin	9	trh	15
Formic Acid	15	Neurotrophic Factor pegylated	5	TRH	16
formic acid	16	Non-Peg Protein	3	ubiquitin	15
formic acid	18	Nucleotides	11	Urea	8
Gamma Interferon	11	ovalbumin	15	Vasoactive Intestinal Peptide	13
Gentamycin	9	Oxytocin	21	Vasopressin	21
gentamycin 2	9	Oxytocin	26	VIP Analogs Lys15 thiopropionyl	13
Gentamycin 3	9	PCR	28	West Nile Virus template	28



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