

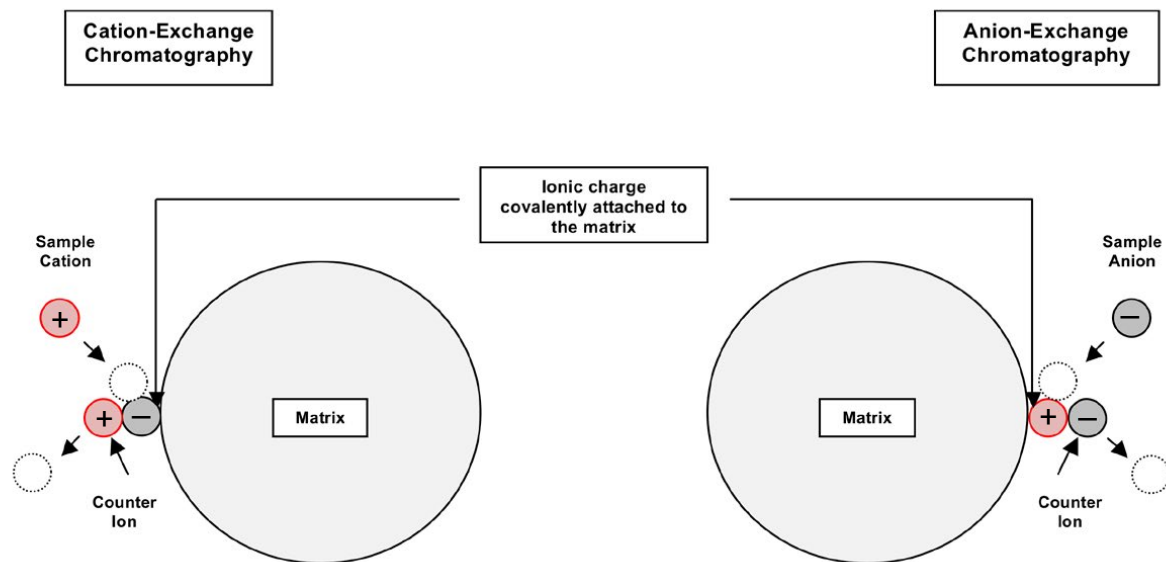
Ion-Exchange Chromatography

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).

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. 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 packing 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.

Figure 1. Schematic representation of ion-exchange chromatography



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

Special features:

- Superior selectivity and efficiency in separation of proteins and biomolecules.
- High stability under extreme operating conditions.
- High recovery of analytes.

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

Typical Column Specification:	SAX-Columns	
5 µm Silica	100Å	300Å
Surface Area [m ² /g]	340	90
Capacity [meq/g]	0.92	0.39

Ordering Information

SMT SAX - Columns 5 µm, 100Å

* Column Dimension (length x i.d.)

50mmx4.6mm
75mmx4.6mm
100mmx4.6mm
150mmx4.6mm
250mmx4.6mm
300mmx4.6mm

Catalog Number

SAX-5-100/5
SAX-5-100/7.5
SAX-5-100/10
SAX-5-100/15
SAX-5-100/25
SAX-5-100/30

SMT SAX - Columns 5 µm, 300Å

* Column Dimension (length x i.d.)

50mmx4.6mm
75mmx4.6mm
100mmx4.6mm
150mmx4.6mm
250mmx4.6mm
300mmx4.6mm

Catalog Number

SAX-5-300/5
SAX-5-300/7.5
SAX-5-300/10
SAX-5-300/15
SAX-5-300/25
SAX-5-300/30

SMT SAX - Columns 10 µm, 100Å

* Column Dimension (length x i.d.)

50mmx4.6mm
75mmx4.6mm
100mmx4.6mm
150mmx4.6mm
250mmx4.6mm
300mmx4.6mm

Catalog Number

SAX-10-100/5
SAX-10-100/7.5
SAX-10-100/10
SAX-10-100/15
SAX-10-100/25
SAX-10-100/30

SMT SAX - Columns 10 µm, 300Å

* Column Dimension (length x i.d.)

