

Introduction

Separation Methods Technologies, Incorporated (*SMT, Inc.*) is a surface chemistry research corporation. Our goal is to provide chromatographers with outstanding column packing materials and specialty columns for various separation chemistries ranging from analytical to process scale. Our primary focus is on the creation of well organized functional molecules on substrate surfaces for various functions, including **chromatographic applications** and **materials engineering**. *SMT Inc.* was founded in 1993. The company has its corporate headquarters in Newark, DE, with a worldwide distribution network.



Separation Methods Technologies' 10,000 square foot corporate headquarters in Newark, DE

SMT utilizes proprietary bonding technologies that result in bonded phase coverages that approach 100%. *SMT's* methods of bonding allow the density of the functional ligands to be controlled with appropriate spacer molecules, a novel procedure that ensures **TOTAL COVERAGE** and highly cross-linked polysiloxane under layer structure. The results are bonded phases that are well protected and that show unprecedented resistance to both acid and base hydrolysis. SAM technology provides you with widest range of column retention selectivities and performance benefits.

Since its founding in 1993, *SMT* column products and packing materials have become a portion of many analytical method developments in major pharmaceuticals and research institutions in the United States and all around the world. Our specialty products for materials engineering have found applications in the treatment of glass surfaces and reduction of optical fiber breakage as well as other products used in telecommunication industries. Current applications of these products are found in major scientific journals and the application notes cited in this catalog.

SMT, Inc.

Providing you with Separation Alternatives Since 1993

Table of Contents

Introduction	I
Ordering Information	2
Reversed-Phase Chromatography	3
Self-Assembled Monolayers (SAM) in Separation Science	4
SMT-SAM-C18 Columns	5
SMT-SAM-C8 Columns	16
SMT-SAM-MEB Columns	24
SMT-SAM-Phenyl Columns	28
Normal Phase Chromatography	30
SMT-Silica Columns	31
SMT-SAM-Diol Columns	32
SMT-SAM-Aminopropyl Columns	33
SMT-SAM-Cyanopropyl Columns	34
Ion-Exchange Chromatography	35
SMT-SAX Columns	36
SMT-WAX Columns	37
SMT-DEAE Columns	38
SMT-SCX Columns	39
SMT-WCX Columns	40
SMT Specialty Columns	41
SMT-PAH Columns and Applications	41
SMT-TNT Columns and Applications	42
SMT-OD-IQ Columns and Applications	43
SMT-C12 Columns and Applications	44
SMT-C30 Columns and Applications	45
SMT-QuickSep Columns and Applications	46
SMT-Chiral Columns and Applications	47
SMT-MetalSep Columns and Applications	48
SMT-USP Columns and SMT Equivalents	49
SMT-C6F5 Applications	50
SMT-Micro & Narrow Bore Columns	51
SMT-Guard Columns	52
Bulk Packing Materials	54
Specialty Products for Materials Engineering	55
Column Selection Guide-Suggested SMT Alternative	56
References	II

Ordering Information

SMT Guarantee

SMT, Inc. guarantees that all its products including columns and packing materials will reach you in perfect conditions, or a replacement will be made immediately. Please refer to our return policy.

Specialty Products

All specialty products are prepared to order. The columns packing materials, and other products described in this catalog represent only a collection of products commonly used for chromatographic applications. However, *SMT* can work with you in developing a specialty product for special or new applications. New products that are not described here can often be prepared by simple adaptations of our already developed technology. And, as such, specialty products may require little or no additional cost. Please call for information regarding feasibility, pricing, and ordering procedures for specialty products.

Quantity Discounts

SMT offers discounts for large quantities and purchase agreements on all products. Please call *SMT*'s sales department for information regarding discounts on bulk purchases.

How To Order

Call our Phone number using: 302-368-0610 or Fax in your order using: 302-368-0282 or E-mail using sales@separationmethods.com or Mail in your order using: *SMT*, Inc., Sales Department, 31 Hen Drive, Newark, DE 19713. When you order, be sure to include: your purchase order number, billing and shipping address, our catalog number and product description and your name and telephone number. **All major credit cards are accepted.**

Sales Terms & Conditions

Terms of Payment: Net 30 days, FOB Newark, Delaware. Postage and Handling are prepaid and added to the invoice. Product prices are subject to change without notice

Return Policy: No returns will be accepted without prior authorization. Please call for return authorization number and forwarding instructions to prevent delays in refund. All claims must be made within 60 days of shipping.

Reversed-Phase Chromatography

Reversed-Phase Chromatography

The use of high performance liquid chromatography (HPLC) for the separation and purification of organic compounds including pharmaceuticals, natural products, food additives, organic chemicals and biologicals, has increased dramatically in the past three decades. This increase is undoubtedly associated with the enormous improvement in bonding chemistry.

When chromatographic separation is done in a reversed-phase mode, the surface chemistry of the stationary (or bonded) phase has a nonpolar characteristic. The mobile phase is generally polar and the polarity can be achieved by variation of one or more polar organic solvents (such as methanol and acetonitrile) with water. Furthermore, the ability to vary the nonpolar characteristic of the stationary phase provides ground for flexibility and the continuous growth of interest in separation using reversed-phase mode. In fact, the limiting factor in reversed phase chromatography now depends on the characteristics of the stationary phases procurable. Thus, future advancement in separation science will be continuously governed by the amount of effort expended on surface modification and materials engineering.

HPLC Method Development - Choosing a column

The column of choice for analytical methods development is very easy; the best column for an application is the column that gives the highest performance under the most favorable condition desired by the end-user. Most analytes are acidic, basic or neutral. The best initial approach is to use a mid-range pH, such as pH 7. The standard *SMT* SAM-C18 and C8 columns are the best choice for use at this pH because they provide superior column lifetime, extremely high selectivity and resolution. Acetonitrile or methanol and water are normally the first choice for mobile phase. Another option is combination of organic solvent with phosphate buffer (with buffer range pH 6.2-8.2) or acetate buffer (with buffer range pH 3.8-5.8). Method development optimization can continue from here by changing several factors, including mobile phase, pH, column temperature (up to 95°C). *SMT* SAM-C18 is uniquely stable to high temperatures, a characteristic that can be used as an additional tool to improve resolution.

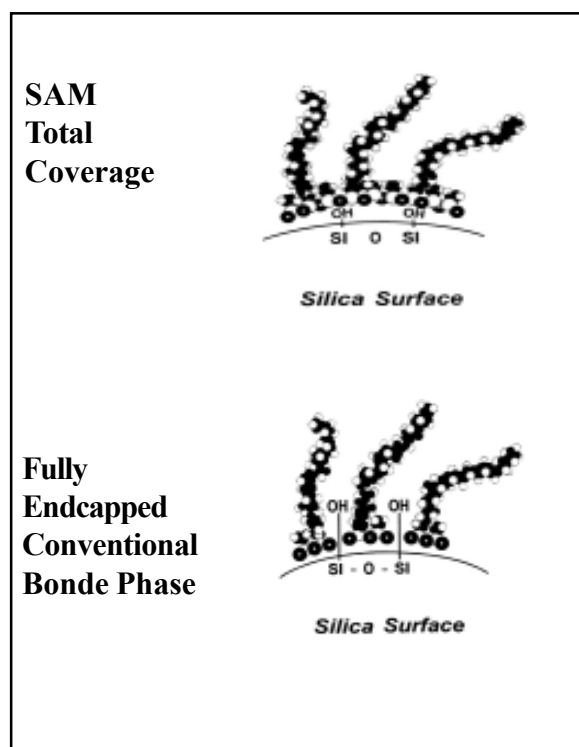
Using a low pH mobile phase results in the best peak shapes for basic compounds because these analytes are fully protonated and exhibit low retention and tailing. *SMT* SAM C18 or C8 columns are the best choice providing longest available lifetime and performance at low pH.

Separations at high pH region may also be the most appropriate for certain compounds. For example, it may be possible to separate bases in their free form-where they are not charged. Here the retention increases as the chance of obtaining the desired selectivity improves. *SMT* SAM-C18 column has highest ligand density available and offers the best protection (up to pH 12) of the silica substrate from being dissolved by the strongly basic mobile phase.

Self-Assembled Monolayers (SAM) in Separation Science

Self-Assembled Monolayers (SAM) are supramolecular organizes resembling, in some respects, the well-known Langmuir-Blodgett (LB) built-up films while displaying other distinct and rather unique features¹⁻⁵. Much of the interest in SAM stems from their potential in wide range of scientific and technological applications⁴. The first application of SAM in chromatographic separation science was developed at the University of Delaware by Fatunmbi and Wirth¹⁻³. The bonding technique allows ordered monolayers of functional molecules to be chemically immobilized on solid substrates, such as, silica and alumina. The technique of bonding was termed “horizontal polymerization” due to the fact that there is significant Si-O-Si bridging parallel to the silica substrate. This is achieved by reaction of trifunctional silanizing agent with the silica substrate under anhydrous condition, except for a monolayer of water on silica. This contrasts with conventional polymerization of trifunctional silanes, referred to as “vertical polymerization,” where water is deliberately added to polymerize the reagents before attachment to the surface. The key structural difference is that horizontal polymerization provides much higher ligand density at the silica surface boundary.

The bonding chemistry utilized for chromatographic applications results in a monolayer coverage with typical thickness in the range of 6-22 Å, depending on the length of the attached ligand. For example, when a C18 ligand is attached, a film thickness of about 22 Å is obtained. Thickness in this range ensures bonding of the ligand both in and around the substrate material without blocking of the pores. Results from the relaxation time measurements, using solid state nuclear magnetic resonance spectroscopy (NMR)^{3,4}, showed that the spacer molecules are evenly dispersed within the functional ligand and are not clumped together.



SAM is applicable to virtually all types of functional group.

SMT columns for reversed-phase chromatography include SMT-C18, SMT-C8, SMT-Elite C18, SMT-Elite C8, SMT-ODL, SMT-OL, SMT-MEB (including C1, C2, and C4), SMT-C30, SMT-C12, SMT-ODIQ, SMT-OIQ, SMT-Urea, SMT-QuickSep, SMT-ChiralSep, SMT-FatSep and other mixed phases. SMT offers many other columns for ion exchange chromatography including SMT-SAX, SMT-WAX, SMT-SCX, SMT-WCX, SMT-DEAE, SMT-MetalSep.

SMT offers packing materials for large-scale purification and solid phase extraction. Essentially all SMT analytical column packing materials are offered in large particle sizes at significantly reduced prices for

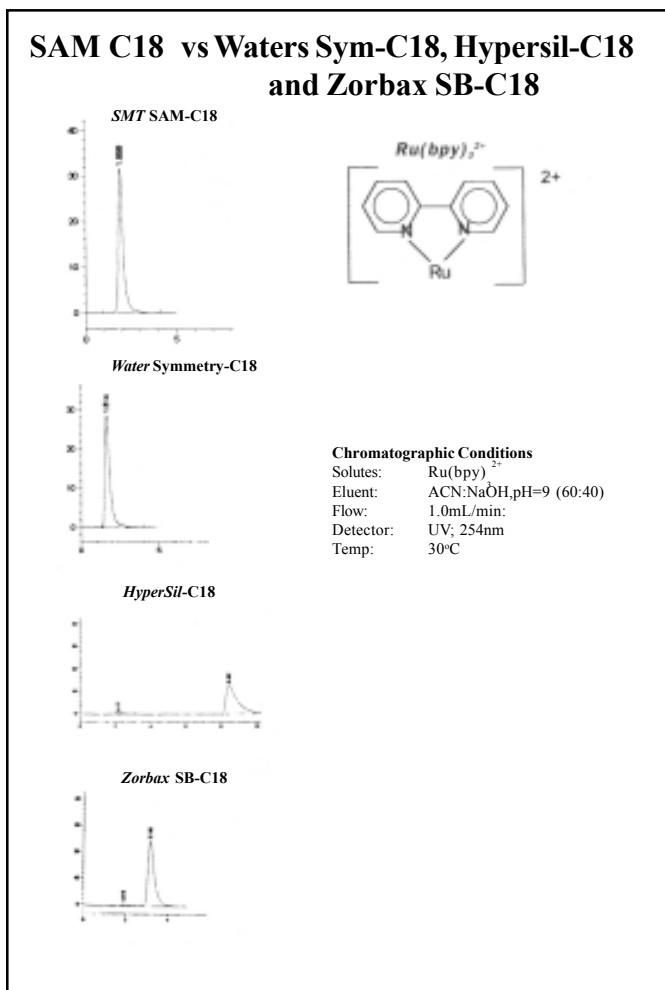
Introduction to *SMT* SAM-Columns

SMT SAM-C18 or [OD] column is usually the first column of choice for reversed-phase chromatographic separation or method development. When compared to other columns such as a C8, C4, CN, phenyl, or an amino bonded phase, C18 is the most hydrophobic.

SMT SAM-C18 column is very stable at a wide pH range and high temperatures. Separation of most basic solutes is often possible without trifluoroacetic acid (TFA) or other mobile phase additives. *SMT* packings enable you to achieve a broader pH range than what is accessible with other commercially available packings. *SMT* utilizes a novel self-assembled monolayers technology in all its bonding chemistries to achieve maximum coverage. The technique involves pretreatment of the silica substrate including rigorous control of water molecules. A mixture of trifunctional ligands is then allowed to come in contact with the substrate. The result is an unprecedented high-density assembly of molecules on the substrate. The unique aspect of SAM is that only a monolayer of coverage is achieved when the bonding is performed accordingly. At least one of the ligands (e.g. C18) is functional for the separation while the other (e.g. C1) is used as a spacer molecule, although, it too can impact certain selectivity needed for some separation. A typical coverage achievable with SAM is 7-8 $\mu\text{mole}/\text{m}^2$. This coverage value is equivalent to the maximum achievable coverage on any substrate and it is usually about 50% higher than that achievable using the most exhaustive conventional bonding and end-capping methods available in the market today.

Important Information about of *SMT* SAM-Columns

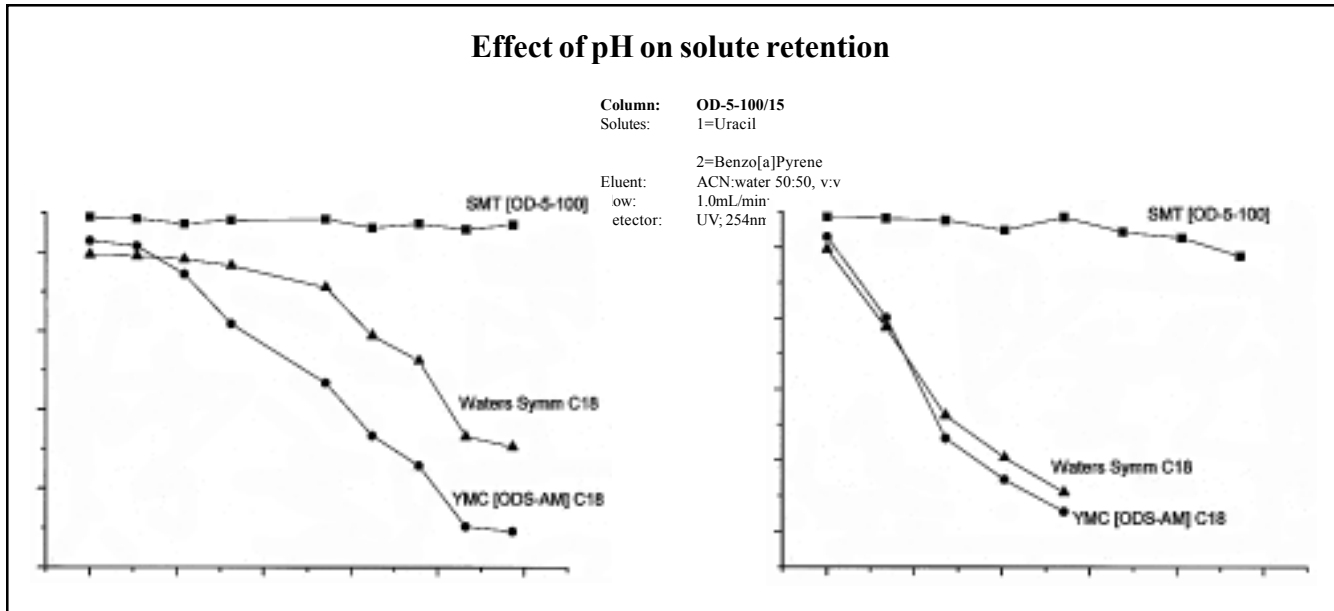
It is very important to point out that *SMT*-C18 columns as well as all the other columns introduced in this catalog are unique in their applications; while in most cases, the columns may show relatively similar selectivities when compared with other commercially available, for example, other C18 columns in the market, subtle differences in separation of most complex molecules are often possible. All *SMT* columns contain mixed ligands that are necessary for the extremely high stability and surface coverage. Furthermore, utilization of SAM technology in the manufacturing process automatically ensures true **base-deactivated**. This fact is demonstrated by the chromatograms of an organic cation, $\text{Ru}(\text{bpy})_3^{2+}$ on *SMT* SAM-C18 and some competitors' columns.



Unique Characteristics of SAM

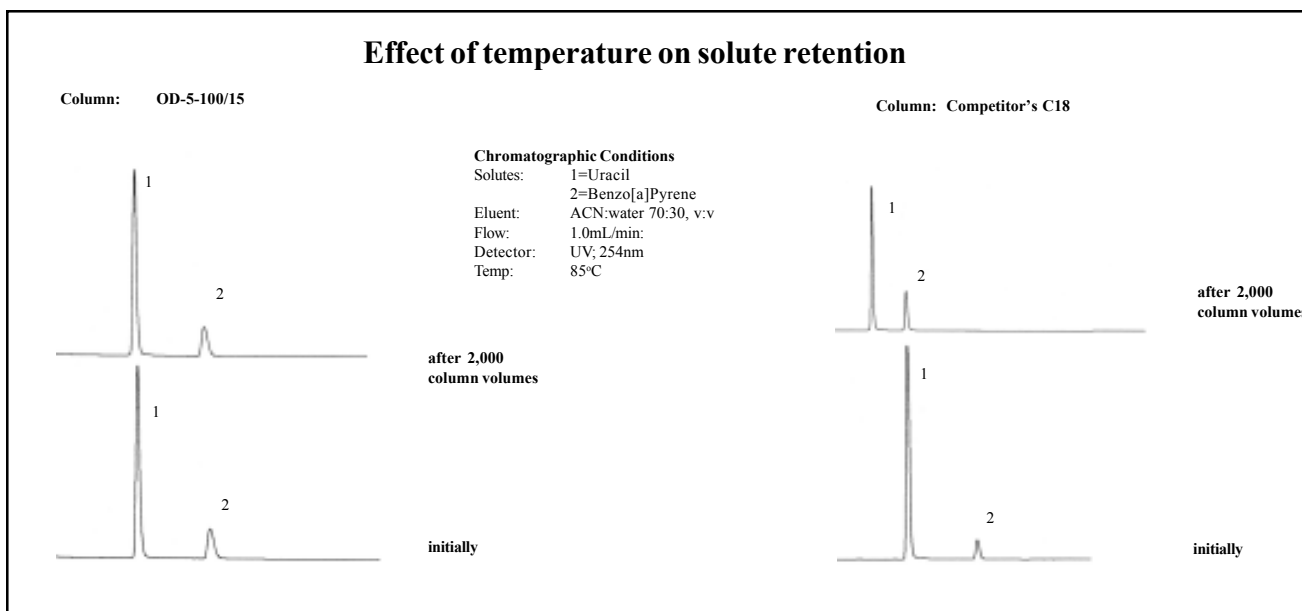
1. SMT SAM-C18 shows unprecedented Stability in wide range of pH conditions

SMT SAM columns and packings are manufactured to resist hydrolysis at wide pH environments as demonstrated by the following comparative studies.



2. SMT SAM-C18 shows unprecedented Stability when used at high temperatures

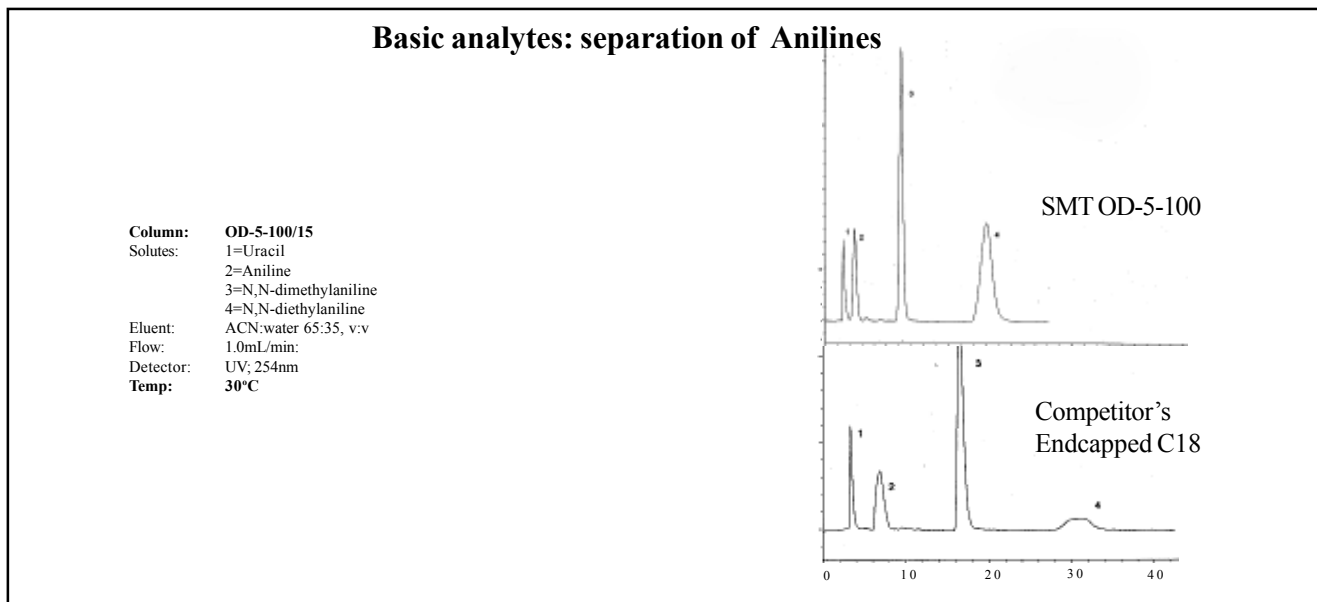
SMT SAM columns and packings are manufactured to resist hydrolysis when used at high temperatures as demonstrated by the following comparative studies.



Unique Characteristics of SAM

3. SMT SAM-C18 results in no tailing, even for difficult analytes

Silanophilic interaction can often preclude elution of basic analytes with symmetric peaks in conventional C18 columns. Mobile phase additives such as TFA or buffer are often used to suppress the interaction. Separation of most basic compounds on SMT SAM-C18 is often possible without these additives.



4. High Efficiency, Reproducibility, and Symmetry

SMT SAM columns and packings are manufactured to provide high efficiency, reproducibility and symmetry. Extremely tight manufacturing controls as well as extensive characterization of the silica substrates and the bonded phases enable us to manufacture all our columns and packings with all of these important features. Typical efficiencies are in the order of 65,000 plates per meter on our probe molecules. Our SAM technology ensures production of columns and packings of extremely high reproducibility with symmetry in the order of 1.0.

Batch-to-Batch Reproducibility

A result of five batches of SMT SAM-C18 and SAM-C8

SAM OD-Columns	Batch #1	Batch #2	Batch #3	Batch #4	Batch #5
Particle size	5 m	5 m	5 m	5 m	5 m
Pore size	100	100	100	100	100
surface area [m ² /g]	340	340	340	340	340
%Carbon	24	24	24	24	24
Coverage [moles/m ²]	7.4	7.3	7.4	7.4	7.3
SAM O-Columns	Batch #1	Batch #2	Batch #3	Batch #4	Batch #5
Particle size	5 m	5 m	5 m	5 m	5 m
Pore size	100	100	100	100	100
surface area [m ² /g]	340	340	340	340	340
%Carbon	12	12	12	12	12
Coverage [moles/m ²]	7.3	7.3	7.4	7.3	7.5

SMT-SAM-C18 Columns and Packings

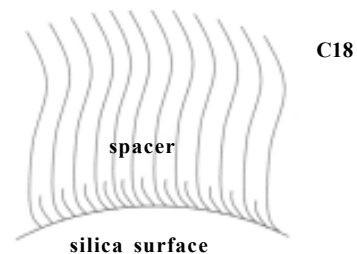
Unique features:

- Very hydrophobic
- Designed to tolerate usage in very aggressive pH conditions [1-12]
- Stable at extended temperature range [25 °C to 90 °C]

SMT offers three different C18 phases of varying carbon loads for optimal selectivity:

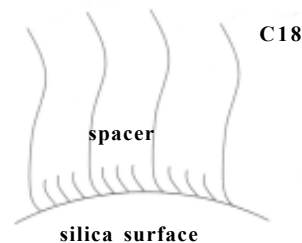
OD series:

SMT SAM-C18 phase with the highest functional ligand coverage confirmed with carbon analysis results of 24% carbon load. In these series, a very high density of the functional ligand, octadecyl (C18) molecule, is achieved through meticulous mixture of the C18 with proprietary spacer molecules to ensure maximum coverage. These phases are very hydrophobic and are designed to tolerate usage in very aggressive pH conditions and high temperatures.



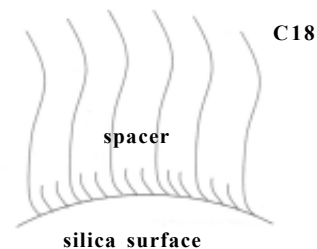
ODL series:

SMT SAM-C18 phase with the lowest functional ligand coverage confirmed with carbon analysis results of 12% carbon load. In these series, the proportional ratio of the functional C18 molecule, mixed with the proprietary spacer molecule, is reduced. The result is a packing material with maximum coverage but much lower functional ligand. Low density C18 packing material ensures faster mass transfer of solutes during separation. These phases have much lower hydrophobicity compared to the standard SMT OD-series. The spacer molecules protect the substrate from aggressive pH conditions and impact unique selectivity compared with other C18 phases.



Elite-C18 series:

SMT SAM-C18 phases with the intermediate functional ligand coverage confirmed with carbon analysis results of 16% carbon load. In these series, the density of the functional ligand, octadecyl molecule or C18, is moderated with the proprietary spacer molecule to ensure maximum coverage. These phases are moderately hydrophobic; nevertheless, designed to tolerate usage in very aggressive pH conditions and high temperatures.



All SMT SAM-C18 packing materials are available for preparatory, solid phase extraction and process scale applications. Please refer to our bulk packing materials catalog for various particle sizes available for your application.

SMT-SAM-C18 [OD-Series]

Unique features:

- SMT-C18 phase with the highest functional ligand density consisting of about 24% carbon load.
- Highly versatile; strongly recommended for basic compounds.
- Offers high selectivity for polar, neutral and moderately nonpolar pharmaceuticals, natural products, food additives, organic chemicals and biologicals.

OD-Columns are available in various particle and pore sizes:

3, 5, 10 m and 100, 120 and 300 are stock sizes.