50mmx4.6mm
75mmx4.6mm
100mmx4.6mm
150mmx4.6mm
250mmx4.6mm
300mmx4.6mm

Catalog Number

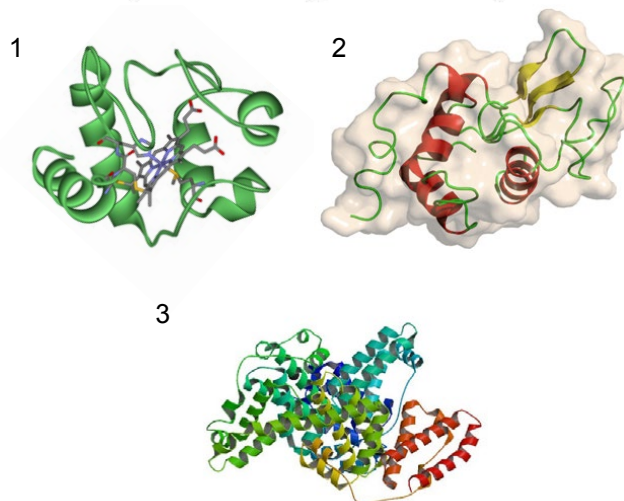
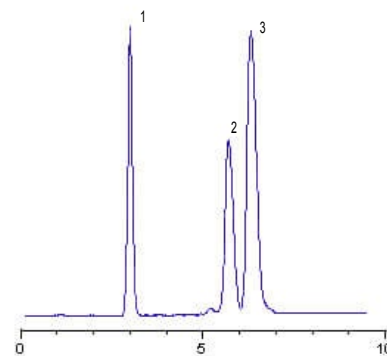
SAX-10-300/5
SAX-10-300/7.5
SAX-10-300/10
SAX-10-300/15
SAX-10-300/25
SAX-10-300/30

*Guard column: 20mmx4.0mm; add suffix G to Catalog Number
+Other dimensions available; Please contact SMT, Inc. for quotation



Separation of 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: 1.0 mL/min
Detector: UV; 260nm
Temp: 30°C



SMT WAX Columns & 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 on silica substrate. The technique of SAM is used in the bonding process to significantly increase the functional ligand density. Unlike polymer-based WAX, the packing material is mechanically stable at high flow rates and high pressures up to 6,000 psi. SMT WAX packing does not swell with organic solvents, salts, or pH gradients

Special features:

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

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

Typical Column Specification:	WAX-Columns	
5 µm Silica	100Å	300Å
Surface Area [m ² /g]	340	90
Capacity [meq/g]	0.96	0.38



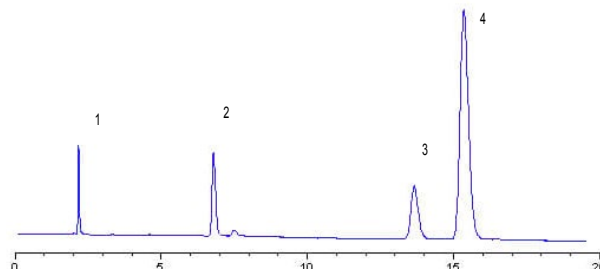
Separation of Biomolecules: Nucleotides

Column: WAX-5-100/15

Solutes:
1=CMP
2=AMP
3=UMP
4=CDP

Eluent: A=0.1M Sodium phosphate buffer [pH=3]; B=0.1M Sodium phosphate and 2.0M NaCl [pH=3] gradient 0-100% B in 20 min

Flow: 1.0 mL/min
Detector: UV; 254nm
Temp: 30°C



Ordering Information

SMT WAX - Columns 5 µm, 100Å

* Column Dimension (length x i.d.)