Typical Column Specification:

	SAM OD-Columns	
5 m silica	100	300
surface area [m ² /g]	340	120
%Carbon	24	8
Coverage [moles/m ²]	7.4	7.2

Ordering Information

SAM-C18 (OD-Columns): 5 m, 100

+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	OD-5-100/5
75mmx4.6mm	OD-5-100/7.5
100mmx4.6mm	OD-5-100/10
150mmx4.6mm	OD-5-100/15
250mmx4.6mm	OD-5-100/25
300mmx4.6mm	OD-5-100/30
150mmx7.8mm	OD-5-100/157.8
250mmx7.8mm	OD-5-100/257.8
300mmx7.8mm	OD-5-100/307.8
150mmx10mm	OD-5-100/1510
250mmx10mm	OD-5-100/2510
300mmx10mm	OD-5-100/3010
150mmx22.1mm	OD-5-100/1522
250mmx22.1mm	OD-5-100/2522

SAM-C18 (OD-Columns): 5 m, 300

+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	OD-5-300/5
75mmx4.6mm	OD-5-300/7.5
100mmx4.6mm	OD-5-300/10
150mmx4.6mm	OD-5-300/15
250mmx4.6mm	OD-5-300/25
150mmx7.8mm	OD-5-300/157.8
250mmx7.8mm	OD-5-300/257.8
150mmx10mm	OD-5-300/1510
250mmx10mm	OD-5-300/2510
150mmx22.1mm	OD-5-300/1522
250mmx22.1mm	OD-5-300/2522

SAM-C18 (OD-Columns): 5 m, 60

+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	OD-5-60/5
75mmx4.6mm	OD-5-60/7.5
100mmx4.6mm	OD-5-60/10
150mmx4.6mm	OD-5-60/15
250mmx4.6mm	OD-5-60/25

SAM-C18 (OD-Columns): 10 m, 100

+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	OD-10-100/5
75mmx4.6mm	OD-10-100/7.5
100mmx4.6mm	OD-10-100/10
150mmx4.6mm	OD-10-100/15
250mmx4.6mm	OD-10-100/25
300mmx4.6mm	OD-10-100/30
150mmx7.8mm	OD-10-100/157.8
250mmx7.8mm	OD-10-100/257.8
300mmx7.8mm	OD-10-100/307.8
150mmx10mm	OD-10-100/1510
250mmx10mm	OD-10-100/2510
300mmx10mm	OD-10-100/3010
150mmx22.1mm	OD-10-100/1522
250mmx22.1mm	OD-10-100/2522

SAM-C18 (OD-Columns): 10 m, 300

+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	OD-10-300/5
75mmx4.6mm	OD-10-300/7.5
100mmx4.6mm	OD-10-300/10
150mmx4.6mm	OD-10-300/15
250mmx4.6mm	OD-10-300/25
150mmx7.8mm	OD-10-300/157.8
250mmx7.8mm	OD-10-300/257.8
150mmx10mm	OD-10-300/1510
250mmx10mm	OD-10-300/2510
150mmx22.1mm	OD-10-300/1522
250mmx22.1mm	OD-10-300/2522

SAM-C18 (OD-Columns): 3 m, 120

+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	OD-3-120/5
75mmx4.6mm	OD-3-120/7.5
100mmx4.6mm	OD-3-120/10
150mmx4.6mm	OD-3-120/15
250mmx4.6mm	OD-3-120/25

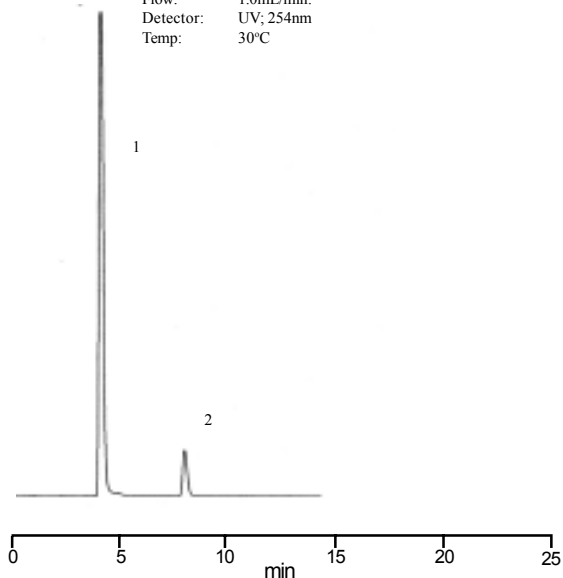
*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

+Other columns of different dimensions are also available; Please contact SMT, Inc. for quotation

Applications of SMT-SAM-C18 [OD-Columns]

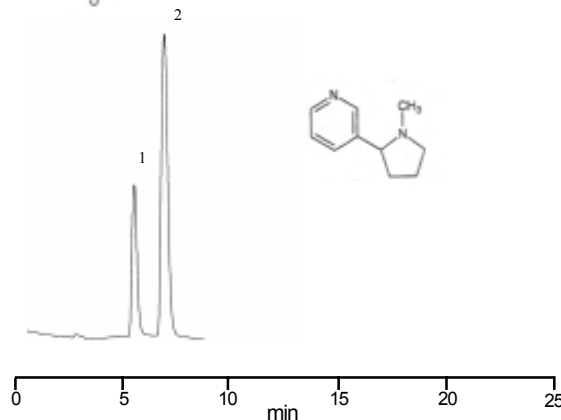
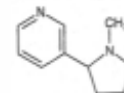
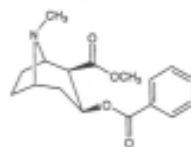
Drug Molecules: Tylenol[®] with Codiene

Column: OD-5-100/15
Solutes: 1=Acetaminophen
 2=Codiene
Eluent: ACN:0.01M Potassium Phosphate [pH=3] 70:30, v:v
Flow: 1.0mL/min
Detector: UV; 254nm
Temp: 30°C



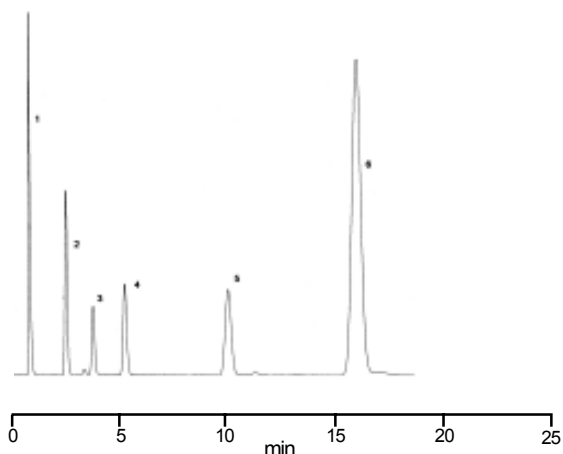
Basic Compounds: cocaine and nicotine

Column: OD-5-100/15
Solutes: 1=Cocaine
 2=Nicotine
Eluent: methanol:water (65:35)
Flow: 1.0mL/min
Detector: UV; 235m
Temp: 30°C



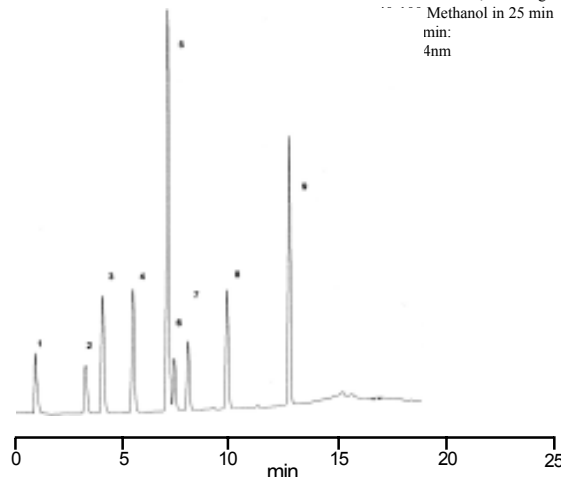
Non-polar Molecules

Column: OD-5-100/15
Solutes: 1=Uracil
 2=Benzene
 3=Toulene
 4=Naphthalene
 5=t-Butyl Benzene
 6=Anthracene
Eluent: Methanol:H₂O 70:30 (v:v)
Flow: 1.0mL/min
Detector: UV; 254nm
Temp: 30°C



Analysis of Phenols

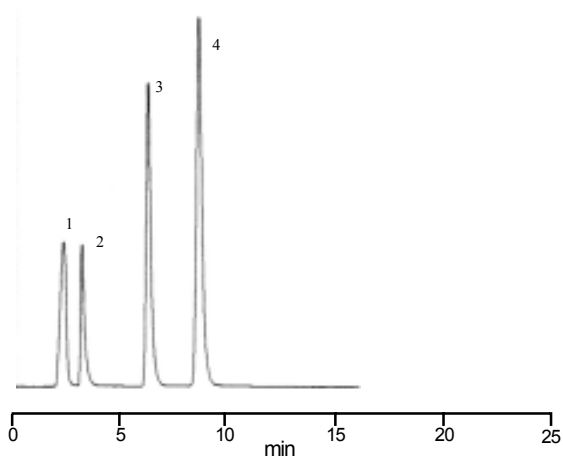
Column: OD-5-100/15
Solutes: 1=Uracil
 2=Phenol
 3=2-nitrophenol
 4=4-nitrophenol
 5=2-methyl-4,6-dinitrophenol
 6=4-chloro-3-methylphenol
 7=2,4-dichlorophenol
 8=2,4,6-trichlorophenol
 9=pentachlorophenol
Eluent: Methanol:water; Linear gradient
 min: Methanol in 25 min
 min: 4nm



Applications of *SMT-SAM-C18* [OD-Columns]

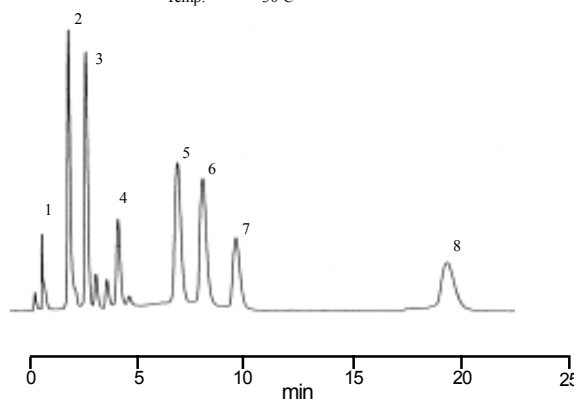
Drug molecules: Steroids

Column: OD-5-100/15
Solutes: 1=4-androstene-3,17-dione
 2=(+) androsta-1,4-diene-3,17-dione
 3=epiandrosterone
 4=progesterone
Eluent: ACN:water (60:40)
Flow: 1.0mL/min
Detector: UV; 280nm
Temp: 30°C



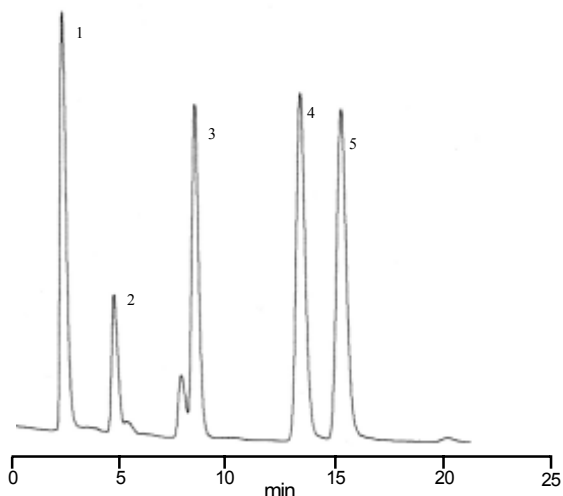
Antibacterial: Tetracyclines

Column: OD-5-100/15
Solutes: 1=minocycline
 2=oxytetracycline
 3=tetracycline
 4=demeclocycline
 5=chlortetracycline
 6=methacycline
 7=doxycycline
 8=meclocycline
Eluent: ACN:0.05% TFA water[pH=2] 24:76, (v:v) isocratic
Flow: 1.0mL/min
Detector: UV; 254nm
Temp: 30°C



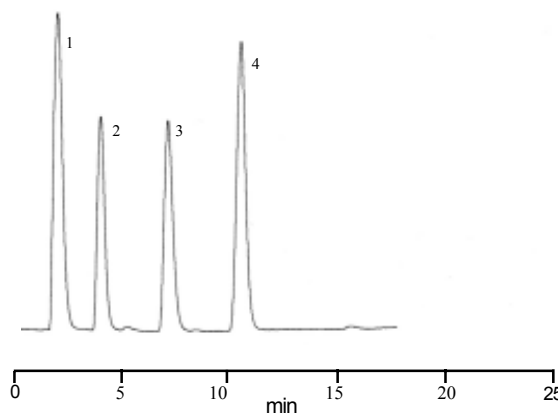
Water-soluble Vitamins

Column: OD-5-100/15
Solutes: 1=vitamin C [ascorbic acid]
 2=niacin
 3=vitamin B6 [pyridoxine]
 4=vitamin B1 [thiamine]
 5=vitamin B2 [riboflavin]
Eluent: Methanol: 0.01%TFA-water 20:80, (v:v)
Flow: 1.0mL/min
Detector: UV; 220nm
Temp: 30°C



Fat-soluble Vitamins: Tocopherols

Column: OD-5-100/15
Solutes: 1=δ-tocopherol
 2=β-tocopherol
 3=α-tocopherol
 4=Tocopherol-Ac
Eluent: Methanol:water 98:2 (v:v)
Flow: 1.0mL/min
Detector: UV; 295nm
Temp: 45°C



SMT-SAM-C18 [ODL-Series]

Unique features:

- Fast mass transfer and very high efficiency for the separation of highly hydrophobic molecules.
- Low hydrophobicity. The spacer molecules have much fewer carbon chains; nevertheless, the effective cross-linking with the functional ligands offers adequate protection to the substrate material against aggressive pH conditions.
- Offers unique selectivity compared with other C18 phases. The higher population of the spacer molecules provides the unique mixed-mode effect for the selectivity

ODL-Columns are available in various particle and pore sizes: 5, 10 μ m ; 100 and 300 \AA are stock sizes.

Typical Column Specification:	SAM ODL-Columns	
5 μ m silica	100	300
surface area [m ² /g]	340	90
%Carbon	12	4
Coverage [moles/m ²]	7.4	7.3

Ordering Information:

SAM-C18 (ODL-Columns): 5 μ m, 100 \AA

+Column Dimension (Length x i.d)	* Catalog Number
50mmx4.6mm	ODL-5-100/5
75mmx4.6mm	ODL-5-100/7.5
100mmx4.6mm	ODL-5-100/10
150mmx4.6mm	ODL-5-100/15
250mmx4.6mm	ODL-5-100/25
300mmx4.6mm	ODL-5-100/30
150mmx7.8mm	ODL-5-100/157.8
250mmx7.8mm	ODL-5-100/257.8
300mmx7.8mm	ODL-5-100/307.8
150mmx10mm	ODL-5-100/1510
250mmx10mm	ODL-5-100/2510
300mmx10mm	ODL-5-100/3010
150mmx22.1mm	ODL-5-100/1522
250mmx22.1mm	ODL-5-100/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

SAM-C18 (ODL-Columns): 5 μ m, 300 \AA

+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	ODL-5-300/5
75mmx4.6mm	ODL-5-300/7.5
100mmx4.6mm	ODL-5-300/10
150mmx4.6mm	ODL-5-300/15
250mmx4.6mm	ODL-5-300/25
300mmx4.6mm	ODL-5-300/30
150mmx7.8mm	ODL-5-300/157.8
250mmx7.8mm	ODL-5-300/257.8
300mmx7.8mm	ODL-5-300/307.8
150mmx10mm	ODL-5-300/1510
250mmx10mm	ODL-5-300/2510
300mmx10mm	ODL-5-300/3010
150mmx22.1mm	ODL-5-300/1522
250mmx22.1mm	ODL-5-300/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

SAM-C18 (ODL-Columns): 3 μ m, 120 \AA

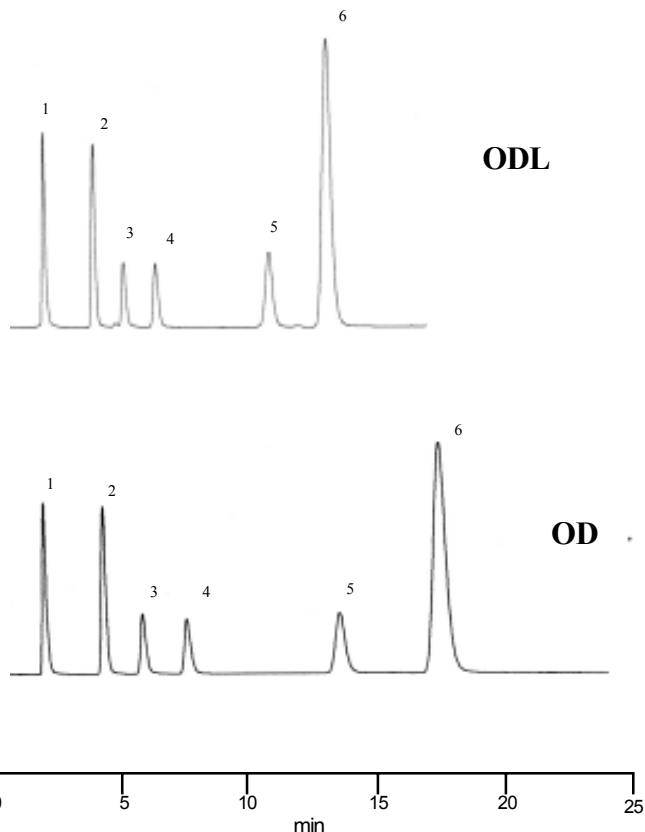
+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	ODL-3-120/5
75mmx4.6mm	ODL-3-120/7.5
100mmx4.6mm	ODL-3-120/10
150mmx4.6mm	ODL-3-120/15
250mmx4.6mm	ODL-3-120/25

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

+Other columns of different dimensions are also available;
Please contact SMT, Inc. for quotation

Hydrophobic molecules: ODL vs OD

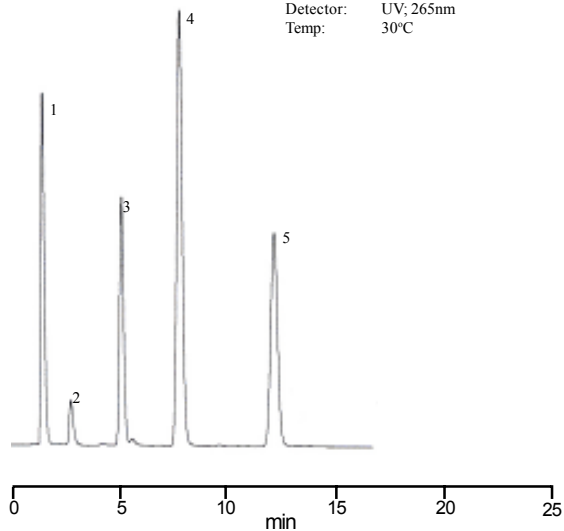
Column: ODL-5-100/15
 Solutes: 1=Uracil
 2=Benzene
 3=Toulene
 4=Naphthalene
 5=t-Butyl Benzene
 6=Anthracene
 Eluent: Methanol:H₂O 70:30 (v:v)
 Flow: 1.0mL/min
 Detector: UV; 254nm
 Temp: 30°C



Application of *SMT-SAM-C18* [ODL-Columns]

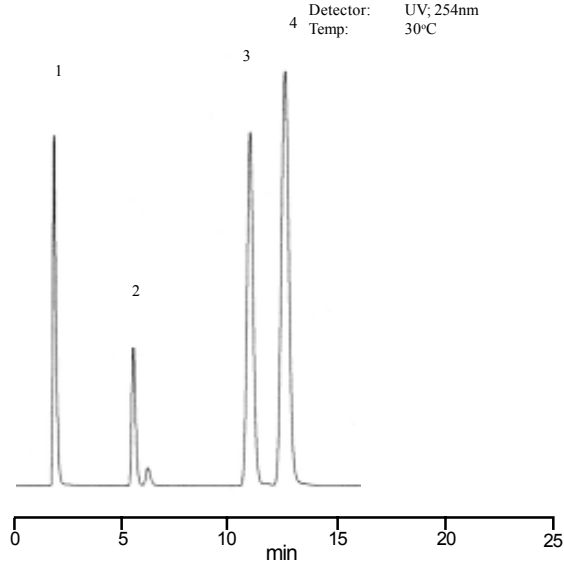
Drug molecules: Barbiturates

Column: ODL-5-100/15
Solutes: 1=sulfanilamide
 2=cefaclor
 3=cefatrizine
 4=thiamphenicol
 5=cefotaxime
Eluent: ACN:0.01M Potassium Phosphate
 [pH=3] 25:75, (v:v)
Flow: 1.0mL/min
Detector: UV; 265nm
Temp: 30°C



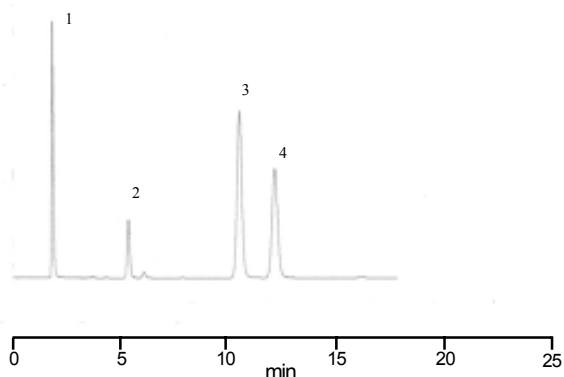
Sulfa Drugs

Column: ODL-5-100/15
Solutes: 1= sulfathiazole
 2=sulfamethizole
 3=sulfadimethoxine
 4=sulfaquinoxaline
Eluent: Methanol: 5mM 1-heptane
 sulfonate Na 30:70, (v:v)
Flow: 1.0mL/min
Detector: UV; 254nm
Temp: 30°C



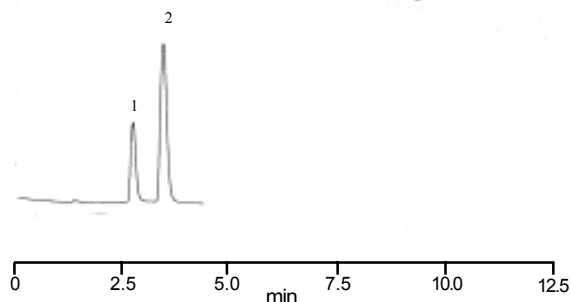
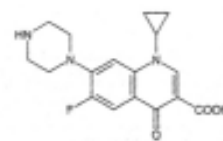
Anticonvulsants

Column: ODL-5-100/15
Solutes: 1=ethotoin
 2=phenobarbital
 3=methsuximide
 4=diazepam
Eluent: Water:ACN;20-60%ACN in 15min
Flow: 1.0mL/min
Detector: UV; 254nm
Temp: 30°C



Ciprofloxacin

Column: ODL-5-100/15
Solutes: 1= ciprofloxacin ethylenediamine Analog
 2= ciprofloxacin hydrochloride
Eluent: ACN:0.025M phosphoric acid, pH=3 15:85 (v:v)
Flow: 1.0mL/min
Detector: UV; 278nm
Temp: 30°C



SMT SAM-C18 [Elite-C18 Series]

Unique features:

- Moderately hydrophobic; Offers comparable carbon load as most other commercially available C18 columns and faster mass transfer than SAM OD-series.
- Excellent peak symmetry; highly versatile; offers very good selectivity for polar and Moderately nonpolar pharmaceuticals and biomolecules.
- High efficiency

Elite-C18 Columns are available in 5 μ m particle size and 100 \AA pore size.

Typical Column Specification:	SAM Elite-C18 Columns
5 μ m silica	100
surface area [m ² /g]	340
%Carbon	12
Coverage [μ moles/m ²]	7.4

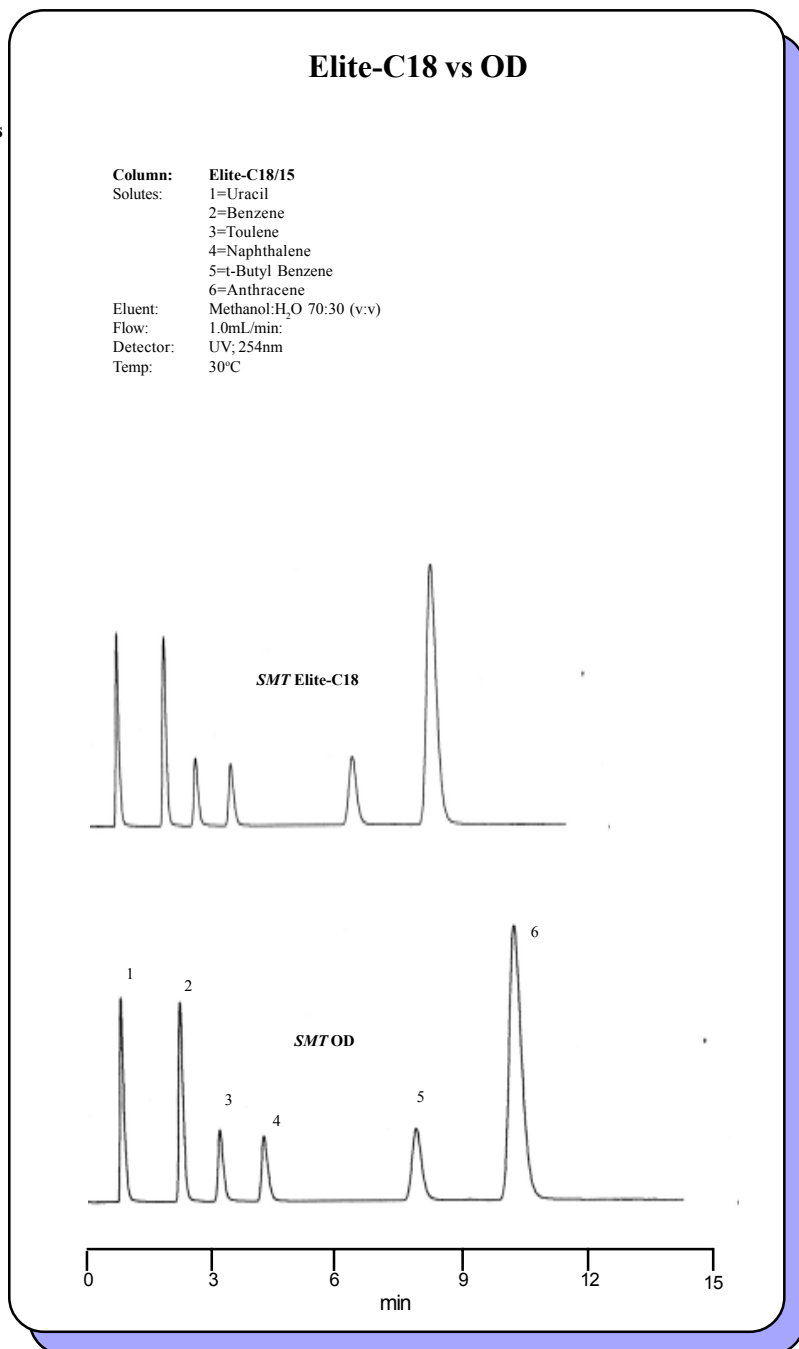
Ordering Information:

SAM Elite-C18 Columns: 5 μ m, 100

+Column Dimension (Length x i.d)	* Catalog Number
50mmx4.6mm	Elite-C18/5
75mmx4.6mm	Elite-C18/7.5
100mmx4.6mm	Elite-C18/10
150mmx4.6mm	Elite-C18/15
250mmx4.6mm	Elite-C18/25
300mmx4.6mm	Elite-C18/30
150mmx7.8mm	Elite-C18/157.8
250mmx7.8mm	Elite-C18/257.8
300mmx7.8mm	Elite-C18/307.8
150mmx10mm	Elite-C18/1510
250mmx10mm	Elite-C18/2510
300mmx10mm	Elite-C18/3010
150mmx22.1mm	Elite-C18/1522
250mmx22.1mm	Elite-C18/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

+Other columns of different dimensions are also available;
Please contact SMT, Inc. for quotation

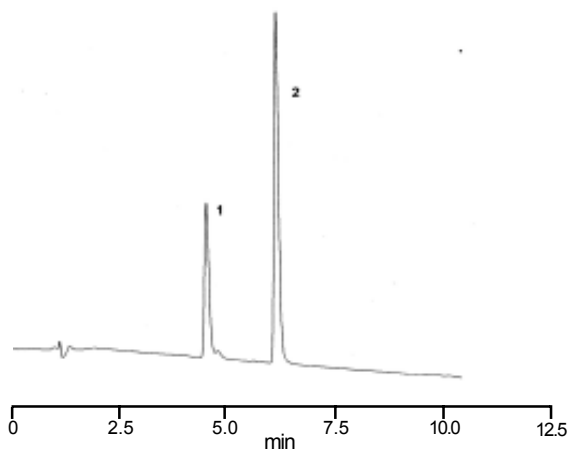


Applications of SMT SAM-C18 [Elite-C18 Columns]

Polypeptides: NPH Insulin

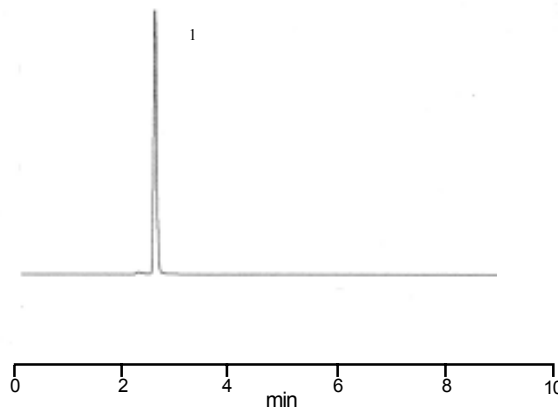
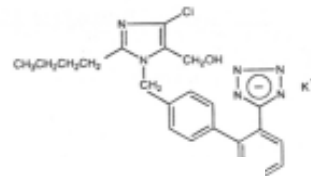
Insulin regulates carbohydrate and lipid metabolism, and influences protein synthesis

Column: Elite-C18/15
Solutes: 1=unknown
 2=Insulin
Eluent: ACN:0.01% TFA water [pH=2]
 20:80 gradient to 40:60 v:v in 20 min
Flow: 1.0mL/min
Detector: UV; 210nm
Temp: 30°C



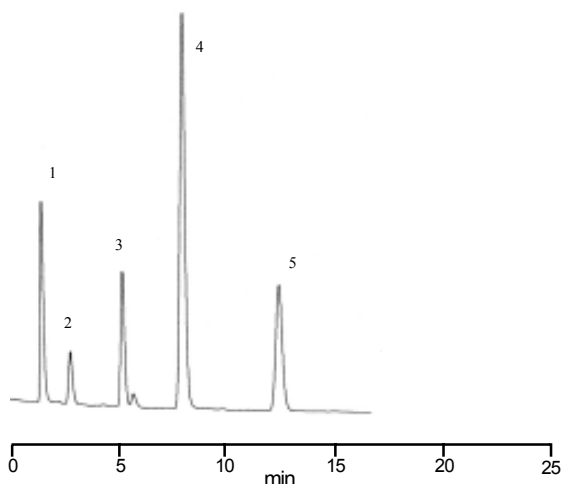
Drug molecules: Cozaar^R

Column: Elite-C18/15
Solutes: 1=losartan potassium
Eluent: Acetonitrile:0.05%TFA-water (30:70)
Flow: 1.0mL/min
Detector: UV; 240nm
Temp: 30°C



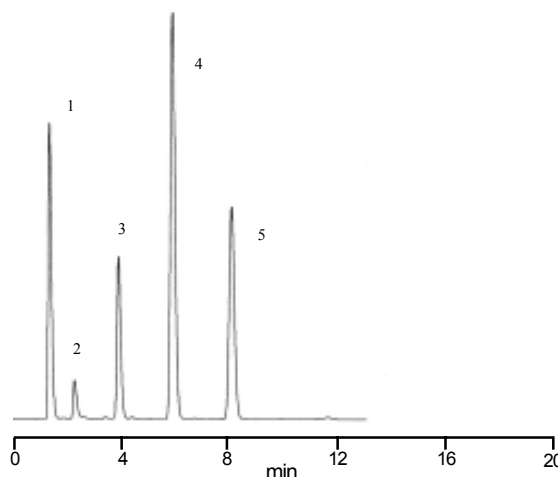
Xanthine derivatives

Column: Elite-C18/15
Solutes: 1=theobromine
 2=theophylline
 3=caffeine
 4=8-chlorotheophylline
 5=7-(2-chloroethyl)theophylline
Eluent: water:methanol:glacial acetic acid (60:39:1)
Flow: 1.0mL/min
Detector: UV; 254nm
Temp: 30°C



Drug molecules: Penicillins

Column: Elite-C18/25
Solutes: 1=ampicillin
 2= oxacillin
 3= cioxacillin
 4= flucloxacillin
 5= dicloxacillin
Eluent: Acetonitrile:0.05M phosphate buffer[pH=7] (25:75)
Flow: 1.5mL/min
Detector: UV; 235nm
Temp: 30°C



Introduction to *SMT* SAM-C8 Columns and Packings

SMT's unique bonding method produces very high ligand density silica based octyl (C8) column packing material which results in chromatographic properties unlike any other silica-based column support. *SMT*'s C8 column is designed for optimum peak shape, peak capacity and high chromatographic efficiency for both acidic and basic solutes.

SMT's C8 column is very stable at extreme pH conditions and high temperatures. The column is strongly recommended for the separation of most basic solutes that have high concentration of very hydrophobic functional groups. C8 column is usually the second column of choice after C18 for method developments using reversed-phase chromatographic separation. When compared to other columns such as C4, CN, phenyl, or an amino bonded phase, the C8 is the most hydrophobic.

Although C18 remains the most widely used, the use of the C8 phase has increased in recent years and represents a good compromise phase. C8 phase normally provides equivalent selectivity; it is not too hydrophobic, and yet it retains many compounds on the basis of interaction with their hydrophobic groups. C8 phases are good choices when too much organic solvent is required to elute the analytes of interest (especially highly hydrophobic molecules) from a C18 phase. The use of C8 columns reduces retention time and consumption of organic solvents

***SMT* offers three different C8 phases of varying carbon loads for optimal selectivity:**

O series:

SMT SAM-C8 phase with the highest functional ligand coverage confirmed with carbon analysis results of 12% carbon load. In these series, a very high density of the functional ligand, octyl molecule or C8, is achieved through meticulous mixture of the C8 with proprietary spacer molecules to ensure maximum coverage. These phases are very hydrophobic and are designed to tolerate usage in mildly aggressive pH conditions and high temperatures. *SMT* SAM-C8 columns are designed to withstand a pH range of 1-10. The columns are generally stable up to 50% better than other competitors used under similar conditions

OL series:

SMT SAM-C8 phase with the lowest functional ligand coverage confirmed with carbon analysis results of 6% carbon load. In these series, the proportional ratio of the functional ligand, octyl or C8 molecule, mixed with the proprietary spacer molecule, is reduced. The result is a packing material with maximum coverage but much lower functional ligand density. Low density C8 packing material ensures faster mass transfer of solutes during separation. These phases have low hydrophobicity. The spacer molecules protect the substrate from aggressive pH conditions and impact unique selectivity compared with other C8 phases.

Elite-C8 series:

SMT SAM-C8 phases with the intermediate functional ligand coverage confirmed with carbon analysis results of 10% carbon load. In these series, the density of the functional ligand, octyl molecule or C8, is moderated with the proprietary spacer molecule to ensure maximum coverage. These phases are moderately hydrophobic; nevertheless, designed to tolerate usage in very aggressive pH conditions and high temperatures.

All *SMT* SAM-C8 packing materials are available for preparatory, solid phase extraction and process scale applications. Please refer to our bulk packing materials catalog for various particle sizes available for your application.

SMT-SAM-C8 [O-Series]

Unique features:

- moderately hydrophobic and are designed to tolerate usage in mildly aggressive pH conditions.
- highly versatile; offers selectivity for polar and moderately nonpolar pharmaceuticals, natural products, organic chemicals and biologicals.

O-Columns are available in various particle and pore sizes: 3, 5, 10 μm and 100, 120 and 300 μm are stock sizes.

Typical Column Specification:

	SAM O-Columns	
5 μm silica	100	300
surface area [m ² /g]	340	120
%Carbon	12	5
Coverage [μmoles/m ²]	7.4	7.2

Ordering Information:

SAM-C8 (O-Columns): 5 μm, 100

+Column Dimension (Length x i.d)

* Catalog Number

50mmx4.6mm	O-5-100/5
75mmx4.6mm	O-5-100/7.5
100mmx4.6mm	O-5-100/10
150mmx4.6mm	O-5-100/15
250mmx4.6mm	O-5-100/25
300mmx4.6mm	O-5-100/30
150mmx7.8mm	O-5-100/157.8
250mmx7.8mm	O-5-100/257.8
300mmx7.8mm	O-5-100/307.8
150mmx10mm	O-5-100/1510
250mmx10mm	O-5-100/2510
300mmx10mm	O-5-100/3010
150mmx22.1mm	O-5-100/1522
250mmx22.1mm	O-5-100/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

SAM-C8 (O-Columns): 5 μm, 300

+Column Dimension (Length x i.d)

*Catalog Number

50mmx4.6mm	O-5-300/5
75mmx4.6mm	O-5-300/7.5
100mmx4.6mm	O-5-300/10
150mmx4.6mm	O-5-300/15
250mmx4.6mm	O-5-300/25
300mmx4.6mm	O-5-300/30
150mmx7.8mm	O-5-300/157.8
250mmx7.8mm	O-5-300/257.8
300mmx7.8mm	O-5-300/307.8
150mmx10mm	O-5-300/1510
250mmx10mm	O-5-300/2510
300mmx10mm	O-5-300/3010
150mmx22.1mm	O-5-300/1522
250mmx22.1mm	O-5-300/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

SAM-C8 (O-Columns): 5 μm, 60

+Column Dimension (Length x i.d)

*Catalog Number

50mmx4.6mm	O-5-60/5
75mmx4.6mm	O-5-60/7.5
100mmx4.6mm	O-5-60/10
150mmx4.6mm	O-5-60/15
250mmx4.6mm	O-5-60/25

SAM-C8 (O-Columns): 10 μm, 100

+Column Dimension (Length x i.d)

* Catalog Number

50mmx4.6mm	O-10-100/5
75mmx4.6mm	O-10-100/7.5
100mmx4.6mm	O-10-100/10
150mmx4.6mm	O-10-100/15
250mmx4.6mm	O-10-100/25
300mmx4.6mm	O-10-100/30
150mmx7.8mm	O-10-100/157.8
250mmx7.8mm	O-10-100/257.8
300mmx7.8mm	O-10-100/307.8
150mmx10mm	O-10-100/1510
250mmx10mm	O-10-100/2510
300mmx10mm	O-10-100/3010
150mmx22.1mm	O-10-100/1522
250mmx22.1mm	O-10-100/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

SAM-C8 (O-Columns): 10 μm, 300

+Column Dimension (Length x i.d)

*Catalog Number

50mmx4.6mm	O-10-300/5
75mmx4.6mm	O-10-300/7.5
100mmx4.6mm	O-10-300/10
150mmx4.6mm	O-10-300/15
250mmx4.6mm	O-10-300/25
300mmx4.6mm	O-10-300/30
150mmx7.8mm	O-10-300/157.8
250mmx7.8mm	O-10-300/257.8
300mmx7.8mm	O-10-300/307.8
150mmx10mm	O-10-300/1510
250mmx10mm	O-10-300/2510
300mmx10mm	O-10-300/3010
150mmx22.1mm	O-10-300/1522
250mmx22.1mm	O-10-300/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

SAM-C8 (O-Columns): 3 μm, 120

+Column Dimension (Length x i.d)

*Catalog Number

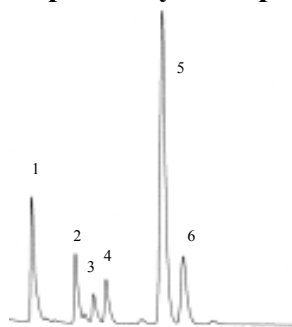
50mmx4.6mm	O-3-120/5
75mmx4.6mm	O-3-120/7.5
100mmx4.6mm	O-3-120/10
150mmx4.6mm	O-3-120/15
250mmx4.6mm	O-3-120/25

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

+Other columns of different dimensions are also available; Please contact SMT, Inc. for quotation

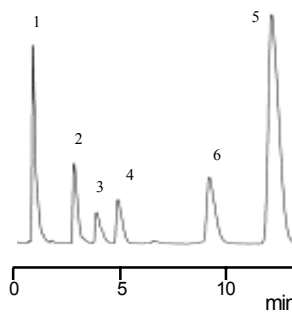
Applications of *SMT* SAM-C8 [O-Columns]

Hydrophobicity: Non-polar Molecules C8 vs C18

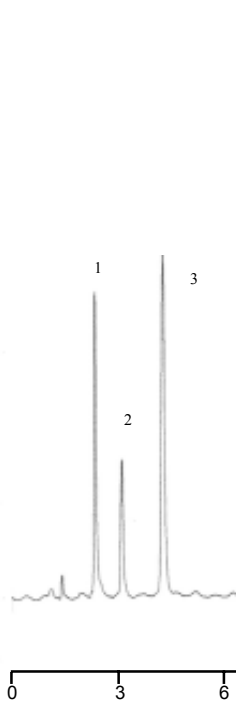


Column: O-5-100/15
 Solutes: 1=uracil
 2=benzene
 3=toluene
 4=naphthalene
 5=iso-butyl Benzene
 6=anthracene
 Eluent: Acetonitrile:H₂O 60:40 (v:v)
 Flow: 1.0mL/min
 Detector: UV; 254nm
 Temp: 30°C

-C8 usually offers similar selectivities as C18 but reduced retention of hydrophobic analytes
 -Note the change in selectivities of isobutyl benzene and anthracene on *SMT* SAM-C8

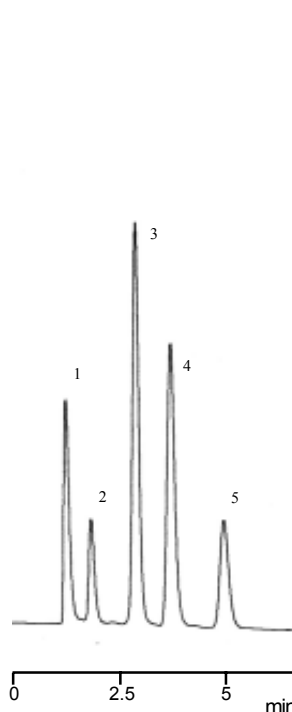


Drugs: Antibiotics



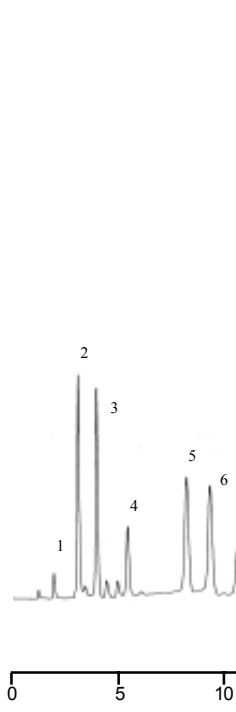
Column: O-5-100/10
 Solutes: 1=ampicillin
 2=oxacillin
 3=dicloxacillin
 Eluent: Acetonitrile:0.05M Potassium phosphate[pH=7] 35:65
 Flow: 1.0mL/min
 Detector: UV; 254nm
 Temp: 30°C

Organic Acids



Column: O-5-100/25
 Solutes: 1=oxalic acid
 2=tartaric acid
 3=lactic acid
 4=acetic acid
 5=Fumaric acid
 Eluent: Acetonitrile:0.02mM potassium phosphate buffer [pH=3] 5:95
 Flow: 1.0mL/min
 Detector: UV; 210nm
 Temp: 30°C

Antibacterial: Tetracyclines

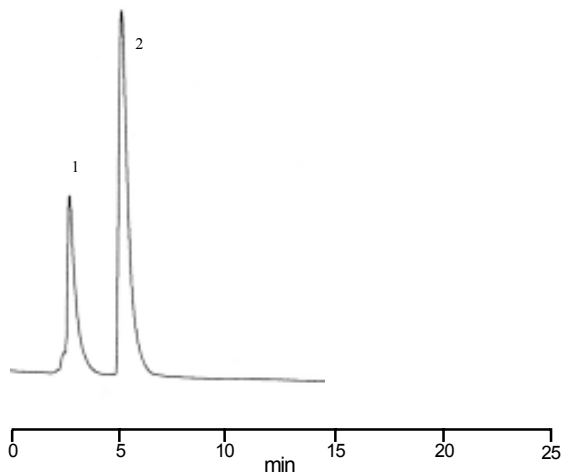


Column: O-5-100/15
 Solutes: 1=minocycline
 2=oxytetracycline
 3=tetracycline
 4=demeclocycline
 5=chlorotetracycline
 6=methacycline
 7=doxycycline
 8=meclocycline
 Eluent: ACN:0.05% TFA water [pH=2] 25:75, (v:v) isocratic
 Flow: 1.0mL/min
 Detector: UV; 254nm
 Temp: 30°C

Applications of *SMT* SAM-C8 [O-Columns]

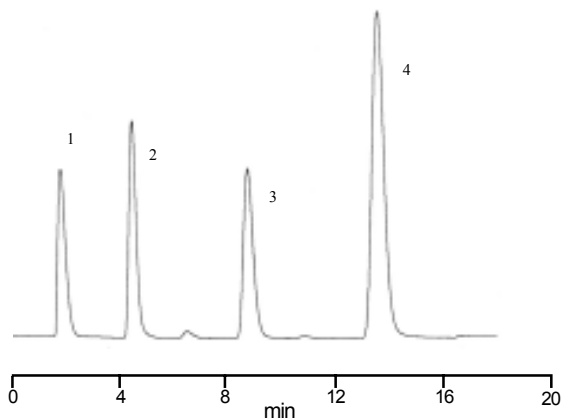
Bromfed-PD^R Capsules

Column: O-5-100/15
 Solutes: 1=Brompheniramine Maleate
 2=Pseudoephedrine HCl
 Eluent: ACN:0.05% TFA water[pH=2] (30:70)
 Flow: 1.0mL/min:
 Detector: UV; 254nm
 Temp: 30°C



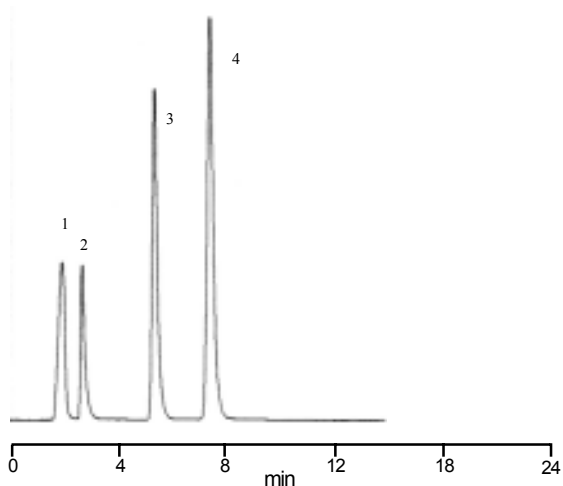
Drug molecules: Antipsychotics

Column: O-5-100/15
 Solutes: 1=perphenazine
 2=promazine
 3=chlorpromazine
 4=triflupromazine
 Eluent: Acetonitrile:0.1% H_3PO_4 (70:30)
 Flow: 1.0mL/min:
 Detector: UV; 254nm
 Temp: 30°C



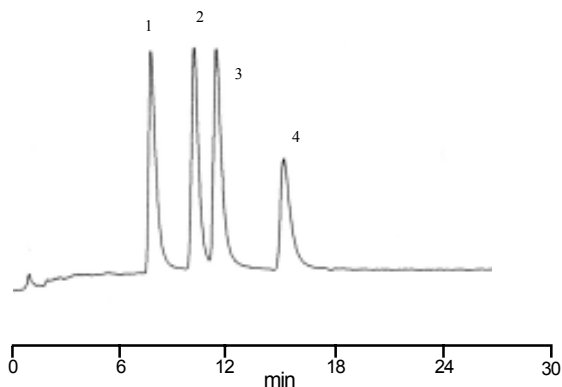
Steroids

Column: O-5-100/10
 Solutes: 1=hydrocortisone
 2=4-androstene-3,17-dione
 3=testosterone
 4=progesterone
 Eluent: methanol:water (80:20)
 Flow: 1.0mL/min:
 Detector: UV; 240nm
 Temp: 30°C



Protein molecules

Column: O-5-300/15
 Solutes: 1=ribonuclease A
 2=cytochrome C
 3=lysozyme
 4=bovine albumin
 Eluent: A=0.05%TFA-water B=0.05%TFA-acetonitrile; 20-80%B in 20min
 Flow: 1.0mL/min:
 Detector: UV; 220nm
 Temp: 30°C



SMT-SAM-C8 Columns [OL-Series]

Unique features:

- Fast mass transfer and high efficiency for the separation of highly hydrophobic molecules.
- Offers unique selectivity compared with other C8 phases. Higher population of spacer molecules provides unique mixed-mode effect for the selectivity
- Stable bonding for long column lifetimes

OL-Columns are available in various particle and pore sizes: 5, 10 μm; 100 and 300 Å are stock sizes.

Typical Column Specification:	SAM OL-Columns	
5 μm silica	100	300
Surface area [m ² /g]	340	90
%Carbon	6	2
Coverage [moles/m ²]	7.4	7.2

Ordering Information:

SAM-C8 (OL-Columns): 5 m, 100

+Column Dimension (Length x i.d)	* Catalog Number
50mmx4.6mm	OL-5-100/5
75mmx4.6mm	OL-5-100/7.5
100mmx4.6mm	OL-5-100/10
150mmx4.6mm	OL-5-100/15
250mmx4.6mm	OL-5-100/25
300mmx4.6mm	OL-5-100/30
150mmx7.8mm	OL-5-100/157.8
250mmx7.8mm	OL-5-100/257.8
300mmx7.8mm	OL-5-100/307.8
150mmx10mm	OL-5-100/1510
250mmx10mm	OL-5-100/2510
300mmx10mm	OL-5-100/3010
150mmx22.1mm	OL-5-100/1522
250mmx22.1mm	OL-5-100/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

SAM-C8 (OL-Columns): 5 m, 300

+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	OL-5-300/5
75mmx4.6mm	OL-5-300/7.5
100mmx4.6mm	OL-5-300/10
150mmx4.6mm	OL-5-300/15
250mmx4.6mm	OL-5-300/25
300mmx4.6mm	OL-5-300/30
150mmx7.8mm	OL-5-300/157.8
250mmx7.8mm	OL-5-300/257.8
300mmx7.8mm	OL-5-300/307.8
150mmx10mm	OL-5-300/1510
250mmx10mm	OL-5-300/2510
300mmx10mm	OL-5-300/3010
150mmx22.1mm	OL-5-300/1522
250mmx22.1mm	OL-5-300/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

SAM-C8 (OL-Columns): 3 m, 120

+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	OL-3-120/5
75mmx4.6mm	OL-3-120/7.5
100mmx4.6mm	OL-3-120/10
150mmx4.6mm	OL-3-120/15
250mmx4.6mm	OL-3-120/25

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

+Other columns of different dimensions are also available; Please contact SMT, Inc. for quotation

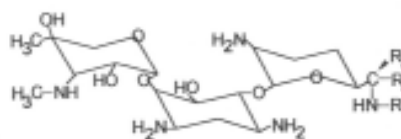
Separation of Gentamicin Complex

Chromatographic Conditions

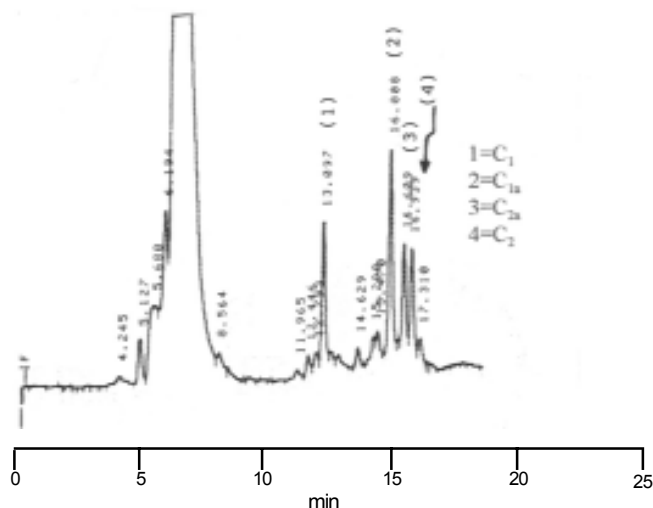
Column: SMT-SAM C8, O-5100/15
Solute: GENTAMITIN COMPLEX

Eluent: A=2.5g 1-Heptane Sulfonic Acid Sodium Salt, 25 mL HAC, 225mL water, dil to 500 mL MeOH; B=MeOH(Gradient 0-5min 75% A, 25% B;5-15min 25% A, 75% B; 5min hold)

Flow: 1.0mL/min:
Detector: Fluorescence,345nm emi



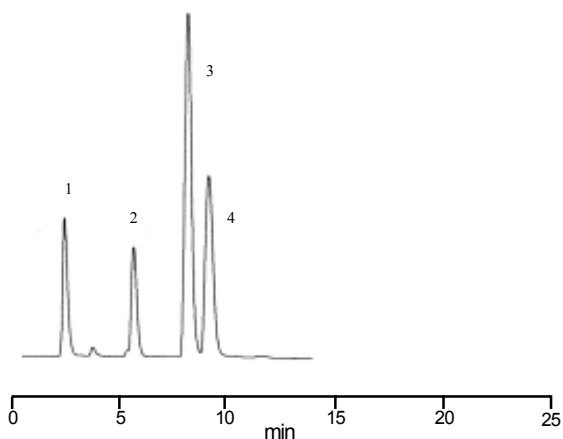
Gentamicin C₁ R₁=R₂=CH₃, R_B=H
Gentamicin C_{1a} R₁=R₂=R_B=H
Gentamicin C₂ R₂=CH₃, R₁=R_B=H
Gentamicin C_{2a} R₁=R₂=H, R_B=CH₃



Applications of SMT SAM-C8 [OL-Columns]

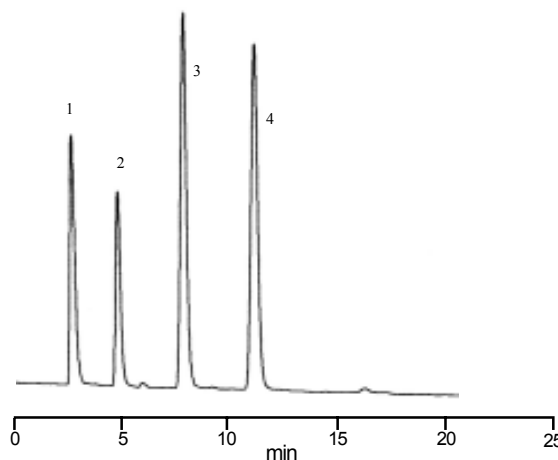
Basic Drugs

Column: OL-5-100/10
Solutes: 1=procainamide
 2=acetaminophen
 3=theophylline
 4=caffeine
Eluent: methanol: 0.05M KH₂PO₄ [pH=3] 25:75
Flow: 1.0mL/min:
Detector: UV; 254nm
Temp: 30°C



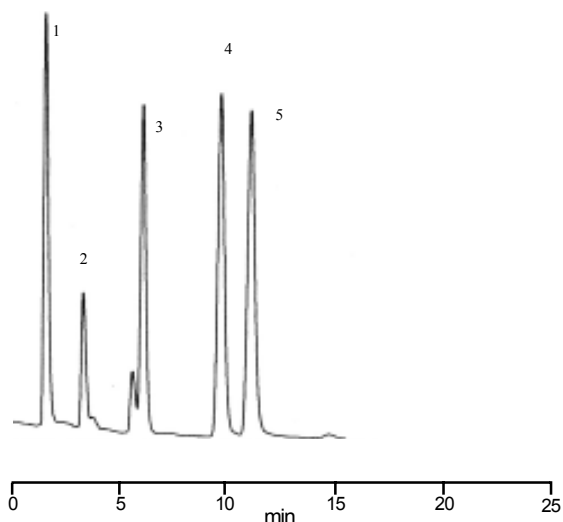
B-Vitamins

Column: OL-5-100/15
Solutes: 1=nicotinic acid
 2=pyridoxine
 3=folic acid
 4=niacinamide
Eluent: acetonitrile: 0.05M Potassium phosphate [pH=7] 10:90
Flow: 1.0mL/min:
Detector: UV; 254nm
Temp: 30°C



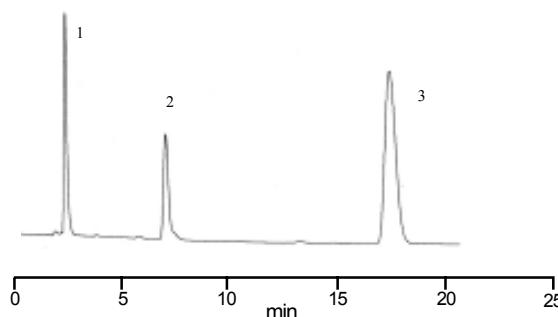
Antihistamines

Column: OL-5-100/15
Solutes: 1=tripelennamine
 2=triprolidine
 3=cyclizine
 4=chlorcyclizine
 5=meclizine
Eluent: Acetonitrile: 0.05M Potassium phosphate [pH=3] 25:75 to 75:25 in 10min.
Flow: 1.0mL/min:
Detector: UV; 220nm
Temp: 30°C



Local Anesthetics

Column: OL-5-100/25
Solutes: 1= procaine
 2=tetracaine
 3=dibucaine
Eluent: Methanol: 0.01%TFA-water 20:80, (v:v)
Flow: 1.0mL/min:
Detector: UV; 220nm
Temp: 30°C



SMT SAM-C8 [Elite-C8 Series]

Unique features:

- Moderately hydrophobic; Offers comparable carbon load as most other commercially available C8 columns and faster mass transfer than SAM O-series.
- Excellent peak symmetry; highly versatile; offers very good selectivity for polar and moderately nonpolar pharmaceuticals and biomolecules.

Elite-C8 Columns are available in 5 μ m particle size and 100 \AA pore size.

Typical Column Specification:	SAM Elite-C8 Columns
5 μ m silica	100
surface area [m^2/g]	340
%Carbon	9
Coverage [moles/m^2]	7.3

Ordering Information:

SAM Elite-C8 Columns: 5 μ m, 100

+Column Dimension (Length x i.d)

* Catalog Number

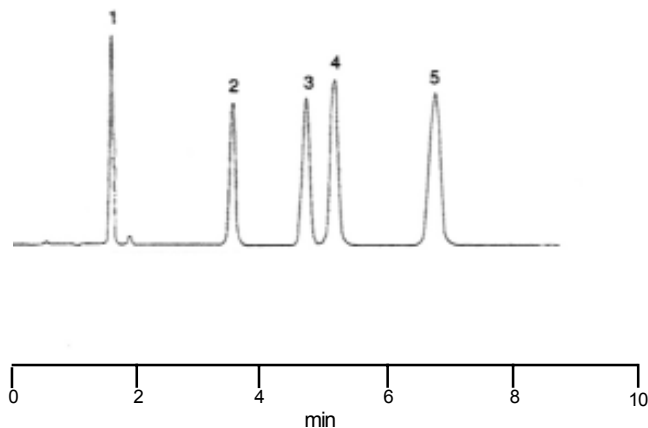
50mmx4.6mm	Elite-C8/5
75mmx4.6mm	Elite-C8/7.5
100mmx4.6mm	Elite-C8/10
150mmx4.6mm	Elite-C8/15
250mmx4.6mm	Elite-C8/25
300mmx4.6mm	Elite-C8/30
150mmx7.8mm	Elite-C8/157.8
250mmx7.8mm	Elite-C8/257.8
300mmx7.8mm	Elite-C8/307.8
150mmx10mm	Elite-C8/1510
250mmx10mm	Elite-C8/2510
300mmx10mm	Elite-C8/3010
150mmx22.1mm	Elite-C8/1522
250mmx22.1mm	Elite-C8/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

+Other columns of different dimensions are also available; Please contact SMT, Inc. for quotation

Herbicides

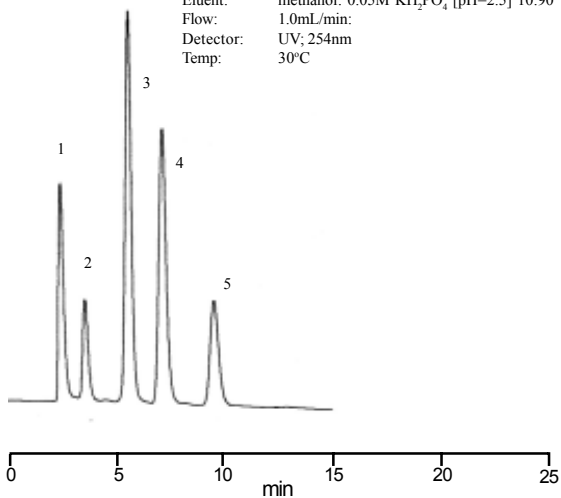
Column: Elite-C8/15
Solutes: 1=Tebuthiuron
2=Simazine
3=Altrazine
4=Propazine
5=Dacthol
Eluent: Acetonitrile:Water 60 to 100% in 3 min
Flow: 1.0mL/min:
Detector: UV; 220nm
Temp: 30°C



Applications of *SMT* SAM-C8 [Elite-Columns]

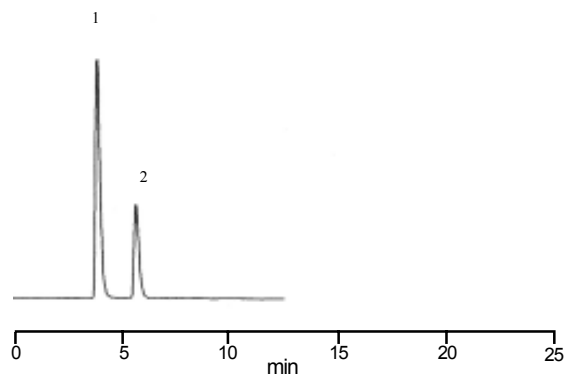
Organic Acids

Column: Elite-C8/15
Solutes: 1=oxalic acid
 2=tartaric acid
 3=malic acid
 4=ascorbic acid
 5=citric acid
Eluent: methanol: 0.05M KH_2PO_4 [pH=2.5] 10:90
Flow: 1.0mL/min
Detector: UV; 254nm
Temp: 30°C



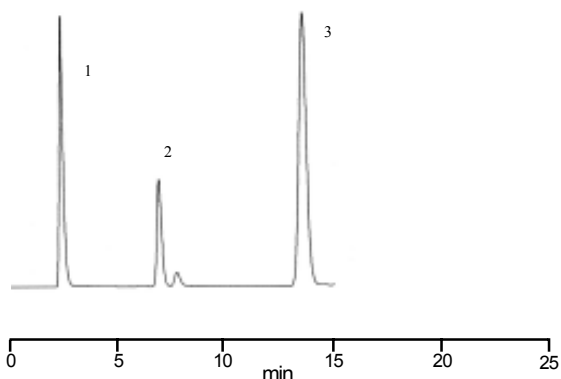
Antioxidants

Column: Elite-C8/10
Solutes: 1=Butylated hydroxyanisole
 2=Butylated hydroxytoluene
Eluent: Acetonitrile:water (65:35)
Flow: 1.0mL/min
Detector: UV; 254nm
Temp: 30°C



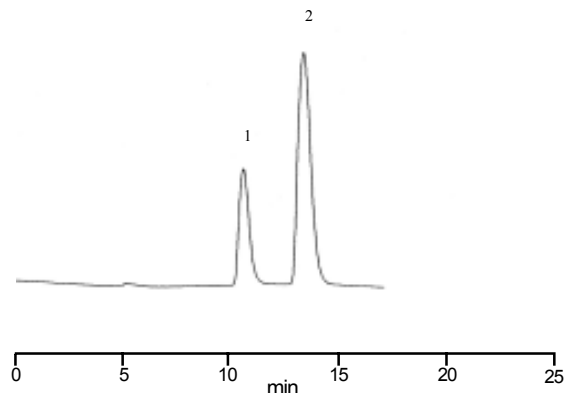
Drug molecules: AZT

Column: Elite-C8/15
Solutes: 1=AZT-monophosphate
 2=AZT-glucuronide
 3=AZT
Eluent: Acetonitrile:0.1% H_3PO_4 (20:80)
Flow: 1.0mL/min
Detector: UV; 280nm
Temp: 40°C



Drugs: Antiarrhythmic

Column: Elite-C8/15
Solutes: 1= procainamide
 2=N-acetylprocainamide
Eluent: Acetonitrile: 0.025M Potassium phosphate buffer [pH=3] 10:90
Flow: 1.0mL/min
Detector: UV; 254nm
Temp: 30°C



Introduction to *SMT*-MEB Columns and Packings

SMT manufactures columns with short carbon chains for rapid analysis of basic, neutral, and mildly acidic drugs and small molecules. These columns provide excellent baseline resolution for small basic molecules including therapeutic drugs. The bonding scheme ensures proper deactivation substrate silanols and resistance to acid hydrolysis.

MEB (Methyl, Ethyl, and Butyl) columns are particularly superior to other reversed-phases in the separation of compounds that show very strong hydrophobic interaction with hydrophobic stationary phases such as C18 and C8. MEB columns offers extremely fast mass transfer and high efficiency in the separation of these compounds. Specific applications include separation of proteins, peptides and food additives.

***SMT* offers 3 different MEB phases of varying carbon loads for optimal selectivity:**

MEB1 series: *SMT* MEB column with the shortest carbon length. The functional ligand is methyl, C1 with carbon analysis results of about 1% carbon load. In these series, a very high density of the functional ligand, methyl molecule or C1, is achieved through a novel method of molecular assembly that ensures maximum coverage of the short chain. These phases are the least hydrophobic of all the MEB columns.

MEB2 series: *SMT* MEB column with only two carbon chains. The functional ligand is ethyl, C2 with carbon analysis results of 2% carbon load. In these series, a very high density of the functional ligand, ethyl molecule or C2, is achieved through a novel method of molecular assembly that ensures maximum coverage. These phases offer medium hydrophobicity when compared with all the other MEB phases.

MEB4 series: *SMT* MEB column with four carbon chains. The functional ligand is butyl, C4 with carbon analysis results of about 4% carbon load. In these series, a very high density of the functional ligand, butyl molecule or C4, is achieved through a novel method of molecular assembly that ensures maximum coverage. These phases offer the highest hydrophobicity when compared with all the other MEB phases.

All *SMT* MEB packing materials are available for preparatory, solid phase extraction and process scale applications. Please refer to our bulk packing materials catalog for various particle sizes available for your application.

SMT-MEB1 [C1] Columns and Applications

Unique features:

- SMTMEB phase with the least hydrophobicity; the functional ligand density provides only about 1% carbon load on the silica substrate.
- Offers selectivity for polar and nonpolar pharmaceuticals, natural products, very hydrophobic proteins and biomolecules.
- Longer column lifetime than traditional C1 columns

MEB1-Columns are available in various particle and pore sizes: 5, 10 μm and 100, 300 μm are stock sizes.

Typical Column Specification:	MEB1-Columns	
5 μm silica	100	300
surface area [m ² /g]	340	90
%Carbon	1.0	0.6
Coverage [moles/m ²]	7.3	7.2

Ordering Information:

MEB1-Columns: 5 μm, 100

+Column Dimension (Length x i.d)	* Catalog Number
50mmx4.6mm	MEB1-5-100/5
100mmx4.6mm	MEB1-5-100/10
150mmx4.6mm	MEB1-5-100/15
250mmx4.6mm	MEB1-5-100/25
150mmx7.8mm	MEB1-5-100/157.8
250mmx7.8mm	MEB1-5-100/257.8
150mmx10mm	MEB1-5-100/1510
250mmx10mm	MEB1-5-100/2510
150mmx22.1mm	MEB1-5-100/1522
250mmx22.1mm	MEB1-5-100/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

MEB1-Columns: 5 μm, 300

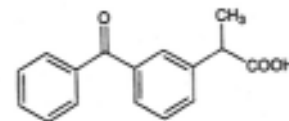
+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	MEB1-5-300/5
100mmx4.6mm	MEB1-5-300/10
150mmx4.6mm	MEB1-5-300/15
250mmx4.6mm	MEB1-5-300/25
150mmx7.8mm	MEB1-5-300/157.8
250mmx7.8mm	MEB1-5-300/257.8
150mmx10mm	MEB1-5-300/1510
250mmx10mm	MEB1-5-300/2510
150mmx22.1mm	MEB1-5-300/1522
250mmx22.1mm	MEB1-5-300/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

+Other columns of different dimensions are also available; Please contact SMT, Inc. for quotation

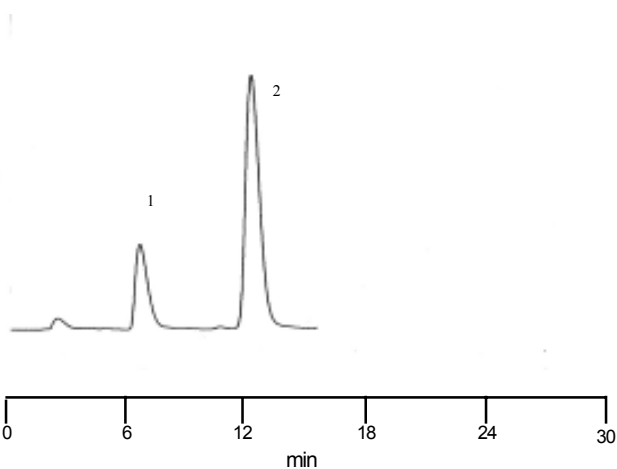
Pain medicine: Orudis[®] KT[™]

Column: MEB1-5-100/15
 Solutes: 1=ketoprofen
 Eluent: ACN:0.01M Potassium Phosphate [pH=3] 25:75, (v:v)
 Flow: 1.0mL/min
 Detector: UV; 255nm
 Temp: 30°C



Protein molecules

Column: MEB1-5-300/15
 Solutes: 1= cytochrome C
 2=Insulin
 Eluent: A=0.05%TFA-water B=0.05%TFA-acetonitrile; 20-80%B in 30min
 Flow: 1.0mL/min
 Detector: UV; 220nm
 Temp: 30°C



SMT-MEB2 [C2] Columns and Applications

Unique features:

- SMT MEB phase with two carbon chains. The functional ligand density provides about 1.2% carbon load on the silica substrate.
- MEB2 is also suitable for analysis of very hydrophobic proteins and biomolecules. More suitable for separation in mildly aggressive pH conditions than MEB1
- Longer column lifetime than traditional C2 columns

MEB2-Columns are available in various particle and pore sizes: 5, 10 μm and 100, 300 μm are stock sizes.

Typical Column Specification:	MEB2-Columns	
5 μm silica	100	300
surface area [m ² /g]	340	90
%Carbon	1.2	0.8
Coverage [moles/m ²]	7.3	7.2

Ordering Information:

MEB2-Columns: 5 μm, 100

+Column Dimension (Length x i.d)

* Catalog Number

50mmx4.6mm	MEB2-5-100/5
100mmx4.6mm	MEB2-5-100/10
150mmx4.6mm	MEB2-5-100/15
250mmx4.6mm	MEB2-5-100/25
150mmx7.8mm	MEB2-5-100/157.8
250mmx7.8mm	MEB2-5-100/257.8
150mmx10mm	MEB2-5-100/1510
250mmx10mm	MEB2-5-100/2510
150mmx22.1mm	MEB2-5-100/1522
250mmx22.1mm	MEB2-5-100/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

MEB2-Columns: 5 μm, 300

+Column Dimension (Length x i.d)

*Catalog Number

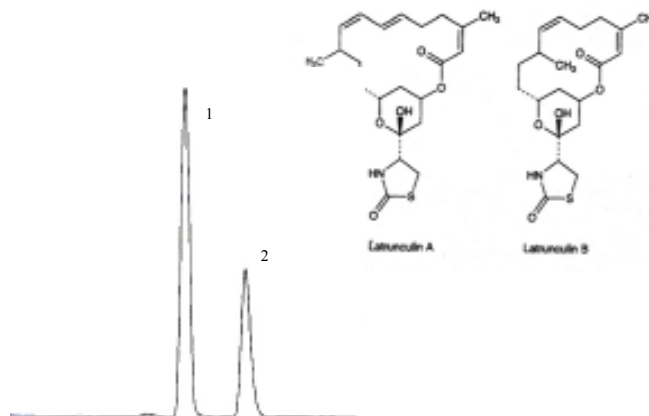
50mmx4.6mm	MEB2-5-300/5
100mmx4.6mm	MEB2-5-300/10
150mmx4.6mm	MEB2-5-300/15
250mmx4.6mm	MEB2-5-300/25
150mmx7.8mm	MEB2-5-300/157.8
250mmx7.8mm	MEB2-5-300/257.8
150mmx10mm	MEB2-5-300/1510
250mmx10mm	MEB2-5-300/2510
150mmx22.1mm	MEB2-5-300/1522
250mmx22.1mm	MEB2-5-300/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

+Other columns of different dimensions are also available; Please contact SMT, Inc. for quotation

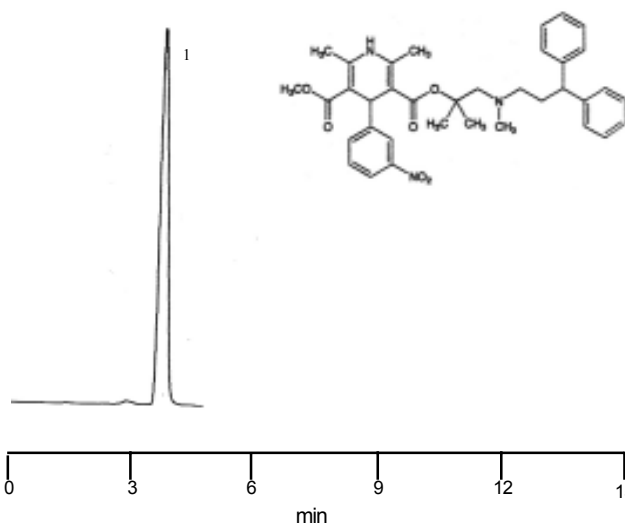
Biomolecules: Latrunculin

Column: MEB2-5-100/15
 Solutes: 1=Latrunculin B
 2=Latrunculin A
 Eluent: Methanol:water (55:45)
 Flow: 1.0mL/min
 Detector: UV; 215nm
 Temp: 30°C



Antihypertensive: Lercanidipine

Column: MEB2-5-100/15
 Solutes: 1= Lercanidipine
 Eluent: ACN:0.01M Potassium Phosphate [pH=3] 45:55
 Flow: 1.0mL/min:
 Detector: UV; 254nm
 Temp: 30°C



SMT-MEB4 [C4] Columns and Applications

Unique features:

- SMT MEB phase with four carbon chains. The functional ligand density provides about 3% carbon load on the silica substrate.
- Most hydrophobic of all MEB columns; designed to tolerate mildly aggressive pH conditions that may hamper usage life of MEB1 and MEB2 columns.
- Excellent peak symmetry; offers very good selectivity for polar and moderately nonpolar pharmaceuticals and biomolecules.
- Longer column lifetime than traditional C4 columns

MEB4-Columns are available in various particle and pore sizes: 5, 10 μm and 100, 300 μm are stock sizes.

Typical Column Specification:	MEB4-Columns	
5 μm silica	100	300
surface area [m ² /g]	340	90
%Carbon	3.2	1.4
Coverage [moles/m ²]	7.3	7.2

Ordering Information:

MEB4-Columns: 5 μm, 100

+Column Dimension (Length x i.d)	* Catalog Number
50mmx4.6mm	MEB4-5-100/5
100mmx4.6mm	MEB4-5-100/10
150mmx4.6mm	MEB4-5-100/15
250mmx4.6mm	MEB4-5-100/25
150mmx7.8mm	MEB4-5-100/157.8
250mmx7.8mm	MEB4-5-100/257.8
150mmx10mm	MEB4-5-100/1510
250mmx10mm	MEB4-5-100/2510
150mmx22.1mm	MEB4-5-100/1522
250mmx22.1mm	MEB4-5-100/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

MEB4-Columns: 5 μm, 300

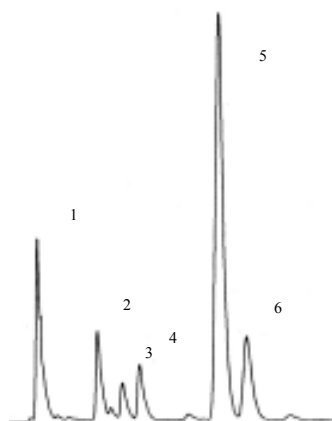
+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	MEB4-5-300/5
100mmx4.6mm	MEB4-5-300/10
150mmx4.6mm	MEB4-5-300/15
250mmx4.6mm	MEB4-5-300/25
150mmx7.8mm	MEB4-5-300/157.8
250mmx7.8mm	MEB4-5-300/257.8
150mmx10mm	MEB4-5-300/1510
250mmx10mm	MEB4-5-300/2510
150mmx22.1mm	MEB4-5-300/1522
250mmx22.1mm	MEB4-5-300/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

+Other columns of different dimensions are also available; Please contact SMT, Inc. for quotation

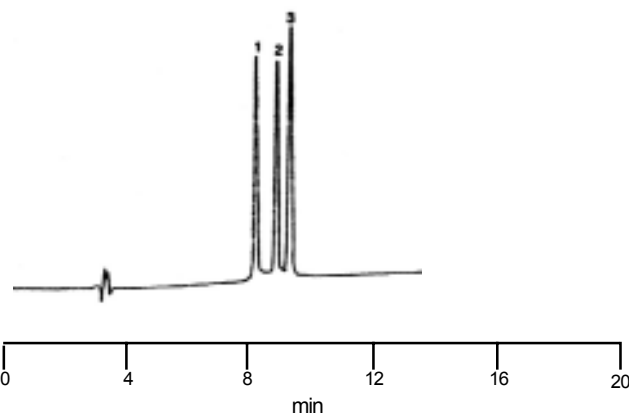
Protein molecules

Column: MEB4-5-300/10
 Solutes: 1=alkaline phosphatase
 2=cyanocobalamin
 3=RNase
 4=Insulin
 5=Transferrin
 6=Trypsin inhibitor
 Eluent: A=0.05%TFA/water B=0.05%TFA/acetonitrile;
 A:B(100:0) to A:B(80:20)in 6min
 A:B(80:20) to A:B(60:40)in 4min
 A:B(60:40) to A:B(40:60)in 4min
 Flow: 1.0mL/min
 Detector: UV; 220nm
 Temp: 30°C



Protein molecules: cytochrome C variants

Column: MEB2-5-300/15
 Solutes: 1= cytochrome C (Equivine)
 2= cytochrome C (Bovine)
 3= cytochrome C (Canine)
 Eluent: A=0.05%TFA/water B=0.05%TFA/ACN;
 A:B(20:80) to A:B(80:20) in 15min
 Flow: 1.0mL/min
 Detector: UV; 220nm
 Temp: 30°C



SMT-Phenyl Columns

SMT-Phenyl column provides unique selectivity for aromatic compounds when compared to other reversed-phase packings such as C18 and C8. The π electrons of the phenyl group can interact with the aromatic ring of an analyte to increase retention relative to less or non-aromatic analytes.

Unique features:

- Offers preferential retention of aromatic compounds.
- Complimentary to other reversed-phase materials such as C18, C8, and C4.

Two types of SMT-Phenyl are available:

Phen1: contains one phenyl per ligand

Phen2: contains two phenyls per ligand

SMT-Phenyl columns are also ideal for the separation of proteins, peptides and other biomolecules. Figure 1 shows a comparison of a typical selectivity obtainable in the separation of a mixture containing aliphatic and aromatic compounds using SMT-Phenyl and SMT-C18 columns.

Typical Column Specification:	SAM Phen1-Columns		SAM Phen2-Columns	
5 μ m silica	100	300	100	300
surface area [m ² /g]	340	90	340	90
%Carbon	8.1	3.4	8.4	3.6
Coverage [μ moles/m ²]	7.2	7.2	7.2	7.2

SMT Phenyl-Columns are available in various particle and pore sizes: 5, 10 μ m and 100, 300 \AA are stock sizes.

Ordering Information:

Phen1-Columns: 5 μ m, 100

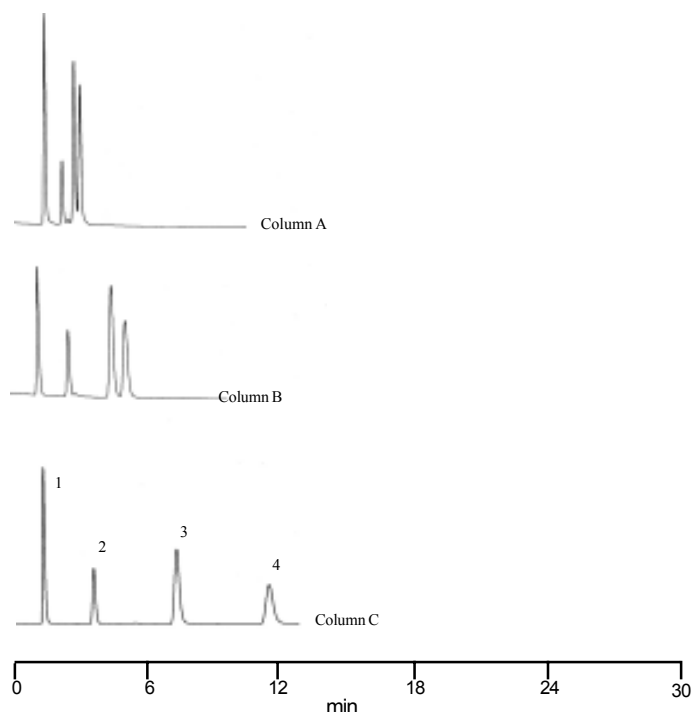
+Column Dimension (Length x i.d)	* Catalog Number
50mmx4.6mm	Phen1-5-100/5
100mmx4.6mm	Phen1-5-100/10
150mmx4.6mm	Phen1-5-100/15
250mmx4.6mm	Phen1-5-100/25
150mmx7.8mm	Phen1-5-100/157.8
250mmx7.8mm	Phen1-5-100/257.8
150mmx10mm	Phen1-5-100/1510
250mmx10mm	Phen1-5-100/2510

Phen1-Columns: 5 μ m, 300

+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	Phen1-5-300/5

Probe molecules

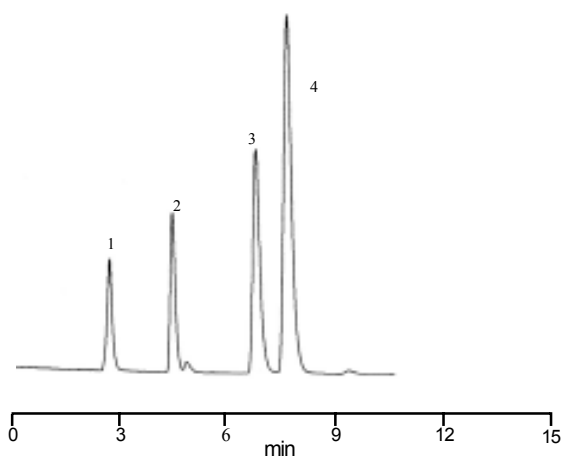
Column: A= Phen1-5-100/15 B= Phen2-5-100/15 C= OD-5-100/15
 Solutes: 1= Uracil
 2= Benzene
 3= Hexanophenone
 4= Anthracene
 Eluent: Acetonitrile: water (70:30)
 Flow: 1.0mL/min:
 Detector: UV; 254nm
 Temp: 30°C



Applications of *SMT* Phenyl Columns

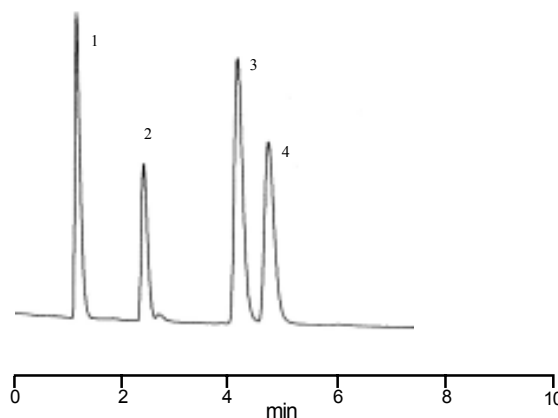
Antibacterials

Column: Phen1-5-100/15
Solutes: 1=carbadox
 2=sulfamerazine
 3=thiamphenicol
 4=sulfadimidine
Eluent: A=Acetonitrile B=0.01M Potassium Phosphate [pH=3] 20%B to 40%B in 20min
Flow: 1.0mL/min:
Detector: UV; 260nm
Temp: 40°C



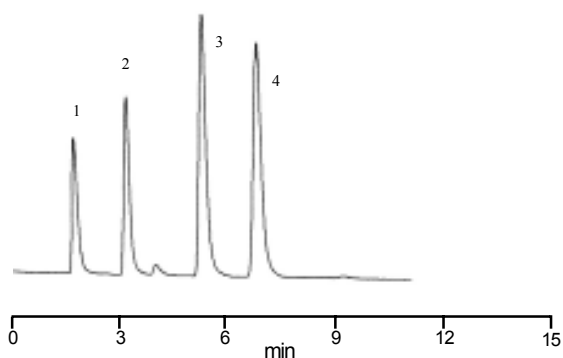
Fatty Acids

Column: Phen1-5-100/15
Solutes: 1=propionic acid
 2=butyric acid
 3=valeric acid
 4=caproic acid
Eluent: Acetonitrile:0.1% H₃PO₄ 20:80 gradient to 60:40 (v:v) in 10 min
Flow: 1.0mL/min:
Detector: UV; 210nm
Temp: 30°C



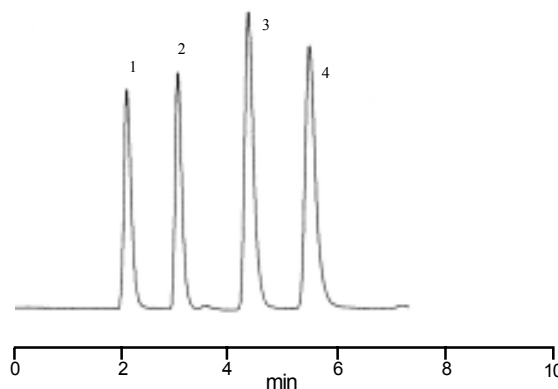
Food Additives

Column: Phen2-5-100/15
Solutes: 1=sodium saccharin
 2=p-hydroxybenzoic acid
 3=benzoic acid
 4=p-toluic acid
Eluent: Acetonitrile:0.01M Potassium Phosphate [pH=3] 25:75
Flow: 1.0mL/min:
Detector: UV; 240nm
Temp: 30°C



Chlorobenzenes

Column: Phen2-5-100/15
Solutes: 1= 1-chlorobenzene
 2=1,2-dichlorobenzene
 3=1,4-dichlorobenzene
 4=1,3-dichlorobenzene
Eluent: Acetonitrile: water 50:50
Flow: 1.0mL/min:
Detector: UV; 254nm
Temp: 30°C

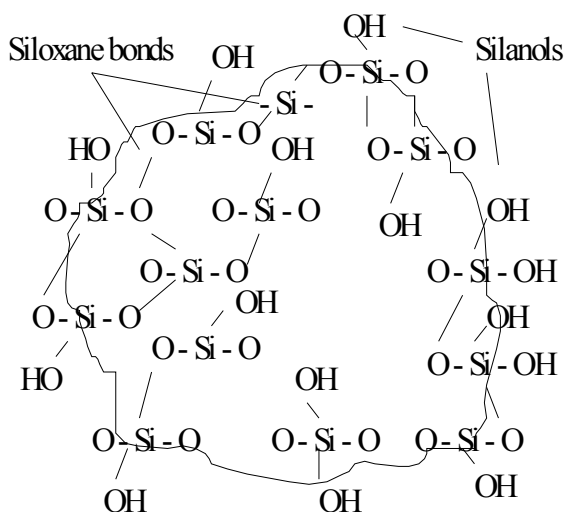


Normal Phase Chromatography

When chromatographic separation is done in a normal phase mode, the surface chemistry of the stationary phase has a *polar* characteristic. The mobile phase is generally *nonpolar* organic solvent (such as hexane or heptane). Because of the limited flexibility in variation of the mobile phase polarity and functional stationary phase, separation in normal phase mode has not grown as much as reversed-phase mode. However, continuous advancement in surface modification has rejuvenated interest in normal phase chromatography. Furthermore, there are some separations that are achieved more conveniently using normal mode.

Silica, alumina, polymers, and a few other metal oxides are the most favorite substrates for normal phase separation. The important features include high surface area, availability in high purity, and homogeneous functional groups.

Structure of Silica gel used in HPLC



Most *SMT* normal phase columns consist of silica as the substrate. *SMT* also offers a series of specialty packing materials for various applications including alumina and magnesia-silica. When used as separation media, attention must be paid to the following characteristics of these packing materials :

- 1. Shape: Spherical or Irregular**
Most packings used for analytical scale separation are best done with spherical particles for reproducibility and reduction of column back pressure. Furthermore, the particle sphericity can provide the column with high mechanical stability. However, irregular packings, which are usually less expensive, may be just as suitable in some analytical applications. Irregular packings are particularly suitable for low-pressure large and process scale including solid phase extraction and flash applications.
- 2. Porosity: Narrow or Wide**
The smaller pore size packings provide higher surface area for greater sample loading. However, the small pore size may exclude large molecules from adequate partitioning over its surface, and as such, may not be ideal for separation of large molecules. Furthermore, the large surface area offered by these packings may result in excessive retention of some analytes of interest. Wide pore size particles generally have low surface area that may be more suitable for the separation of large molecules
- 3. Purity**
Most packings used for analytical scale separation are best done with particles of high purity for reproducibility and to provide complete sample recovery needed in these applications. The absence of impurities reduces non-specific sample adsorption which can lower sample recovery and cause unusual peak shapes.

SMT-Silica [S] Columns and Applications

When silica is used as the stationary phase, the functional groups involved in separation are the surface silanols. However, metal impurities in silica may provide additional sites of interaction for solutes of interest. *SMT* uses high purity silica packing materials that are available in variety of particle and pore sizes. These columns have performed well in the separation of many polar compounds such as pesticides and organic acids.

Unique features:

- Ultra pure silica
- high reproducibility batch to batch resulting in consistent separation.

S-Columns are available in various particle and pore sizes: 3, 5, 10 m ; 100,120 and 300 are stock sizes.

Typical Column Specification:	S-Columns	
5 m silica	100	300
Surface area [m ² /g]	340	90
Pore volume [ml/g]	0.9	2
Particle Shape	Spherical	Spherical
Chemical Purity[Na, Al, Fe, etc.]	<25ppm	<20ppm
Chemical Stability	pH (1.5-9.5)	pH (1.5-9.0)
Mechanical Stability	10,000 psi	8,000psi

Ordering Information:

S-Columns: 5 m, 100

+Column Dimension (Length x i.d)	* Catalog Number
50mmx4.6mm	S-5-100/5
75mmx4.6mm	S-5-100/7.5
100mmx4.6mm	S-5-100/10
150mmx4.6mm	S-5-100/15
250mmx4.6mm	S-5-100/25
300mmx4.6mm	S-5-100/30
150mmx7.8mm	S-5-100/157.8
250mmx7.8mm	S-5-100/257.8
300mmx7.8mm	S-5-100/307.8
150mmx10mm	S-5-100/1510
250mmx10mm	S-5-100/2510
300mmx10mm	S-5-100/3010
150mmx22.1mm	S-5-100/1522
250mmx22.1mm	S-5-100/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

S-Columns: 5 m, 300

+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	S-5-300/5
75mmx4.6mm	S-5-300/7.5
100mmx4.6mm	S-5-300/10
150mmx4.6mm	S-5-300/15
250mmx4.6mm	S-5-300/25
300mmx4.6mm	S-5-300/30
150mmx7.8mm	S-5-300/157.8
250mmx7.8mm	S-5-300/257.8
300mmx7.8mm	S-5-300/307.8
150mmx10mm	S-5-300/1510
250mmx10mm	S-5-300/2510
300mmx10mm	S-5-300/3010
150mmx22.1mm	S-5-300/1522
250mmx22.1mm	S-5-300/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

S-Columns: 3 m, 120

+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	S-3-120/5
75mmx4.6mm	S-3-120/7.5
100mmx4.6mm	S-3-120/10
150mmx4.6mm	S-3-120/15
250mmx4.6mm	S-3-120/25

S-Columns: 10 m, 100

+Column Dimension (Length x i.d)	*Catalog Number
150mmx4.6mm	S-10-100/15
250mmx4.6mm	S-10-100/25

S-Columns: 10 m, 300

+Column Dimension (Length x i.d)	*Catalog Number
150mmx4.6mm	S-10-300/15
250mmx4.6mm	S-10-300/25

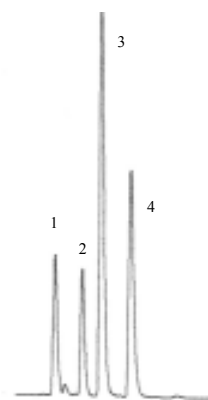
*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

+Other columns of different dimensions are also available;

Please contact *SMT*, Inc. for quotation

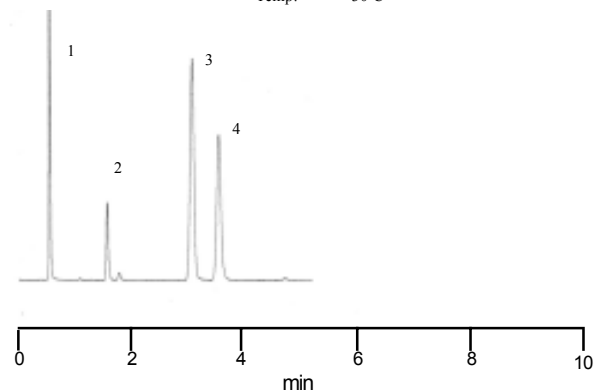
Separation of Tocopherols

Column: S-5-100/15
 Solutes: 1= α -Tocopherol
 2= β -Tocopherol
 3= γ -Tocopherol
 4= δ -Tocopherol
 Eluent: Hexane:THF:Acetic acid (96:4/0.25)
 Flow: 1.0mL/min:
 Detector: UV; 295nm
 Temp: 30°C



Separation of Pesticides

Column: S-5-100/10
 Solutes: 1= Prometryne
 2= Terbutryne
 3= Amerytryne
 4= Atrazine
 Eluent: Hexane:Methanol (98:2)
 Flow: 1.0mL/min:
 Detector: UV; 220nm
 Temp: 30°C



SMT-DIOL Columns and Applications

SMT-Diol column is developed as an alternative for silica column used in normal phase separation methods. The Diol [-OH] functional group is controlled, and as such, provides more reproducible separation when compared to separation on silanols [-OH] from bare silica surface. Furthermore, the hydrogen bonding on the OH functional group on Diol packing material is not as strong as that of bare silica. This results in a reduced interaction of polar compounds on the column. SMT-Diol can be used in normal and reversed-phase separation of pesticides, herbicides, pharmaceutical metabolites, polar natural products, proteins, peptides and other polar biomolecules.

Unique features:

- high loading capability and improved sample recovery
- high reproducibility of bonded ligand resulting in consistent separation.
- increased longevity provided through “total coverage”.

SMT offers two types of Diol columns:

SMT-Diol1 columns-consist of acid-catalyzed cleavage of **3-(2,3-epoxypropoxy) propyl** as the functional ligand

SMT-Diol2 columns-consist of acid-catalyzed cleavage of **5,6-epoxyhexyl** as the functional ligand.

Just like the silica substrate, both of these packings can be subjected to further treatment or modification with another functional ligand for special applications.

SMT-Diol [-OH] -Columns are available in various particle and pore sizes: 5 and 10 μm; 100 and 300 μm are stock sizes.

Typical Column Specification:	SAM Diol1-Columns		SAM Diol2-Columns	
	100	300	100	300
5 μm silica surface area [m ² /g]	340	90	340	90
%Carbon	6.5	3.2	6.2	3.1
Coverage [moles/m ²]	7.2	7.2	7.2	7.2

Ordering Information:

Diol1-Columns: 5 m, 100

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	Diol1-5-100/15
250mmx4.6mm	Diol1-5-100/25
150mmx7.8mm	Diol1-5-100/157.8
250mmx7.8mm	Diol1-5-100/257.8
150mmx10mm	Diol1-5-100/1510
250mmx10mm	Diol1-5-100/2510

Diol1-Columns: 5 m, 300

+Column Dimension (Length x i.d)	*Catalog Number
150mmx4.6mm	Diol1-5-300/15
250mmx4.6mm	Diol1-5-300/25
150mmx7.8mm	Diol1-5-300/157.8
250mmx7.8mm	Diol1-5-300/257.8
150mmx10mm	Diol1-5-300/1510
250mmx10mm	Diol1-5-300/2510

Diol2-Columns: 5 m, 100

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	Diol2-5-100/15
250mmx4.6mm	Diol2-5-100/25
150mmx7.8mm	Diol2-5-100/157.8
250mmx7.8mm	Diol2-5-100/257.8
150mmx10mm	Diol2-5-100/1510
250mmx10mm	Diol2-5-100/2510

Diol2-Columns: 5 m, 300

+Column Dimension (Length x i.d)	*Catalog Number
150mmx4.6mm	Diol2-5-300/15
250mmx4.6mm	Diol2-5-300/25
150mmx7.8mm	Diol2-5-300/157.8
250mmx7.8mm	Diol2-5-300/257.8
150mmx10mm	Diol2-5-300/1510
250mmx10mm	Diol2-5-300/2510

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

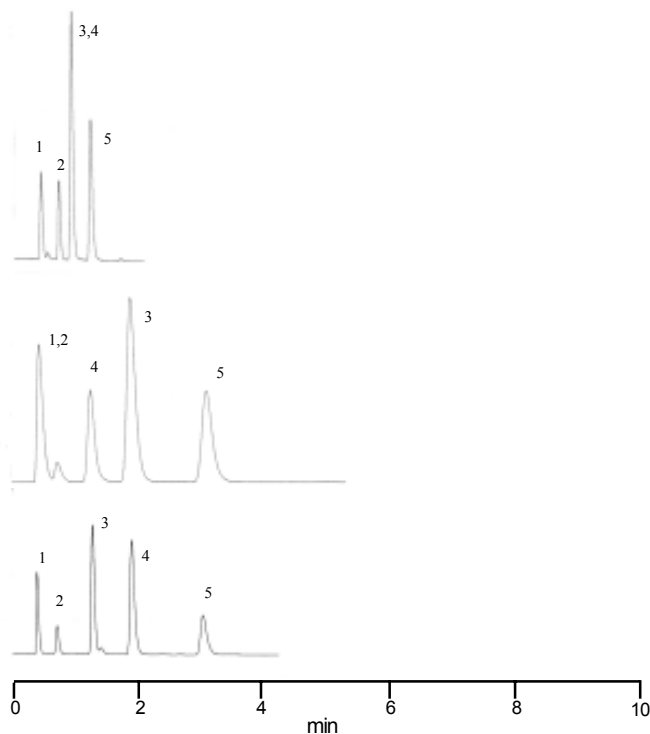
+Other columns of different dimensions are also available; Please contact SMT, Inc. for quotation

Normal Phase Separation of Polar Compounds: Phenols

Column: A=S-5-100/25
B=Diol1-5-100/25
C=Diol2-5-100/25

Solutes: 1=Phenol
2=Catechol
3=Resorcinol
4=Hydroquinone
5=Pyrogallol

Eluent: Isooctane:EtOH (80:20)
Flow: 2.0mL/min
Detector: UV, 254nm
Temp: 30°C



SMT-Aminopropyl [NH₂] Columns and Applications

SMT manufactures very stable aminopropyl [NH₂] columns. SMT aminopropyl columns are often recommended for the separation of polar compounds and can be used in three separation modes:

- normal
- weakly anion exchange and
- reversed -phase

In normal phase mode, the columns can be used to separate polar compounds such as substituted anilines, phenols, and chlorinated pesticides. In reversed-phase mode, separation of organic acids and anions is possible with the addition of common buffers. Other applications include reversed-phase separation of carbohydrates in food and beverages.

Unique features:

- improved separation of polar solutes; excellent sample recovery; high loading capability
- high reproducibility of bonded ligand resulting in consistent separation.
- increased longevity provided through “total coverage”.

Aminopropyl [NH₂] -Columns are available in various particle and pore sizes: 5 and 10 μm; 100 and 300 μm are stock sizes.

Typical Column Specification:	NH ₂ -Columns	
	100	300
5 μm silica		
surface area [m ² /g]	340	90
%Carbon	3.1	1.6
Coverage [moles/m ²]	7.2	7.2

Ordering Information:

NH₂-Columns: 5 μm, 100

+Column Dimension (Length x i.d)	* Catalog Number
50mmx4.6mm	AP-5-100/5
100mmx4.6mm	AP-5-100/10
150mmx4.6mm	AP-5-100/15
250mmx4.6mm	AP-5-100/25
150mmx7.8mm	AP-5-100/157.8
250mmx7.8mm	AP-5-100/257.8
150mmx10mm	AP-5-100/1510
250mmx10mm	AP-5-100/2510
150mmx22.1mm	AP-5-100/1522
250mmx22.1mm	AP-5-100/2522

NH₂-Columns: 5 μm, 300

+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	AP-5-300/5
100mmx4.6mm	AP-5-300/10
150mmx4.6mm	AP-5-300/15
250mmx4.6mm	AP-5-300/25
150mmx7.8mm	AP-5-300/157.8
250mmx7.8mm	AP-5-300/257.8
150mmx10mm	AP-5-300/1510
250mmx10mm	AP-5-300/2510
150mmx22.1mm	AP-5-300/1522
250mmx22.1mm	AP-5-300/2522

NH₂-Columns: 10 μm, 100

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	AP-10-100/15
250mmx4.6mm	AP-10-100/25

NH₂-Columns: 10 μm, 300

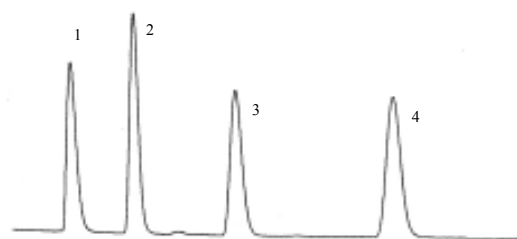
+Column Dimension (Length x i.d)	*Catalog Number
150mmx4.6mm	AP-10-300/15
250mmx4.6mm	AP-10-300/25

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

+Other columns of different dimensions are also available; Please contact SMT, Inc. for quotation

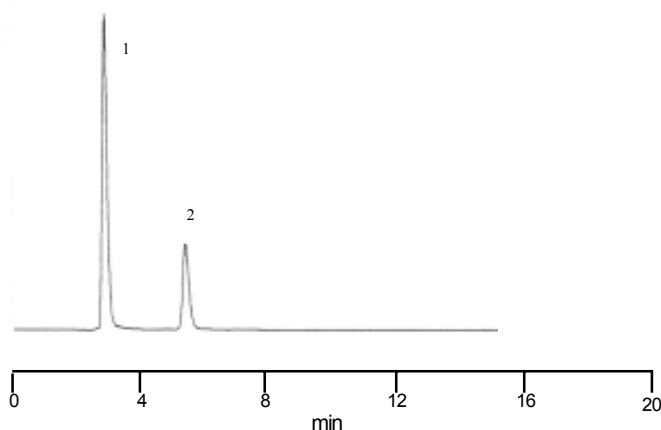
Carbohydrates

Column: AP-5-300/25
 Solutes: 1=fructose
 2=glucose
 3=sucrose
 4=lactose
 Eluent: Acetonitrile:water (80:20)
 Flow: 1.0mL/min:
 Detector: RI
 Temp: 30°C



Ecdysteroids

Column: AP-5-100/25
 Solutes: 1=ecdysone
 2=20-hydroxyecdysone
 Eluent: Dichloromethane:methanol (95:5)
 Flow: 3.0mL/min:
 Detector: UV; 254nm
 Temp: 30°C



SMT-CN Columns and Applications

SMT manufactures ultra-stable cyanopropyl [CN] columns for **normal** and **reversed-phase** chromatographic separation modes. These columns have some special characteristics:

- When used in normal phase mode, with relatively nonpolar solvents, CN-stationary phase can separate many polar compounds just like silica.
- When used in reversed-phase mode, with relatively polar solvents, CN-stationary phase offers complimentary selectivity that may be unattainable with traditional reversed-phase packings such as C18 and C8.

Unique features:

- homogeneous CN-functional surface that permits faster equilibration than unmodified hydroxyl silica surface.
- Extremely high phase *density* and *stability* that are not found in conventional CN-stationary phases.
- increased longevity provided through “total coverage”.

Cyanopropyl [CN] -Columns are available in various particle and pore sizes: 3,5, 10 m; 100, 120 and 300 are stock sizes.

Typical Column Specification:	CN-Columns	
5 m silica	100	300
surface area [m ² /g]	340	90
%Carbon	2.8	1.4

Ordering Information:

CN-Columns: 5 m, 100

+Column Dimension (Length x i.d)	* Catalog Number
50mmx4.6mm	CP-5-100/5
100mmx4.6mm	CP-5-100/10
150mmx4.6mm	CP-5-100/15
250mmx4.6mm	CP-5-100/25
150mmx7.8mm	CP-5-100/157.8
250mmx7.8mm	CP-5-100/257.8
150mmx10mm	CP-5-100/1510
250mmx10mm	CP-5-100/2510
150mmx22.1mm	CP-5-100/1522
250mmx22.1mm	CP-5-100/2522

CN-Columns: 5 m, 300

+Column Dimension (Length x i.d)	*Catalog Number
50mmx4.6mm	CP-5-300/5
100mmx4.6mm	CP-5-300/10
150mmx4.6mm	CP-5-300/15
250mmx4.6mm	CP-5-300/25
150mmx7.8mm	CP-5-300/157.8
250mmx7.8mm	CP-5-300/257.8
150mmx10mm	CP-5-300/1510
250mmx10mm	CP-5-300/2510
150mmx22.1mm	CP-5-300/1522
250mmx22.1mm	CP-5-300/2522

CN-Columns: 10 m, 100

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	CP-5-100/15
250mmx4.6mm	CP-5-100/25

CN-Columns: 10 m, 300

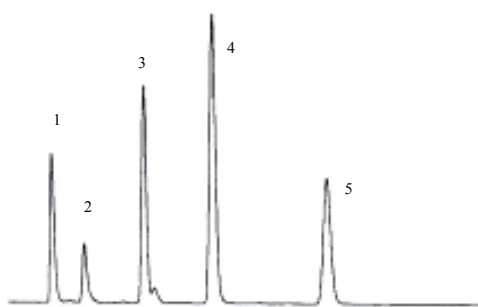
+Column Dimension (Length x i.d)	*Catalog Number
150mmx4.6mm	CP-5-300/15
250mmx4.6mm	CP-5-300/25

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

+Other columns of different dimensions are also available;
Please contact SMT, Inc. for quotation

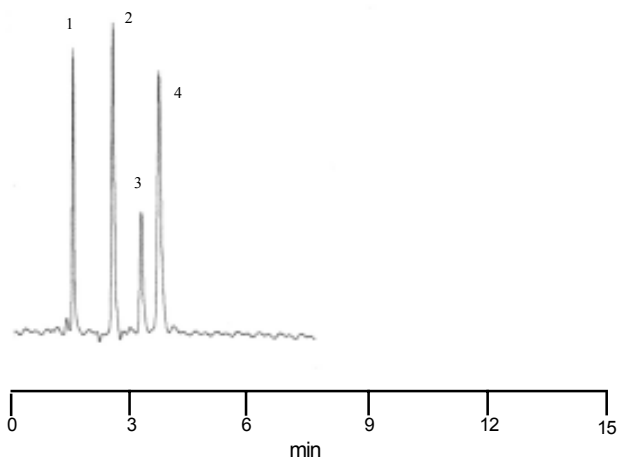
Reversed-Phase Separation of Explosives

Column: CP-5-100/15
Solutes: 1=Nitrobenzene
 2=m-Dinitrobenzene
 3=1,3,5-Trinitrobenzene
 4=4-Nitrotoluene
 5=2,4,6-Trinitrotoluene
Eluent: Acetonitrile:water 60:40
Flow: 1.0mL/min
Detector: UV; 254nm
Temp: 30°C



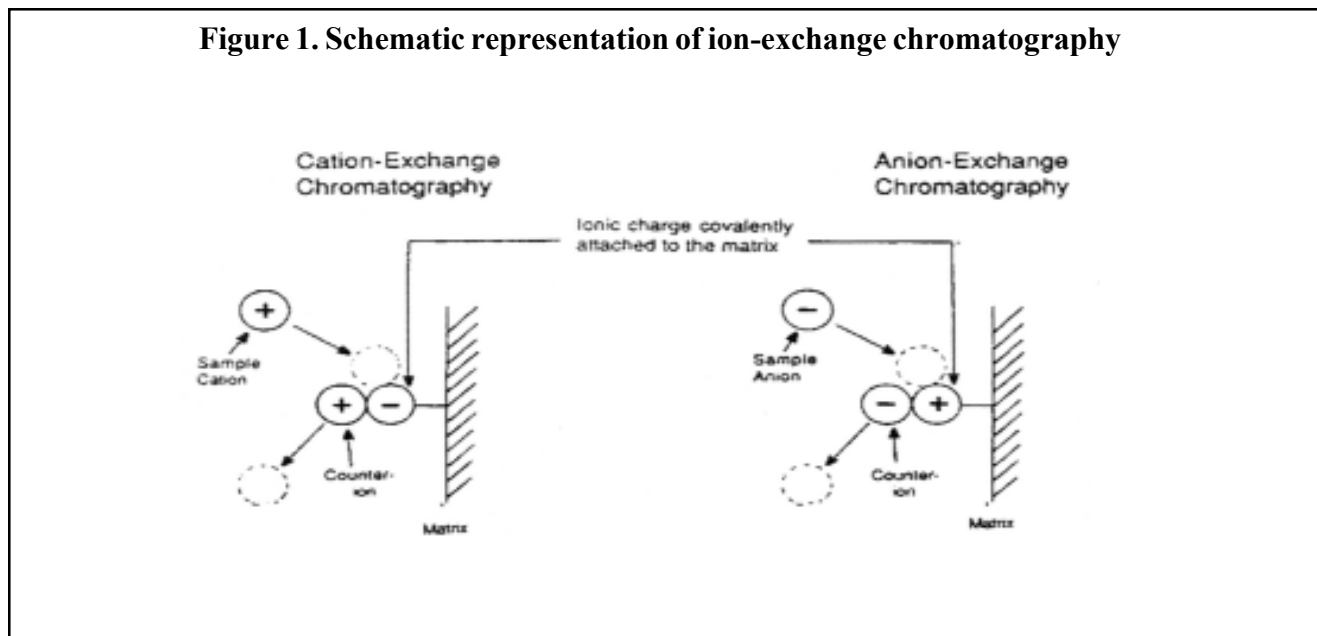
Normal phase separation: Estrogens

Column: CP-5-100/25
Solutes: 1=estrone
 2=Beta-estrone
 3=ethynylestradiol
 4=diethylstilbestrol
Eluent: Hexane:ethanol 92:8
Flow: 1.0mL/min
Detector: UV; 254nm
Temp: 40°C



Ion-Exchange Chromatography

In this mode of chromatography, the separation depends upon the exchange of ions between the mobile phase and the ionic sites of the packing (cationic or anionic). Shown in Figure 1 is a schematic representation of the ion exchange process for cation exchange and anion exchange chromatography.



The stationary phase matrix has a functional group with a fixed ionic charge covalently attached to it. An exchangeable counterion from the mobile phase buffer preserves charge neutrality. The mobile phase usually contains a large number of counterions opposite in charge to the surface ionic group. The counterions are in equilibrium with the matrix charged group in form of an ion-pair. The presence of a sample ion of the same ionic charge as the counterion sets up another equilibrium. The sample ion can exchange with the counterion to form an ion-pair with the matrix. The retention of the sample ion is based on the affinity of the different ions for the site on the matrix and on a number of other solution parameters such as, pH, ionic strength, counterion type, etc. For example, sodium chloride is used in the mobile phase buffer, the counterion is Na^+ (in the case of cation exchange process) and Cl^- (in the case of anion exchange process).

Conductivity is the most widely used detection method in ion chromatography. Optimum results are obtained when the background conductivity is low. For UV-absorbing ions, direct UV detection is the most practical approach. The detection limits depend on the wavelength, eluent, and instrumentation used. Refractive index detection as a universal method can also be used.

Separation Methods Technologies, Incorporated has developed new series of ion-exchange packing materials with its novel SAM technology. These packings are offered for all stages of separation science from analytical scale levels to process scale purification levels. The packings are generally silica-based and consist of totally porous particles with approximately 1 Meq/g capacity. SMT packing materials allow flexibility of mobile phases.

Analytical columns are usually available in 5 and 10 micron particle sizes. Bulk packings are offered in larger particle sizes like 20, 40, and 60 microns. These packings are not only suitable for low pressure column chromatography but also perfect for solid phase extractions. SMT ion exchange series include Strong Anion eXchange (SAX), Weak Anion eXchange (WAX), Strong Cation eXchange (SCX), Weak Cation eXchange (WCX), and DiEthyl Amino Ethyl (DEAE). An important characteristic of all the packings is unprecedented high exchange capacity. This characteristic can be associated with the extremely high ion-exchange ligand density produced by the SAM technology. High exchange capacity often results in superior selectivity and efficiency as well as high recovery of analytes.

SMT-SAX Columns and Applications

SMT-SAX columns are silica-based Strong Anion eXchange packing developed for separation of anionic compounds. SMT-SAX packings consist of chemically attached hydrophilic surface derivatized to form **quaternary amine**. The technique of SAM is used in the bonding process to significantly increase the functional ligand density.

Special features:

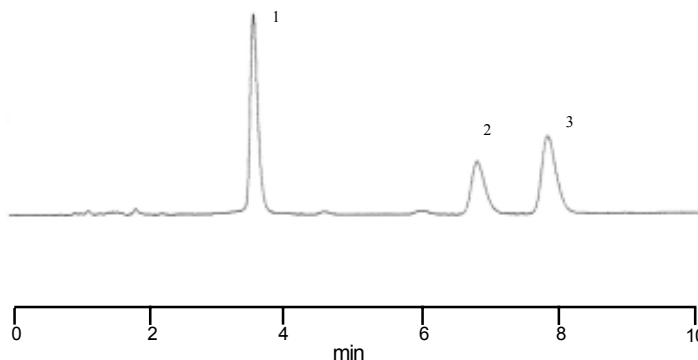
- superior selectivity and efficiency in the separation of proteins and biomolecules.
- high stability under extreme operating conditions.
- high recovery of organic and inorganic analytes.

Typical Column Specification:	SAX-Columns	
5 m silica	100	300
surface area [m ² /g]	340	90
Capacity [meq/g]	0.98	0.39

SMT-SAX columns are available in various particle and pore sizes: 5 and 10 m; 100 and 300 are available stock sizes.

Protein Molecules

Column: SAX-5-300/15
Solutes: 1=Cytochrome C [horse heart]
 2=Lysozyme [chicken egg white]
 3=Albumin [chicken egg]
Eluent: A=0.02M Tris [pH=7] B=0.02M Tris, 1.0M NaOAc [pH=7]
 gradient 0-100%B in 10 min
Flow: 1.0mL/min
Detector: UV; 260nm
Temp: 30°C



Ordering Information:

SAX-Columns: 5 m, 100

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	SAX-5-100/15
250mmx4.6mm	SAX-5-100/25
150mmx7.8mm	SAX-5-100/157.8
250mmx7.8mm	SAX-5-100/257.8
150mmx10mm	SAX-5-100/1510
250mmx10mm	SAX-5-100/2510
150mmx22.1mm	SAX-5-100/1522
250mmx22.1mm	SAX-5-100/2522

SAX-Columns: 10 m, 100

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	SAX-10-100/15
250mmx4.6mm	SAX-10-100/25
150mmx7.8mm	SAX-10-100/157.8
250mmx7.8mm	SAX-10-100/257.8
150mmx10mm	SAX-10-100/1510
250mmx10mm	SAX-10-100/2510
150mmx22.1mm	SAX-10-100/1522
250mmx22.1mm	SAX-10-100/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

SAX-Columns: 5 m, 300

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	SAX-5-300/15
250mmx4.6mm	SAX-5-300/25
150mmx7.8mm	SAX-5-300/157.8
250mmx7.8mm	SAX-5-300/257.8
150mmx10mm	SAX-5-300/1510
250mmx10mm	SAX-5-300/2510
150mmx22.1mm	SAX-5-300/1522
250mmx22.1mm	SAX-5-300/2522

SAX-Columns: 10 m, 300

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	SAX-10-300/15
250mmx4.6mm	SAX-10-300/25
150mmx7.8mm	SAX-10-300/157.8
250mmx7.8mm	SAX-10-300/257.8
150mmx10mm	SAX-10-300/1510
250mmx10mm	SAX-10-300/2510
150mmx22.1mm	SAX-10-300/1522
250mmx22.1mm	SAX-10-300/2522

SMT-WAX Columns and Applications

SMT-WAX columns are silica-based Weak Anion eXchange packing materials developed for separation of anionic compounds. SMT-WAX consists of chemically attached hydrophilic surface derivatized to form **polyethyleneimine** functionality. The technique of SAM is used in the bonding process to significantly increase the functional ligand density.

Special features:

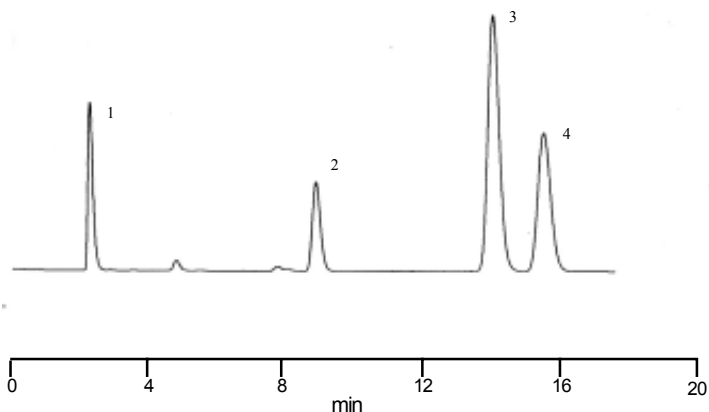
- superior selectivity and efficiency in the separation of proteins and biomolecules.
- high stability under extreme operating conditions.
- high density polyethyleneimine functional groups that provide improved recovery compared to conventional WAX.

Typical Column Specification:	WAX-Columns	
5 m silica	100	300
surface area [m ² /g]	340	90
Capacity [meq/g]	0.96	0.38

SMT-WAX columns are available in various particle and pore sizes: 5 and 10 m; 100 and 300 are available stock sizes.

Biomolecules: Nucleotides

Column: WAX-5-100/15
 Solutes: 1=CMP, 2=AMP, 3=UMP, 4=CDP
 Eluent: A=0.1M Sodium Phosphate [pH=3]; B=0.1M Sodium Phosphate and 2.0M NaCl [pH=3] Gradient 0-100% B in 20 min.
 Flow: 1.0mL/min;
 Detector: UV; 254nm
 Temp: 30°C



Ordering Information:

WAX-Columns: 5 m, 100

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	WAX-5-100/15
250mmx4.6mm	WAX-5-100/25
150mmx7.8mm	WAX-5-100/157.8
250mmx7.8mm	WAX-5-100/257.8
150mmx10mm	WAX-5-100/1510
250mmx10mm	WAX-5-100/2510
150mmx22.1mm	WAX-5-100/1522
250mmx22.1mm	WAX-5-100/2522

WAX-Columns: 10 m, 100

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	WAX-10-100/15
250mmx4.6mm	WAX-10-100/25
150mmx7.8mm	WAX-10-100/157.8
250mmx7.8mm	WAX-10-100/257.8
150mmx10mm	WAX-10-100/1510
250mmx10mm	WAX-10-100/2510
150mmx22.1mm	WAX-10-100/1522
250mmx22.1mm	WAX-10-100/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

WAX-Columns: 5 m, 300

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	WAX-5-300/15
250mmx4.6mm	WAX-5-300/25
150mmx7.8mm	WAX-5-300/157.8
250mmx7.8mm	WAX-5-300/257.8
150mmx10mm	WAX-5-300/1510
250mmx10mm	WAX-5-300/2510
150mmx22.1mm	WAX-5-300/1522
250mmx22.1mm	WAX-5-300/2522

WAX-Columns: 10 m, 300

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	WAX-10-300/15
250mmx4.6mm	WAX-10-300/25
150mmx7.8mm	WAX-10-300/157.8
250mmx7.8mm	WAX-10-300/257.8
150mmx10mm	WAX-10-300/1510
250mmx10mm	WAX-10-300/2510
150mmx22.1mm	WAX-10-300/1522
250mmx22.1mm	WAX-10-300/2522

SMT-DEAE Columns and Applications

SMT-DEAE [Di-Ethyl-Amino-Ethyl] column provides a unique chemically attached hydrophilic, weak anion exchange type, functional surface desirable for the separation of many biomolecules such as proteins, nucleotides, oligonucleotides, polynucleotides, high molecular weight RNA's and plasmid DNA's. The technique of SAM is used in the bonding process to significantly increase the functional ligand density.

SMT-DEAE is silica based and the packing material is mechanically stable at high flow rates and high pressures up to 6,000 psi. SMT-DEAE packing does not swell with organic solvents, salts, or pH gradients.

Special features of SMT-DEAE packing material:

- fast reequilibration and very negligible non-specific proteininteraction.
- high density tertiary amine functional groups that provide better selectivity and recovery compared to conventional DEAE.
- highly stable silica-based anion exchange type packing material; Minimal compressibility and will not swell in organic solvents or in the presence of ion pairing reagents

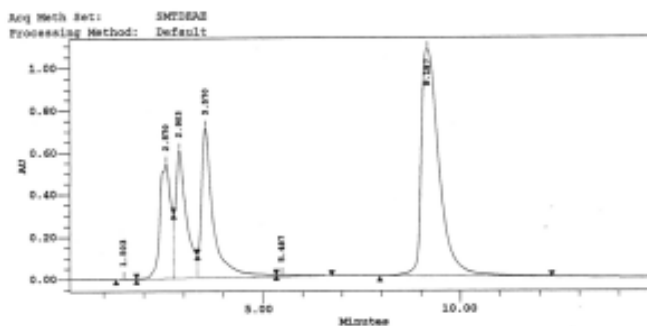
SMT-DEAE columns are available in various particle and pore sizes:

5 and 10 m; 100 and 300 are stock

Typical Column Specification:	DEAE-Columns
5 m silica	100 300
surface area [m²/g]	340 90
Capacity [meq/g]	0.95 0.37

Separation of plasmid DNA molecules with SMT-DEAE columns

Column: DEAE-5-100/25
 Solutes: Plasmid DNA [Supercoil DNA]
 Eluent: A=0.025M Citrate Buffer [pH=5]; B=1.5M NaCl (50:50)
 Gradient 0-100% B in 12 min.
 Flow: 1.5mL/min;
 Detector: UV; 260nm
 Temp: 30°C



Peak Results

#	Name	Ret Time (min)	Area (uV*sec)	Height (uV)	Int Type	Amount	Units
1		1.503	16875	1061	BV		
2		2.570	10278507	544754	VV		
3		2.903	11603614	604433	VV		
4		3.570	14913205	711346	VV		
5		5.487	425611	9635	VB		
6		9.187	33712013	1070667	BB		

Ordering Information:

DEAE-Columns: 5 m, 100

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	DEAE-5-100/15
250mmx4.6mm	DEAE-5-100/25
150mmx7.8mm	DEAE-5-100/157.8
250mmx7.8mm	DEAE-5-100/257.8
150mmx10mm	DEAE-5-100/1510
250mmx10mm	DEAE-5-100/2510
150mmx22.1mm	DEAE-5-100/1522
250mmx22.1mm	DEAE-5-100/2522

DEAE-Columns: 10 m, 100

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	DEAE-10-100/15
250mmx4.6mm	DEAE-10-100/25
150mmx7.8mm	DEAE-10-100/157.8
250mmx7.8mm	DEAE-10-100/257.8
150mmx10mm	DEAE-10-100/1510
250mmx10mm	DEAE-10-100/2510
150mmx22.1mm	DEAE-10-100/1522
250mmx22.1mm	DEAE-10-100/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

DEAE-Columns: 5 m, 300

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	DEAE-5-300/15
250mmx4.6mm	DEAE-5-300/25
150mmx7.8mm	DEAE-5-300/157.8
250mmx7.8mm	DEAE-5-300/257.8
150mmx10mm	DEAE-5-300/1510
250mmx10mm	DEAE-5-300/2510
150mmx22.1mm	DEAE-5-300/1522
250mmx22.1mm	DEAE-5-300/2522

DEAE-Columns: 10 m, 300

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	DEAE-10-300/15
250mmx4.6mm	DEAE-10-300/25
150mmx7.8mm	DEAE-10-300/157.8
250mmx7.8mm	DEAE-10-300/257.8
150mmx10mm	DEAE-10-300/1510
250mmx10mm	DEAE-10-300/2510
150mmx22.1mm	DEAE-10-300/1522
250mmx22.1mm	DEAE-10-300/2522

SMT-SCX Columns and Applications

SMT-SCX columns are silica-based Strong Cation eXchange packing materials developed for separation of cationic compounds. SMT-SCX consists of chemically attached hydrophilic surface derivatized to form **sulfonic acid** functionality. The technique of SAM is used in the bonding process to significantly increase the functional ligand density.

Special features:

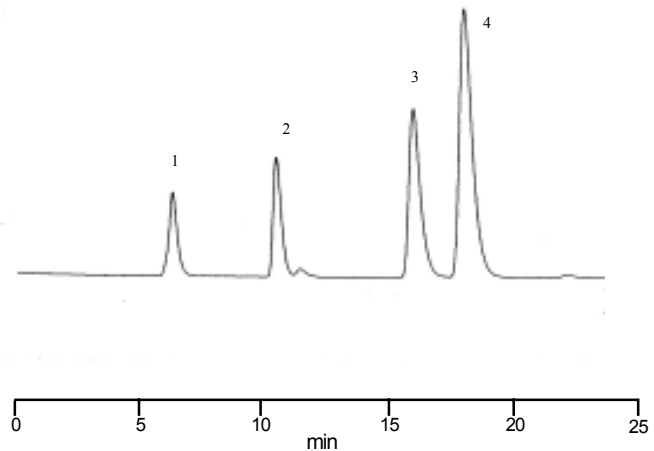
- superior selectivity and efficiency in the separation of proteins and biomolecules with medium to high [isoelectric point] or pH values.
- high stability under extreme operating conditions.
- high density sulfonic acid functional groups that provide improved recovery compared to conventional SCX.

SMT-SCX columns are available in various particle and pore sizes: 5 and 10 μ m; 100 and 300 μ m are available stock sizes.

Typical Column Specification:	SCX-Columns	
5 μ m silica	100	300
surface area [m ² /g]	340	90
Capacity [meq/g]	0.94	0.36

Biomolecules: Proteins

Column: SCX-5-300/25
Solutes: 1=Cytochrome C
 2=Lysozymes
 3=Lactoglobulin
 4=Albumin
Eluent: A=Potassium Phosphate [pH=6] B=A+0.5M NaCl
 Gradient 0-80% B in 20 min
Flow: 1.0mL/min:
Detector: UV; 210nm
Temp: 30°C



Ordering Information:

SCX-Columns: 5 μ m, 100

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	SCX-5-100/15
250mmx4.6mm	SCX-5-100/25
150mmx7.8mm	SCX-5-100/157.8
250mmx7.8mm	SCX-5-100/257.8
150mmx10mm	SCX-5-100/1510
250mmx10mm	SCX-5-100/2510
150mmx22.1mm	SCX-5-100/1522
250mmx22.1mm	SCX-5-100/2522

SCX-Columns: 10 μ m, 100

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	SCX-10-100/15
250mmx4.6mm	SCX-10-100/25
150mmx7.8mm	SCX-10-100/157.8
250mmx7.8mm	SCX-10-100/257.8
150mmx10mm	SCX-10-100/1510
250mmx10mm	SCX-10-100/2510
150mmx22.1mm	SCX-10-100/1522
250mmx22.1mm	SCX-10-100/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

SCX-Columns: 5 μ m, 300

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	SCX-5-300/15
250mmx4.6mm	SCX-5-300/25
150mmx7.8mm	SCX-5-300/157.8
250mmx7.8mm	SCX-5-300/257.8
150mmx10mm	SCX-5-300/1510
250mmx10mm	SCX-5-300/2510
150mmx22.1mm	SCX-5-300/1522
250mmx22.1mm	SCX-5-300/2522

SCX-Columns: 10 μ m, 300

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	SCX-10-300/15
250mmx4.6mm	SCX-10-300/25
150mmx7.8mm	SCX-10-300/157.8
250mmx7.8mm	SCX-10-300/257.8
150mmx10mm	SCX-10-300/1510
250mmx10mm	SCX-10-300/2510
150mmx22.1mm	SCX-10-300/1522
250mmx22.1mm	SCX-10-300/2522

SMT-WCX Columns and Applications

SMT-WCX columns are silica-based Weak Cation eXchange packing materials developed for separation of cationic compounds. SMT-WCX consists of chemically attached hydrophilic surface derivatized to form **carboxylic acid** functionality. The technique of SAM is used in the bonding process to significantly increase the functional ligand density.

Special features:

- superior selectivity and efficiency in the separation of proteins and biomolecules high stability under extreme operating conditions.
- high density carboxylic acid functional groups provide much better analyte recovery compared to conventional WCX.

SMT-WCX columns are available in various particle and pore sizes: 5 and 10 μm; 100 and 300 μm are available stock sizes.

Typical Column Specification:	WCX-Columns	
5 μm silica	100	300
surface area [m ² /g]	340	90
Capacity [meq/g]	0.91	0.35

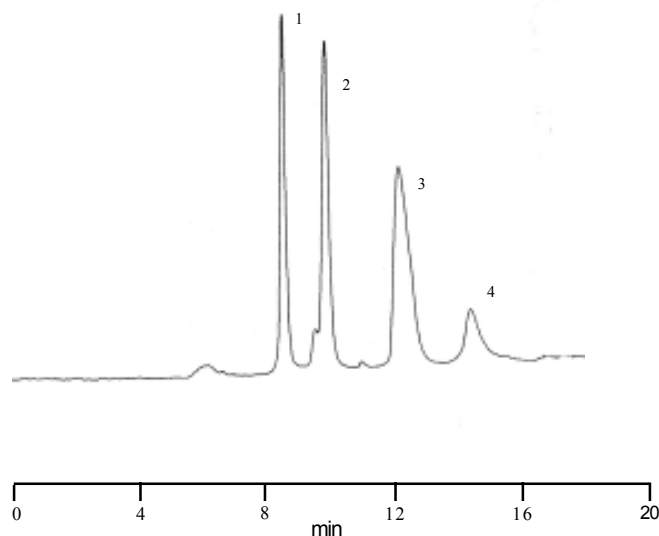
Biomolecules: Proteins

Protein Analysis

Column: WCX-5-300/25
Solutes: 1=Tripsinogen
 2=Ribonuclease A
 3=Cytochrome C
 4=Chymotrypsinogen A

Eluent: A=0.05M Sodium Phosphate [pH 6] B=0.5M Sodium Phosphate [pH 6]
 Gradient 0-20% B in 20 min; Hold 5 min, then 20-60% B in 50 min.

Flow: 1.0mL/min:
Detector: UV; 280nm
Temp: 30°C



Ordering Information:

WCX-Columns: 5 μm, 100

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	WCX-5-100/15
250mmx4.6mm	WCX-5-100/25
150mmx7.8mm	WCX-5-100/157.8
250mmx7.8mm	WCX-5-100/257.8
150mmx10mm	WCX-5-100/1510
250mmx10mm	WCX-5-100/2510
150mmx22.1mm	WCX-5-100/1522
250mmx22.1mm	WCX-5-100/2522

WCX-Columns: 10 μm, 100

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	WCX-10-100/15
250mmx4.6mm	WCX-10-100/25
150mmx7.8mm	WCX-10-100/157.8
250mmx7.8mm	WCX-10-100/257.8
150mmx10mm	WCX-10-100/1510
250mmx10mm	WCX-10-100/2510
150mmx22.1mm	WCX-10-100/1522
250mmx22.1mm	WCX-10-100/2522

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

WCX-Columns: 5 μm, 300

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	WCX-5-300/15
250mmx4.6mm	WCX-5-300/25
150mmx7.8mm	WCX-5-300/157.8
250mmx7.8mm	WCX-5-300/257.8
150mmx10mm	WCX-5-300/1510
250mmx10mm	WCX-5-300/2510
150mmx22.1mm	WCX-5-300/1522
250mmx22.1mm	WCX-5-300/2522

WCX-Columns: 10 μm, 300

+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	WCX-10-300/15
250mmx4.6mm	WCX-10-300/25
150mmx7.8mm	WCX-10-300/157.8
250mmx7.8mm	WCX-10-300/257.8
150mmx10mm	WCX-10-300/1510
250mmx10mm	WCX-10-300/2510
150mmx22.1mm	WCX-10-300/1522
250mmx22.1mm	WCX-10-300/2522

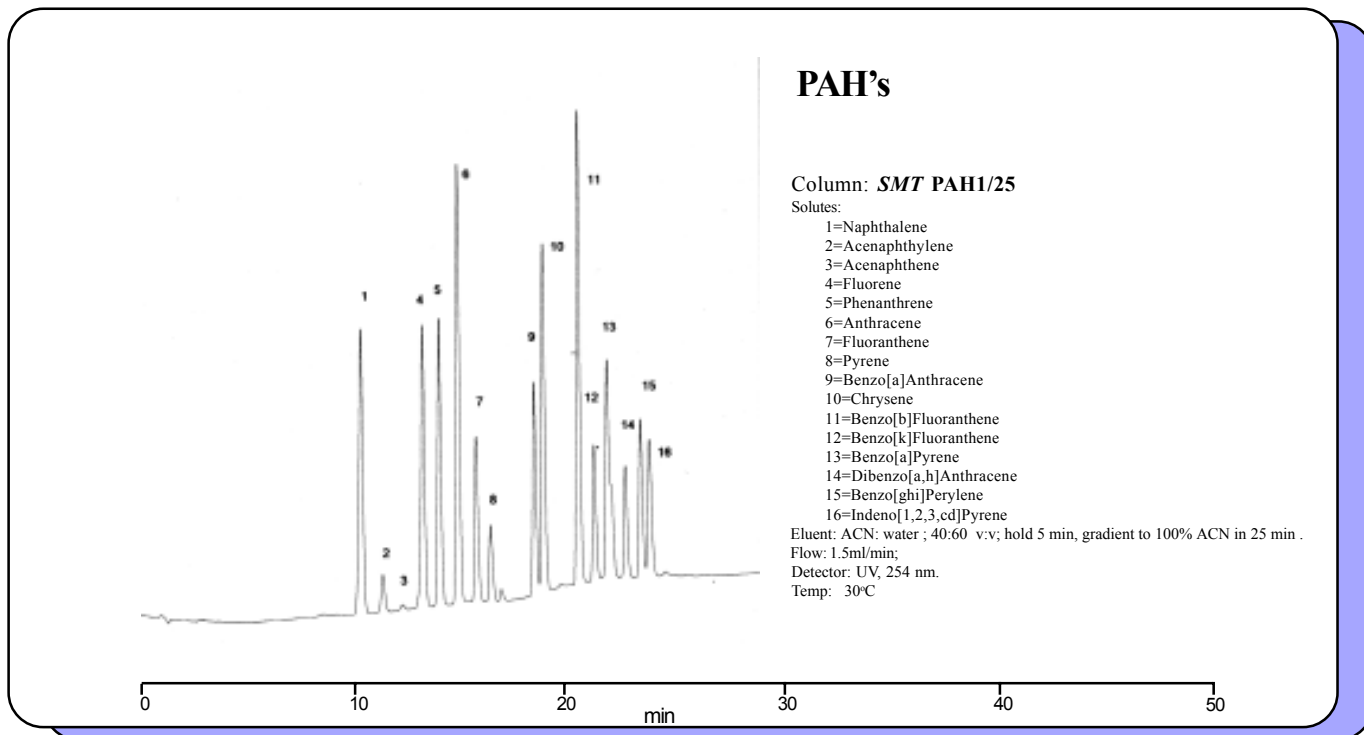
SMT-Specialty Columns and Applications

SMT has a special interest in surface modification and materials engineering. When separation is difficult with conventional bonded phases, SMT assists in method development and special column design for new applications. SMT specialty columns include special columns designed for reversed phase, normal phase, and ion exchange chromatography. These columns are specially designed for companies that are interested in having competitive advantage in separation and surface modification. The following specialty columns are currently available:

Column	Function
PAH	Analysis of polyaromatic hydrocarbons
TNT	Separation of Explosives
OD-IQ and OIQ	Polar/nonpolar/basic compounds
C12	Nonpolar/Polar compounds
C30	Nonpolar compounds
Urea	Polar compounds
QuickSep	Quick screening/analysis
ChiralSep	Enantiomers
MetalSep	Metal removal
C6F5	Separation of Taxols
USP	Regulated Analytical Methods
Micro/Narrow Bore	LC/MS, LC/GC, Drug Screening
Guard	Column Guard

SMT PAH Columns and Applications

Polyaromatic hydrocarbons (PAH's) are large organic compounds produced during combustion. Many of these compounds are carcinogenic and are often found in water, air and other natural habitats. Monitoring of these compounds is very crucial for a healthy environment. The major challenge in HPLC analysis of PAH's is in the resolution of their structurally similar isomers. Figure 1 shows the resolution of 16 PAH's designated as Priority pollutants by the US EPA. SMT PAH1 columns consist of octadecyl functional ligands and are made with silica with proprietary pore size.



The packings can be made available in various particle sizes. Please call SMT for quotes on other sizes.

Ordering Information:

PAH1-Columns: 5 m
 +Column Dimension (Length x i.d)
 150mmx4.6mm
 250mmx4.6mm

* Catalog Number
 PAH1-5/15
 PAH1-5/25

SMT-TNT Columns and Applications

SMT-TNT columns are specially designed C18 column for use in the reversed-phase separation of nitroaromatic and nitroamine derivatives. The isomeric nature of these explosive compounds is the reason for the difficulty in their separation.

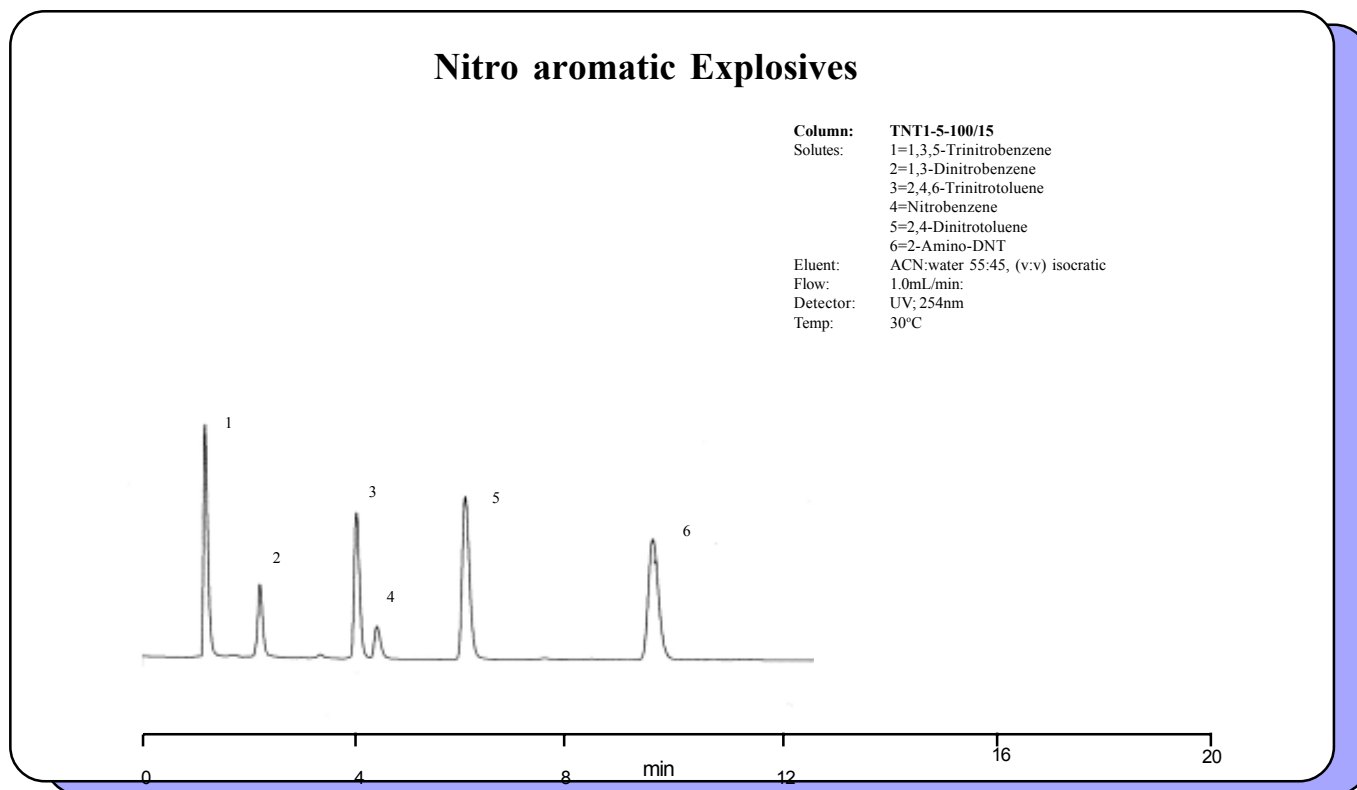
The standard test method for the analysis of **seven** nitroaromatic and nitroamine explosives in soil by HPLC specifies the use of two reversed-phase columns [C18 and CN] in series.

A new HPLC method developed using SMT TNT1 is very simple and results in separation of **six** nitroaromatic explosives in fifteen minutes or less with a single column using a simple isocratic elution.

Unique features of SMT-TNT columns:

- Highly reproducible mixed bonded phase; consistent separation of analytes.
- Increased longevity provided through “total coverage”.

The column also offers enhanced separation for pesticides, herbicides, pharmaceutical metabolites, polar natural products and other polar biomolecules.



SMT-TNT Columns are available in 5 m particle and 100 pore sizes. Please call SMT for other packing configuration.

Ordering Information:

TNT1-Columns: 5 m, 100

+Column Dimension (Length x i.d)

150mmx4.6mm

250mmx4.6mm

150mmx7.8mm

250mmx7.8mm

150mmx10mm

250mmx10mm

* Catalog Number

TNT1-5-100/15

TNT1-5-100/25

TNT1-5-100/157.8

TNT1-5-100/257.8

TNT1-5-100/1510

TNT1-5-100/251D

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

SMT-OD-IQ Columns and Applications

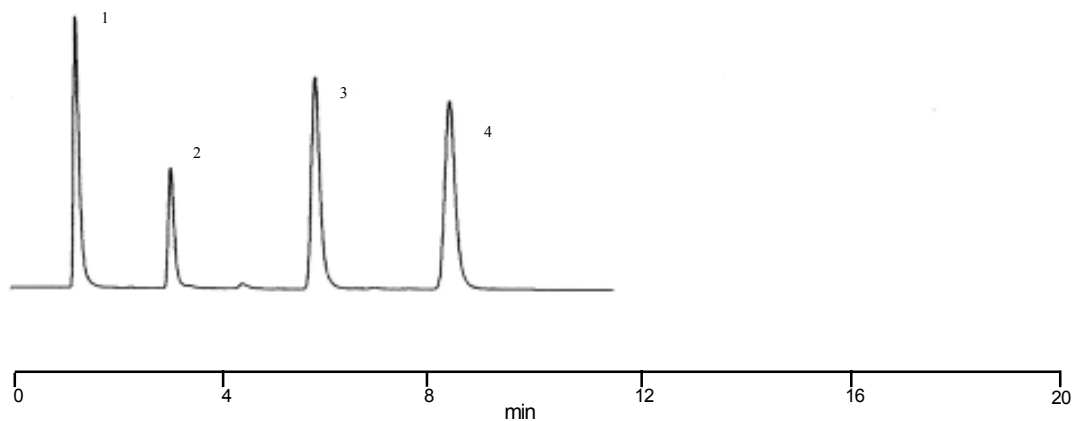
SMT OD-IQ is unique reversed phase packing material designed to have both hydrophobic and truly hydrophilic spacer ligands. The mixed-phase consists of a meticulously controlled mixture of hydrophobic, C18 molecules, and proprietary hydrophilic molecules, chemically attached on the silica substrate, using "total coverage" technology. The result is a stationary phase that has all of the following characteristics:

- ◆ Stronger retention of polar molecules in aqueous eluent.
- ◆ Reduced backpressure; the hydrophilic hybrid enhances the solvation of the bonded phase in an aqueous environment.
- ◆ Different selectivity compared to conventional C18.
- ◆ Eliminates the need for ion pairing reagents

The column offers enhanced separation for proteins, peptides, nucleotides and other biomolecules. The column is also recommended for the analyses of highly polar organic compounds.

Polar Compounds: Tricyclic Antidepressants

Column: ODIQ-5-100/15
Solute: 1= uracil
 2= nortriptyline
 3= doxepin
 4= amitriptyline
Eluent: Acetonitrile:water 10:90
Flow: 1.0mL/min:
Detector: UV; 254nm
Temp: 30°C



SMT OD-IQ -Columns are available in various particle and pore sizes: 3 and 5 μ m; 100, 120 and 300 \AA are stock sizes.

Ordering Information:

ODIQ-Columns: 5 μ m, 100

+Column Dimension (Length x i.d)

150mmx4.6mm

250mmx4.6mm

* Catalog Number

ODIQ-5-100/15

ODIQ-5-100/25

ODIQ-Columns: 5 μ m, 300

+Column Dimension (Length x i.d)

150mmx4.6mm

250mmx4.6mm

* Catalog Number

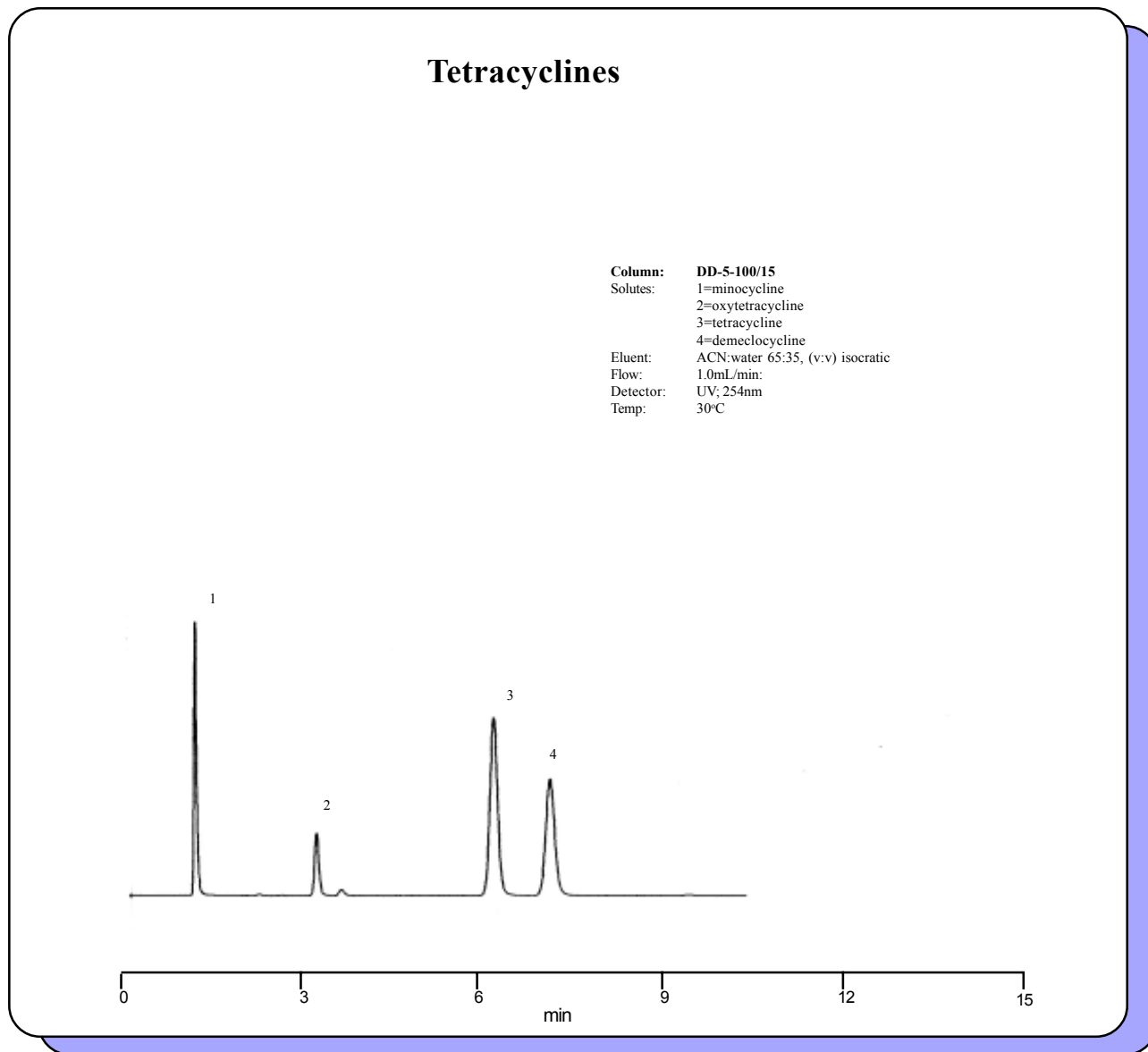
ODIQ-5-300/15

ODIQ-5-300/25

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

SMT-C12 Columns and Applications

SMT-C12 columns consist of Dodecyl as the functional ligand. The columns offer selectivities that are slightly different from C8 and C18 reversed-phase columns when applied to separation of polyaromatic hydrocarbons. SMT-C12 columns are specially designed as complementary alternatives for the separation of polar, neutral and moderately nonpolar pharmaceuticals; natural products, food additives, organic chemicals and biologicals.



Typical Column Specification:

	SAM DD-Columns	
5 μ m silica	100	300
surface area [m ² /g]	340	120
%Carbon	16	6
Coverage [moles/m ²]	7.5	7.4

Ordering Information:

DD-Columns: 5 μ m, 100

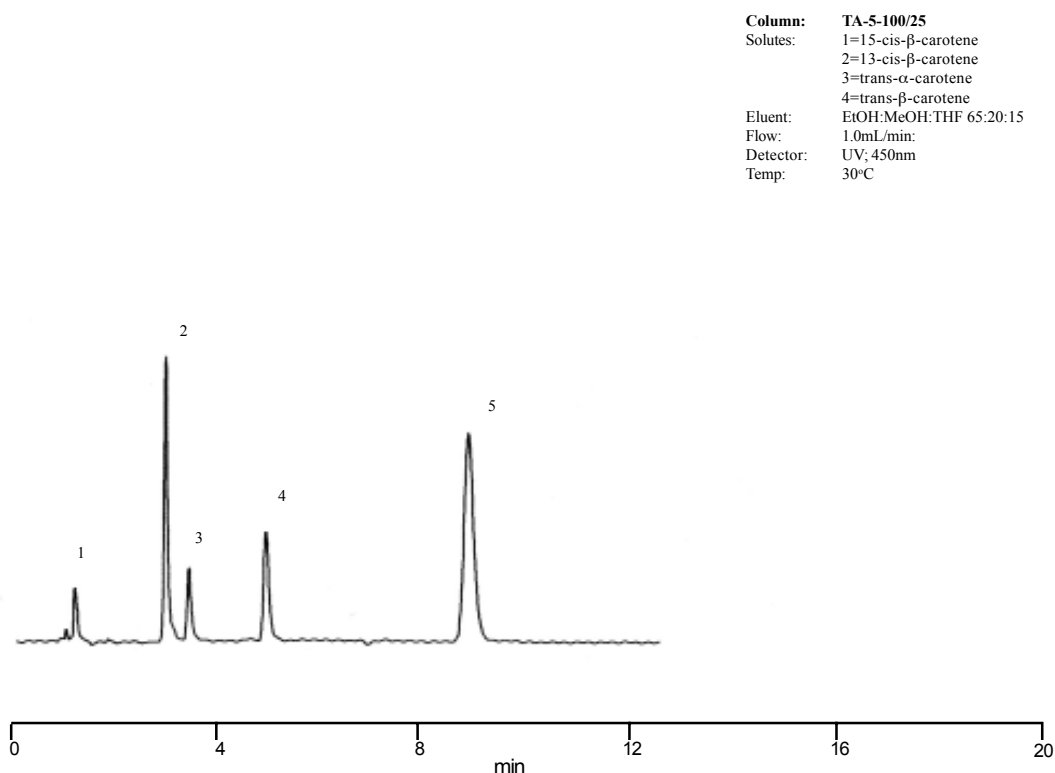
+Column Dimension (Length x i.d)	* Catalog Number	+Column Dimension (Length x i.d)	* Catalog Number
150mmx4.6mm	DD-5-100/15	150mmx4.6mm	DD-5-300/15
250mmx4.6mm	DD-5-100/25	250mmx4.6mm	DD-5-300/25

*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

SMT-C30 Columns and Applications

SMT-C30 columns consist of Triacetyl as the functional ligand. The columns offer selectivities that are much different from C18 reversed-phase columns when applied to separation of carotenoid and related compounds. Carotenoids consist of very diverse groups of molecules that include nonpolar hydrocarbons and polar xanthophylls. These compounds have geometric and positional isomers with very subtle molecular differences that can pose challenges in separation. Previous efforts to separate these compounds with available C18 and other reversed phases have been unsatisfactory. SMT-C30 ligand provides sufficient interactive sites for complete partitioning of these positional isomers

Cis- and trans- isomers of beta carotene



Typical Column Specification:

5 μm silica
surface area [m²/g]
%Carbon

SAM TA-Columns

100
340
28

Coverage [moles/m²]

7.6

Ordering Information:

TA-Columns: 5 μm, 100

+Column Dimension (Length x i.d.)
150mmx4.6mm
250mmx4.6mm

* Catalog Number
TA-5-100/15
TA-5-100/25

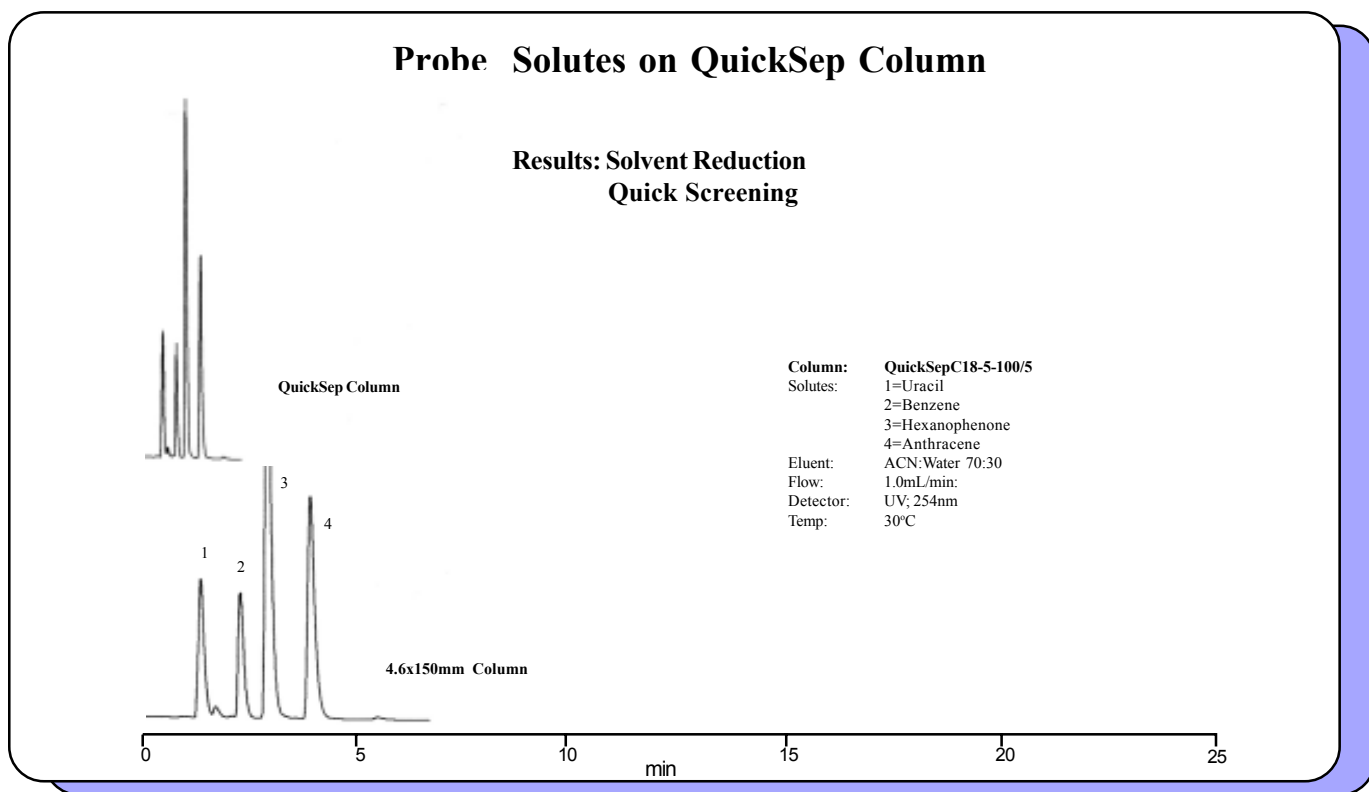
*Guard column: 20mmx4.6mm; add suffix G to Catalog Number

SMT-QuickSep Columns and Applications

SMT-QuickSep columns are specially designed for rapid resolution. These columns are ideal for *fast analysis, drug screening, and purification*.

The following represents some of the most important features of QuickSep columns:

- # economical; many analyses can be accomplished with up to 70% savings in both time and money.
- # quick screening for method development; QuickSep columns can be used to assess columns suitability for a particular analysis.
- # available in C18, C8, C4, C2, C1, NH2, CN, Phenyl, etc.
- # requires no modification of HPLC configuration, a procedure that is often necessary for proper usage of other rapid analysis columns, such as, Micro and narrow bore columns (2.1mm i.d and less).
- # available as value packages of 3 or more columns of similar or different packing materials (e.g. C18, C8, C4, C2, C1, NH2, CN, etc.)



QuickSep-Columns are available in various packing materials as packages of 3 or more columns for method developments. QuickSep column are available as 4.6x50mm column dimension only.

Available Particle Sizes: 5 m

Available Pore sizes: 100 and 300

*Ordering Information:

QuickSep-Columns: 5 m, 100
+Column Dimension (4.6x50mm)
C18

+Column Dimension (4.6x50mm)
C4

+Column Dimension (4.6x50mm)
C1

+Column Dimension (4.6x50mm)
NH2

* Catalog Number
QuickSepC18-5-100
QuickSepC18-5-300

* Catalog Number
QuickSepMEB4-5-100
QuickSepC18-5-300

* Catalog Number
QuickSepMEB1-5-100
QuickSepC18-5-300

* Catalog Number
QuickSepAP-5-100
QuickSepAP-5-300

QuickSepC8-Columns: 5 m, 300
+Column Dimension (4.6x50mm)
C8

+Column Dimension (4.6x50mm)
C2

+Column Dimension (4.6x50mm)
CN

+Column Dimension (4.6x50mm)
Phenyl

* Catalog Number
QuickSepC8-5-100
QuickSepC8-5-300

* Catalog Number
QuickSepMEB2-5-100
QuickSepMEB2-5-300

* Catalog Number
QuickSepCP-5-100
QuickSepCP-5-300

* Catalog Number
QuickSepPhen1-5-100
QuickSepPhen1-5-300

*QuickSep-columns are offered as packages of 3 or 5 units of similar different columns for screening and method development.

SMT-ChiralSep Columns and Applications

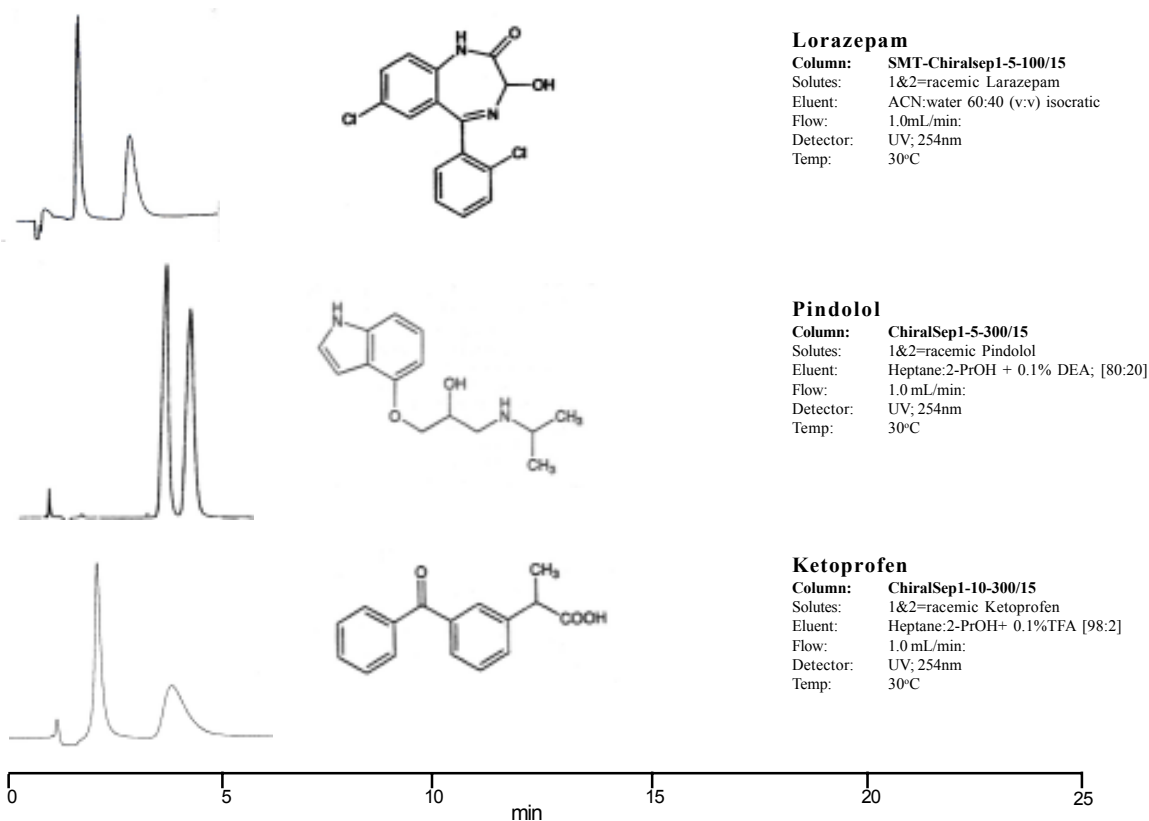
Chiral compounds, or enantiomers have identical molecular structures that are related as mirror images of one another much like a left hand is related to a right hand. Rapid and accurate stereochemical resolution of enantiomeric molecules has become a challenge in various aspects of pharmaceuticals and drug discoveries.

A chiral column may contain one form of an enantiomeric compound immobilized on the surface of a packing material. The following is a list of some of the most important features for adequate separation with chiral columns:

- ☐ at least three points of simultaneous interaction between the chiral phase and one analyte enantiomer, with at least one point of stereochemical dependence.
- ☐ one of the enantiomers have differing degrees of interaction with the stationary phase, so that one will be more strongly retained than the other.

SMT manufactures ultra-stable chiral columns for normal and reversed-phase chromatographic separation modes. **SMT uses derivatives of optically active polysaccharides that are chemically bonded on silica in the synthesis of its ChiralSep packings.** Bimodal separation is made possible due to the nature of the chiral surface and the proprietary bonding technique that ensures strong chemical linkage between the chiral ligand and the silica substrate.

Applications of SMT-ChiralSep columns.



Ordering Information:

ChiralSep1-Columns: 5 m, 100
+Column Dimension (Length x i.d)
 150mmx4.6mm
 250mmx4.6mm
ChiralSep1-Columns: 10 m, 100
+Column Dimension (Length x i.d)
 150mmx4.6mm
 250mmx4.6mm

* Catalog Number
 ChiralSep1-5-100/15
 ChiralSep1-5-100/25

* Catalog Number
 ChiralSep1-10-300/15
 ChiralSep1-10-300/25

ChiralSep1-Columns: 5 m, 300
+Column Dimension (Length x i.d)
 150mmx4.6mm
 250mmx4.6mm
ChiralSep1-Columns: 10 m, 300
+Column Dimension (Length x i.d)
 150mmx4.6mm
 250mmx4.6mm

* Catalog Number
 ChiralSep1-5-100/15
 ChiralSep1-5-100/25

* Catalog Number
 ChiralSep1-10-100/15
 ChiralSep1-10-100/25

SMT-MetalSep Columns and Applications

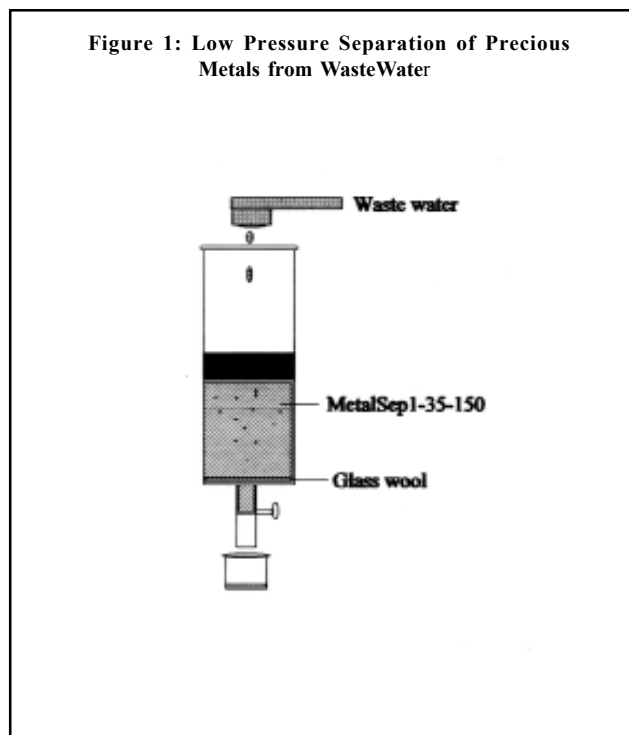
SMT MetalSep is offered as bulk packing materials for low pressure liquid chromatography, solid phase extraction, preparatory and process scale applications. The packings consist of proprietary strong cation exchange functional ligands that are chemically attached on silica substrate using SAM technique. The packing materials offer strong selectivities toward heavy metal ions such as Copper, gold, nickel, silver, iron, etc. Applications include precious metal recovery and purification of waste water.

Precious Metal Recovery: Cu, Au, Ni, Ag, Fe

Product: MetalSep1-35-150

Solutes: 1=waste water from electroplating bath

- Method: 1. Fill glass column with 10 g packing material (see diagram in Figure 1)
2. Equilibrate packing with aqueous solution [e.g. pH=7]
 3. Pour waste water solution into the bed and collect the effluent
 4. Regenerate the packing by successive washing of the bed with aqueous solution of pH=6, pH=5, pH=4, pH= 3, pH=2 and pH=1.
 5. Further purification is possible with repetitive application of steps 1 to 4 on isolated sample.



Low Pressure Separation of precious Metals from Waste water

Typical Column Specification:	MetalSep1-35-150
35-50 m silica	150
surface area [m ² /g]	360
Capacity [meq/g]	0.99

MetalSep1 packing materials are available for solid phase extraction and process scale applications in various particle sizes and pore sizes: 20, 35, 60 m and 60, 150 and 300 are stock sizes.

The packings are available in bulk quantities of 50gm, 100 gm, 250 gm, 500 gm, 5 Kg, 10 kg. For larger quantities call for a price quote.

Ordering Information:

+MetalSep-Columns/Packings: 35 m, 150

Catalog Number

50 g
100 g
250 g
500 g
1000 g

MetalSep1-35-150/50
MetalSep1-35-150/100
MetalSep1-35-150/250
MetalSep1-35-150/500
MetalSep1-35-150/1000

USP Columns and SMT-Equivalents

The following chart has been provided as guide to selecting SMT-HPLC columns which meet the specifications set forth in the United States Pharmacopeia [USP], which provides guidelines for the separation of related compounds.

It is important to note that, in many cases, USP column specifications are so broad that several (or many) column types actually meet the basic specifications. For example, L1 specification calls for a column consisting of silica packing material, 5 or 10 μ m in diameter, bonded with octadecyl (C18) silane. However, a limited number of available C18 columns will actually perform the desired separation.

USP Designation	Description	SMT Column
L1	C18 on 3-10 μ m porous silica	SMT -OD SMT -ODL Elite-C18
L3	5-10 μ m porous silica	SMT- S
L7	8 on 3-10 μ m porous silica	SMT -O SMT- OL Elite-C8
L8	NH ₂ on 10 μ m porous silica	SMT -AP
L9	SCX on 10 μ m porous silica	SMT -SCX
L10	CN on 3-10 μ m porous silica	SMT -CP
L11	Phenyl on 5-10 μ m porous silica	SMT -Phen1 SMT-Phen2
L12	SAX on 30-50 μ m porous silica	SMT- SAX
L13	C1 on 3-10 μ m porous silica	SMT -MEB1
L14	SAX on 10 μ m porous silica	SMT -SAX
L15	C6 on 3-10 μ m porous silica	SMT -C6
L20	Diol on 3-10 μ m porous silica	SMT -DIOL
L26	C4 on 5-10 μ m porous silica	SMT -MEB4
L27	30-50 μ m porous silica	SMT- S
Unclassified	C12 on 5-10 μ m porous silica	SMT -DD
	C30 on 5-10 μ m porous silica	SMT -TC

SMT offers a variety of columns for each category. These columns are representative of the wide range of selectivities available for each bonded phase. The packing materials vary in particle size, pore size, surface area, carbon load, hydrophobicity, bonded phase coverage or density, and other characteristics. Refer to the catalog for description and characteristics of a specific column of interest

USP-Columns are available in various column configurations. Available stock sizes include 4.6x150mm and 4.6x250mm (Please refer to the catalog for description and characteristic of specific column).

Particle Sizes: 3-10 μ m

Pore sizes: 60, 100, 120, and 300

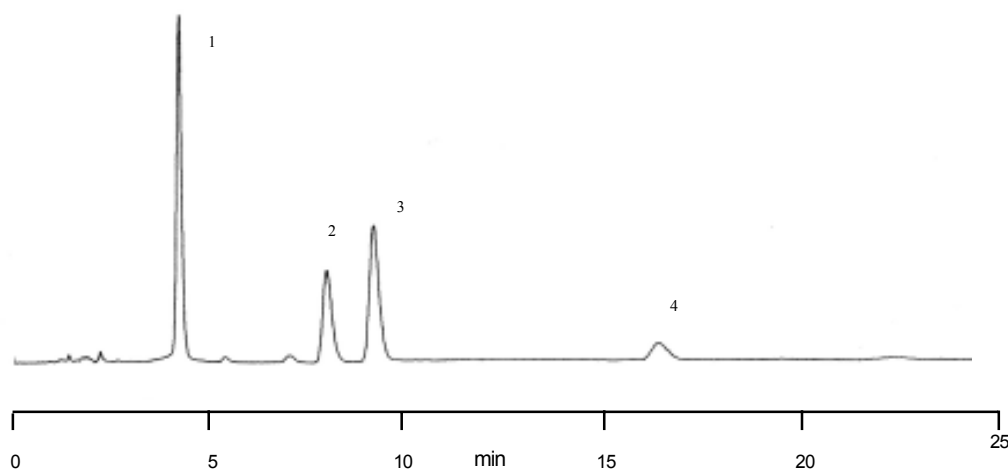
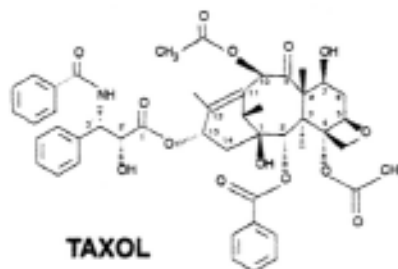
SMT-C6F5 Columns and Applications

SMT-C6F5 columns consist of Pentafluorophenyl as the functional ligand. The columns offer selectivities that are different from other reversed-phase columns when applied to separation of halogenated compounds, ketones, esters, and taxols. Taxol[®] (Paclitaxel) and some taxane analogs have been approved by the US Food and Drug Administration for treatment of ovarian cancer. SMT C6F5 columns are specially designed for the separation of Taxols. The crude and complex nature of the matrix tend to shorten the column lifetime when traditional reversed-phase columns are used in this application. SMT C6F5 columns are much more suitable alternatives for the separation of these compounds

Analysis of Taxol[®]

Column: C6F5-5-100/25
Solute: 1=10-Deacetyl Taxol
2=Cephalomannine
3=10-Deacetyl-7-Epi Taxol
4=Taxol (Paclitaxel)

Eluent: ACN:tetrahydrofuran:water 20:25:55, (v:v) isocratic
Flow: 1.5mL/min
Detector: UV; 230nm
Temp: 30°C



Ordering Information:

C6F5-Columns: 5 m, 100
+Column Dimension (Length x i.d.)
150mmx4.6mm
250mmx4.6mm

* Catalog Number
C6F5-5-100/15
C6F5-5-100/25

C6F5-Columns: 10 m, 100
+Column Dimension (Length x i.d.)
150mmx4.6mm
250mmx4.6mm

* Catalog Number
C6F5-10-100/15
C6F5-10-100/25

Micro/Narrow Bore Columns and Applications

Micro and narrow bore columns are nonstandard columns designed for special HPLC applications (such as LC/MS and LC/GC). The *SMT* microbores are referred to as all columns that have internal diameters (id) of 1.0mm or less. *SMT* narrow bore columns have id of 2.0 to 3.0 mm.

Micro and narrow bore columns are generally not recommended for usage on normal configuration HPLC systems. Modification of system configuration with regards to pumping, injecting, flow cell, and detecting, are often crucial. Compared with standard columns(4.6mm, id), Micro and narrow-bore columns provide:

Unique features:

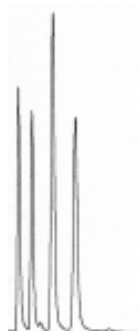
- # *greatly enhanced sensitivity*
- # *dramatic solvent savings, without altering the resolution and retention values.*
- # *ideal for applications in which very small quantities of samples are available for analysis.*
- # *favorite choice for applications in LC/MS*
- # *better choice for applications in drug discoveries and screening*
- # *ideal for applications in genomics and proteomics*

Microbore HPLC columns require the use of a specialized, dedicated microbore HPLC system, equipped with a very low-volume injector, low-volume detector flow cell, micro pump heads capable of delivering low flow rates, and small-bore connective tubings. *SMT* manufactures micro and narrow bore columns of outstanding efficiency and durability. These columns have found tremendous number of applications in LC/MS (liquid chromatography/mass spectrometry), especially in the area of drug discoveries

Micro and Narrow-Bore Columns are available in various column configurations and packing materials. Available stock sizes include 3.1, 2.1, and 1.0 mm i.d. columns of various lengths. Particle Sizes include 3 and 5 μm; Pore Sizes include 100, 120, and 300 Å. Packings include C18, C8, C1, C2, C4, Phenyl, CN, and NH₂.

Probe Solutes on Micro and Narrow Bore

Column: A=OD-5-300/152
B=OD-5-300/15
Solute: 1=Uracil
2=Benzene
3=Hexanophenone
4=Anthracene
Eluent: ACN:Water 70:30
Flow: 1.0mL/min
Detector: UV; 254nm
Temp: 30°C



Results: Solvent Reduction

Enhanced Sensitivity

*Ordering Information:

C18-Columns: 5 m, 100

+Column Dimension (Length x i.d)

50mmx2.1mm

100mmx2.1mm

150mmx2.1mm

250mmx2.1mm

C18-Columns: 5 m, 300

+Column Dimension (Length x i.d)

50mmx2.1mm

100mmx2.1mm

150mmx2.1mm

250mmx2.1mm

C18-Columns: 5 m, 100

+Column Dimension (Length x i.d)

50mmx1.0mm

100mmx1.0mm

150mmx1.0mm

250mmx1.0mm

* Catalog Number

OD-5-100/52

OD-5-100/102

OD-5-100/152

OD-5-100/252

* Catalog Number

OD-5-300/52

OD-5-300/102

OD-5-300/152

OD-5-300/252

* Catalog Number

OD-5-100/51

OD-5-100/101

OD-5-100/151

OD-5-100/251

C8-Columns: 5 m, 100

+Column Dimension (Length x i.d)

50mmx2.1mm

100mmx2.1mm

100mmx2.1mm

250mmx2.1mm

C8-Columns: 5 m, 300

+Column Dimension (Length x i.d)

50mmx2.1mm

100mmx2.1mm

100mmx2.1mm

250mmx2.1mm

C18-Columns: 5 m, 300

+Column Dimension (Length x i.d)

50mmx1.0mm

100mmx1.0mm

100mmx1.0mm

250mmx1.0mm

* Catalog Number

O-5-100/52

O-5-100/102

O-5-100/102

O-5-100/252

* Catalog Number

O-5-300/52

O-5-300/102

O-5-300/102

O-5-300/252

* Catalog Number

OD-5-300/51

OD-5-300/101

OD-5-300/101

OD-5-300/251

*Similar configurations available for other packings.

SMT-HPLC Guard Columns and Applications

Guard columns are expendable small columns designed to remove anything that may interfere with the separation or shorten the lifetime of the primary column. A standard HPLC column (analytical or preparative) is hereby referred to as the primary because it is first in value and in importance for separation.

Guard columns are utilized to remove:

- particles that may clog the primary column and necessitate a frit change, which can be cumbersome.
- compounds, including ions, that may adsorb strongly on the packing material and cause baseline drift, spurious peaks, loss of resolution and change in selectivity
- compounds that can form a precipitate upon contact with mobile phase or packing
- compounds that may co-elute with analyte and interfere with its detection and quantitation.

SMT guard is designed to have minimal or no effect on separation, as shown in Figure 2. The concept is verified by injection of standards before and after guard installation. The small increase in retention is due to the added packing materials in the guard device. In Figure 2, the column performance and peak symmetry are not altered in the separation because SMT guard is packed with the same pressure as the primary column and has minimal void volume design as shown in Figure 1. Because of the way it is packed, the guard can also be used alone as an analytical column.

SMT HPLC Guard-Columns are available in all column packing materials. Available stock size includes 4.6mm i.d. x 20mm length.

Ordering Information:

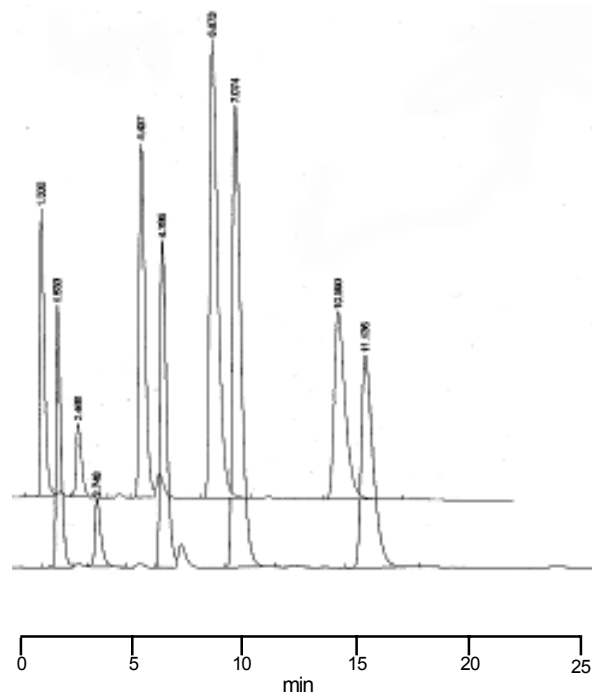
Guard column: 20mmx4.6mm; add suffix G to Catalog Number

Figure 1: SMT minimal void Guard Column



Figure 2: Effect of Guard Column in Separation

Column: A=OD-5-100/15
B=A+OD-5-100G
Solutes: 1=Uracil
2=Toluene
3=Hexanophenone
4=Anthracene
Eluent: ACN:Water 70:30
Flow: 1.0mL/min:
Detector: UV; 254nm
Temp: 30°C



SMT Bulk Packing Materials and Applications

SMT total coverage packings are designed for usage from analytical to process scale purification. The primary purpose for analytical method developments in pharmaceutical and food industries is for subsequent process scale purification. The analytical steps are used to reduce the cost incurable in erroneous large-scale purification steps. SMT is a specialty column company, and as such, offers services that can enhance scale-up of your analytical methods development.

SMT offers a variety of packing materials in bulk quantities for *reversed-phase, normal phase, and ion exchange chromatography*. SMT's packing materials usually consists of silica substrates and are made with total coverage technology and guaranteed to last much longer than competitor's packings.

Unique features:

- 99% Silanol site coverage vs competitor's 40-50%
- Ultra Stable phases for bulk and process-scale purification
- Highest levels of Consistency and reproducibility.
- Wide range of pH stability
- High throughput - No carry over of analytes
- Low back pressure
- Improved resolution
- Perfect for Solid Phase Extraction and Process Scale purifications
- Ideal for applications in flash cartridges.

**SMT Bulk Packings
for a large-scale
Chromatographic Separation**



Silica gels and Bulk Packing materials for process scale applications are available in various particle sizes and pore sizes: 10, 20, 35, 60 μ m and 60, 100, 150, and 300 μ m are stock sizes

The packings are available in bulk quantities of 100 grams, 500 grams, 5 Kg, 10 kg. For larger quantities, please call SMT for a price quote.

SMT Bulk-C18 and C8 Packing Materials

SMT's C18 and C8 columns are very stable at extreme pH conditions and high temperatures. C18 and C8 columns are strongly recommended for the separation of most basic, acidic and neutral compounds. C8 is usually the second choice after C18 for method developments using reversed-phase chromatographic separation. Although C18 remains the most widely used, the use of the C8 phase has increased in recent years and represents a good compromise phase. C8 phase normally provides equivalent selectivity; it is not too hydrophobic, and yet it retains many compounds on the basis of interaction with their hydrophobic groups. C8 phases are good choices when too much organic solvent is required to elute the analytes of interest (especially highly hydrophobic molecules) from a C18 phase. The use of C8 packings reduces retention time and consumption of organic solvents

Unique features:

- Ultra Stable phases for bulk and process-scale purification
- Very high Carbon load
- pH stability from 1 to 12
- Very high silanol site coverage vs competitor's 30-50%
- Perfect for Solid Phase Extraction and Process Scale purifications .
- Ideal for applications in flash cartridges.

Ordering Information:

Bulk C18: 35 m, 150
Catalog#: BOD-35-150
Bulk C18: 35 m, 60
Catalog#: BOD-35-60

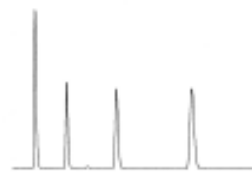
Bulk C8: 35 m, 150
Catalog#: BO-35-150
Bulk C8: 35 m, 60
Catalog#: BO-35-60

The packings are available in bulk quantities of 100 g, 250 g, 500 g, 5 Kg, 10 kg. For larger quantities call for a price quote.

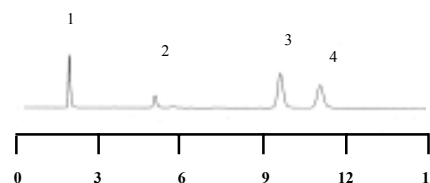
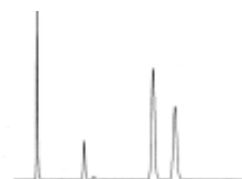
Silica gel and Bulk Packing materials for process scale applications are available in various particle sizes and pore sizes: 10, 20, 35, 60 m and 60, 100, 150 and 300 are stock sizes.

From Analytical to Semi-Prep using SMT Bulk C18 and C8

Column: A=OD-5-100/15
B=OD-35-150/1510
Solutes: 1=Uracil
2=Toluene
3=Hexanophenone
4=Anthracene
Eluent: ACN:Water 70:30
Flow: 1.0mL/min
Detector: UV; 254nm
Temp: 30°C



Column: A=O-5-100/15
B=O-35-150/1510
Solutes: 1=Uracil
2=Toluene
3=Hexanophenone
4=Anthracene
Eluent: ACN:Water 70:30
Flow: 1.0mL/min
Detector: UV; 254nm
Temp: 30°C



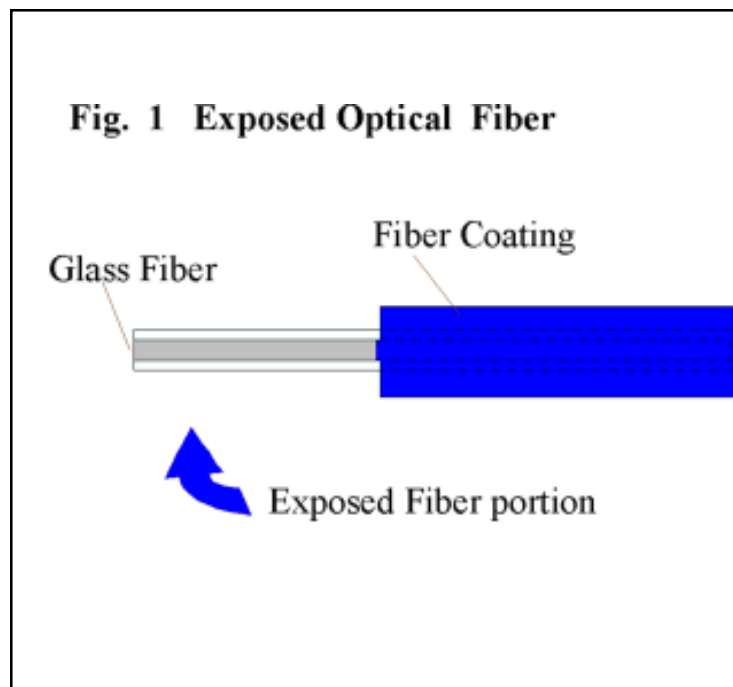
SMT Specialty Products for Materials Engineering

SMT manufactures and designs specialty products for materials engineering. Some of these products have found applications in the treatment of specialty glass surfaces and optical fibers, as illustrated in the following examples.

Fiber Optics

A mixed-ligand mixture that consists of a specially formulated molecular assembly^{1,2} in solution has been developed for bonding on bare optical fibers. The mixed-ligand organizes into a dense, two-dimensionally cross-linked network over the fiber and results in a significant reduction in surface hydrolysis and breakage due to stress. The chemically bonded phase, which provides a film thickness of only about 45-120 Å, offers unprecedented protection against chemical and mechanical abuse on exposed fibers¹².

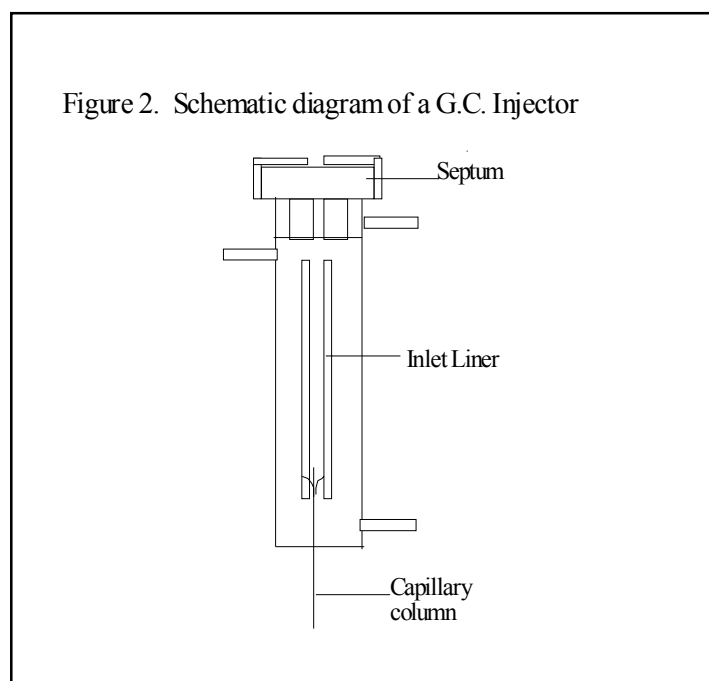
During usage, an optical fiber [Figure 1] is constantly exposed to different harsh environments, such as, water, high humidity, low and high temperatures, chemicals, or a combination of environments. The strength of the fiber is controlled by the growth of cracks that penetrate its molecular structure. The cracks develop from breakage of the tetrahedron network when the fiber is stressed or hydrolysis of the bonds when the fibers are exposed to harsh environments. Even the process of extrusion of the fiber alone can be stressful to the tetrahedron network and it may well be a unique and perhaps an inevitable source of cracks in the fiber.



Inlet Liners

A mixed-ligand mixture that consists of a specially formulated molecular assembly^{1,2} in solution has been developed for bonding on glass inlet liner used for gas chromatography. The mixed-ligand organizes into a dense, two-dimensionally cross-linked network over the liner and results in a significant reduction in carryover of strongly basic and acidic analytes¹³. The bonded phase is stable to temperature in excess of 350°C

Glass inlet liners [Figure 2] have a direct effect in the analysis results in gas chromatography. When dirty samples are analyzed routinely, replaceable inlet liners (usually made of glass) are often used to minimize the influence of contaminants in subsequent analyses.



Please Call SMT for Detail or Ordering Information about these specialty products.

Separation Methods Technologies, Inc. - www.separationmethods.com - Tel: 302.368.0610 Fax: 302.368.0282

HPLC Column Selection Guide

Reversed-Phase Columns

SMT SAM-C18 Columns OD-5-100	Equivalent Columns Luna C18 Symmetry C18 YMC ODS-AM Xterra C18 Kromasil C18 Inertsil C18	SMT SAM-C8 Columns O-5-100	Equivalent Columns Luna C8 Symmetry C8 YMC-Pack C8 Xterra C8 Kromasil C8 Inertsil C8
SMT Elte-C18	Luna C18 Symmetry C18 YMC ODS-AM Xterra C18 Kromasil C18 Inertsil C18	SMT Elite-C8	Luna C8 Symmetry C8 YMC-Basic, Pack C8 Xterra C8 Kromasil C8 Inertsil C8
ODL-5-100	Luna C18 Symmetry C18 YMC ODS-AM Xterra C18 Kromasil C18 Inertsil C18 Zorbax SB C18	OL-5-100	Luna C8 Symmetry C8 YMC-Pack C8 Xterra C8 Kromasil C8 Inertsil C8 Zorbax SB C8
SMT MEB Columns MEB1-5-100 MEB2-5-100 MEB4-5-100	Luna C5 Kromasil C1 Zorbax SB C3 Kromasil C4	SMT Phenyl Columns Phen1-5-100 Phen2-5-100	Luna Phenyl BetaSil Phenyl YMC-Pack Phenyl Zorbax Phenyl

Normal Phase Columns

SMT NH2 Columns AP-5-100	Luna NH2 Kromasil NH2 YMC-Pack-NH2	SMT CN-Columns CP-5-100	Luna CN Zorbax SB CN YMC-Pack CN
SMT Silica Columns S-5-100	Kromasil Si Spherisorb Luna Silica NucleoSil Si	SMT-Diol Columns Diol1-5-100 Diol12-5-100	Lichrosorb Diol Spherex Diol YMC-Pack Diol NucleoSil Diol

Ion-Exchange & Specialty Columns

SMT SAX Columns SAX-5-100	Hypersil SAX Vydac SAX PureGel SAX	SMT SCX Columns SCX-5-100	Vydac SCX PureGel SCX Capcell Pak SCX
SMT WAX Columns WAX-5-100	Vydac WAX BioSep DEAE	SMT WCX Columns WCX-5-100	PartiSphere WCX Gammabond WCX
SMT DEAE Columns DEAE1-5-100	BioSep DEAE TSK DEAE	SMT QuickSep Columns	Luna C18,C8,C4 etc. Symmetry C18,C8 etc. Inertsil C18,C8 etc.
SMT PAH Columns PAH1	Luna C18, EnviroSep PAH Vydac PAH	SMT C6F5 Columns C6F5	Phenomenex-Curosil SupelcoSil LC-F

References Cited

- 1 Mary J. Wirth and Hafeez O. Fatunmbi, "Products Having Multiple-substituted Polysiloxane Monolayer" U.S. Patent No. 5,599,625, 1997.
- 2 Mary J. Wirth and Hafeez O. Fatunmbi, "Products Having Multiple-substituted Polysiloxane Monolayer" U.S. Patent No. 5,716,705, 1998.
- 3 Mary J. Wirth, R.W. Peter Fairbank, and Hafeez O. Fatunmbi, "Mixed Self-Assembled Monolayers in Chemical Separations," *Science*, 44, 275, 1997.
- 4 Hafeez O. Fatunmbi, Martha D. Bruch, and Mary J. Wirth " ²⁹Si and ¹³C NMR Characterization of Mixed Horizontally Polymerized Monolayers on Silica Gel" *Anal. Chem.* 65, 2048, 1993.
- 5 Ming Huang, Eva Dubrovackova, Milos Novotny, Hafeez O. Fatunmbi and Mary J. Wirth, "Self-Assembled Alkylsilane Monolayers for the Preparation of Stable and Efficient Coatings in Capillary Electrophoresis" *J. Microcolumn Sep.* 6, 571, 1994.
- 6 Mary J. Wirth and Hafeez O. Fatunmbi, "Horizontal Polymerization of Mixed Trifunctional Silanes on Silica: A Potential Chromatographic Stationary Phase" *Anal. Chem.* 64, 2783, 1992.
- 7 Mary J. Wirth and Hafeez O. Fatunmbi, "Horizontal Polymerization of Mixed Trifunctional Silanes on Silica: 2 Application to Chromatographic Silica Gel" *Anal. Chem.* 65, 822, 1993.
- 8 Mary J. Wirth and Hafeez O. Fatunmbi, "Self-Assembly Monolayers in Separations" *LC.GC.* 12, 222, 1994.
- 9 Ian S. Zagon, W. Jeffery Hurst, and Patricia J. McLaughlin, *Life Sci.* 61, 1261, 1997.
- 10 R. W. Peter Fairbank, Yang Xiang, and Mary J. Wirth, "Use of Methyl Spacers in a Mixed Horizontally Polymerized Stationary Phase" *Anal. Chem.* 67, 3879, 1995.
- 11 Samuel O. Akapo and Hafeez O. Fatunmbi, "The Performance of Mixed Horizontally Polymerized Phases Versus Conventional C18 Silica Columns for Reversed-Phase HPLC" *LC.GC.* 17, 334, 1999.
- 12 Mary J. Wirth and Hafeez O. Fatunmbi, "Horizontal Polymerization of Mixed Trifunctional Silanes on Silica: A Potential Chromatographic Stationary Phase" *Anal. Chem.* 64, 2783, 1992.
- 13 Mary J. Wirth, "Spectroscopic Probing of Reversed-Phase Chromatographic retention" *LC.GC.* 12, 656, 1994.
- 14 Mary J. Wirth and Hafeez O. Fatunmbi, "Horizontal Polymerization of Mixed Trifunctional Silanes on Silica: A Potential Chromatographic Stationary Phase" *Anal. Chem.* 64, 2783, 1992.
- 15 Mary J. Wirth and Hafeez O. Fatunmbi, "Horizontal Polymerization of Mixed Trifunctional Silanes on Silica: A Potential Chromatographic Stationary Phase" *Anal. Chem.* 64, 2783, 1992.
- 16 Li Li, Peter W. Carr and John F. Evans, "Studies of Retention and Stability of a Horizontally Polymerized Bonded Phase for Reversed-phase Liquid Chromatography" *Journal of Chromatogr. A* 868, 153, 2000.
- 17 Mathias Pursch, Lane Sander, and Klaus Albert, "Chain Order and Mobility of High-Density C18 Phases by Solid-State NMR Spectroscopy and Liquid Chromatography" *Anal. Chem.* 68, 4107, 1996
- 18 Martha D. Bruch and Hafeez O. Fatunmbi, "NMR Analysis of Silica Gel Surfaces Modified with Mixed Ligands" *J. Chromatogr.* 2002, In Press.

SMT Application Notes: HPLC SEPARATION GUIDE and OTHER APPLICATIONS

- 1 Selectivities of SMT SAM-C18 and SAM-C8 in the separation of Polar and Non polar compounds
- 2 Analysis of Ciprofloxacin with SMT SAM-C18 App. Note No. 0402-001 Jun. 2002
- 3 Separation of Isoflavones in Soy App. Note No. 0102-001 Jan. 2002.
- 4 Isolation of Protein Molecules with SMT C18 App. Note No. 1101-001 Nov. 2001.
- 5 Isolation of p-Amino Benzoic Acid (PABA) derivatives with SMT-C4 Column App. Note No. 1101-001 Nov. 2001.
- 6 Drug Screening with SMT-QuickSep Columns App. Note No. 0900-001 Mar. 2000.
- 7 Process Scale Purification with SMT Bulk C18 Packings App. Note No. 0300-001 Mar. 2000.
- 8 Separation of Steroids with SMT-C18 App Note No. 0599-001 May. 1999.
- 9 Separation of Closely Related Drug Molecules with SMT-C18 App. Note No. 0199-001 Jan. 1999.
- 10 Separation of Closely Related Phenols SMT-C18 App. Note No. 0698-001 Jun. 1998
- 11 Analysis of Pesticides with SMT-C18 columns App. Note No. 0498-001 Apr. 1998.
- 12 Separation of Organic Acids with SMT-C8 App. Note No. 0298-001 Feb. 1998.
- 13 *Fiber-Optics News* Vol 1, Fall, 1999
- 14 Separation of Closely Related Tetracyclines with SMT C8 and C18 columns App. Note No. 1197-001 Nov. 1997.
- 15 Low Detectability of Cocaine and Nicotine with SMT-QuickSep Column App. Note No. 0397-001 Mar. 1997.
- 16 Analysis of Fat-Soluble Vitamins App. Note No. 0297-001 Feb. 1997.
- 17 Analysis of Nitroaromatic Explosives App. Note No. 0197-001 Jan. 1997.
- 18 Identification of Mycobacterium Intracellulare by HPLC and Computer Driven Pattern Recognition System App. Note No. 0896-003 Aug. 1996.
- 19 Analysis of the Gentamicin Complex App. Note No. 0796-003 Jul. 1996.
- 20 Analysis of Antibacterial Residues Cow Milk App. Note No. 0496-002 Apr. 1996.
- 21 Analysis of Flavonoids in Green Tea App. Note No. 0496-001 Apr. 1996.
- 22 Analysis of Priority Pollutant: Polycyclic Aromatic Hydrocarbons App. Note No. 0396-001 Mar. 1996.
- 23 Analysis of Active Ingredients in a Sun Screen App. Note No. 0196-001 Jan. 1996.
- 24 Separation of Nucleotides App. Note No. 1195-003 Nov. 1995.