50mmx4.6mm
75mmx4.6mm
100mmx4.6mm
150mmx4.6mm
250mmx4.6mm
300mmx4.6mm

Catalog Number
WAX-5-100/5
WAX-5-100/7.5
WAX-5-100/10
WAX-5-100/15
WAX-5-100/25
WAX-5-100/30

SMT WAX - Columns 5 µm, 300Å

* Column Dimension (length x i.d.)

50mmx4.6mm
75mmx4.6mm
100mmx4.6mm
150mmx4.6mm
250mmx4.6mm
300mmx4.6mm

Catalog Number
WAX-5-300/5
WAX-5-300/7.5
WAX-5-300/10
WAX-5-300/15
WAX-5-300/25
WAX-5-300/30

SMT WAX - Columns 10 µm, 100Å

* Column Dimension (length x i.d.)

50mmx4.6mm
75mmx4.6mm
100mmx4.6mm
150mmx4.6mm
250mmx4.6mm
300mmx4.6mm

Catalog Number
WAX-10-100/5
WAX-10-100/7.5
WAX-10-100/10
WAX-10-100/15
WAX-10-100/25
WAX-10-100/30

SMT WAX - Columns 10 µm, 300Å

* Column Dimension (length x i.d.)

50mmx4.6mm
75mmx4.6mm
100mmx4.6mm
150mmx4.6mm
250mmx4.6mm
300mmx4.6mm

Catalog Number
WAX-10-300/5
WAX-10-300/7.5
WAX-10-300/10
WAX-10-300/15
WAX-10-300/25
WAX-10-300/30

*Guard column: 20mmx4.0mm; add suffix G to Catalog Number
*Other dimensions available; Please contact SMT, Inc. for quotation

SMT DEAE Columns & 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 bio-molecules 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:

- Fast reequilibration and very negligible non-specific protein interaction.
- 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.

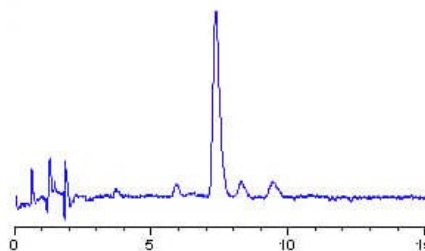
SMT DEAE columns are available in various particle and pore sizes: 5 and 10µm; 100 and 300Å are available stock sizes.

Typical Column Specification:	DEAE-Columns	
5 µm Silica	100Å	300Å
Surface Area [m ² /g]	340	90
Capacity [meq/g]	0.95	0.37



Separation of Plasmid DNA molecules

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



Ordering Information

SMT DEAE - Columns 5 µm, 100Å

* Column Dimension (length x i.d.)

50mmx4.6mm
 75mmx4.6mm
 100mmx4.6mm
 150mmx4.6mm
 250mmx4.6mm
 300mmx4.6mm

Catalog Number
 DEAE-5-100/5
 DEAE-5-100/7.5
 DEAE-5-100/10
 DEAE-5-100/15
 DEAE-5-100/25
 DEAE-5-100/30

SMT DEAE - Columns 5 µm, 300Å

* Column Dimension (length x i.d.)

50mmx4.6mm
 75mmx4.6mm
 100mmx4.6mm
 150mmx4.6mm
 250mmx4.6mm
 300mmx4.6mm

Catalog Number
 DEAE-5-300/5
 DEAE-5-300/7.5
 DEAE-5-300/10
 DEAE-5-300/15
 DEAE-5-300/25
 DEAE-5-300/30

SMT DEAE - Columns 10 µm, 100Å

* Column Dimension (length x i.d.)

50mmx4.6mm
 75mmx4.6mm
 100mmx4.6mm
 150mmx4.6mm
 250mmx4.6mm
 300mmx4.6mm

Catalog Number
 DEAE-10-100/5
 DEAE-10-100/7.5
 DEAE-10-100/10
 DEAE-10-100/15
 DEAE-10-100/25
 DEAE-10-100/30

SMT DEAE - Columns 10 µm, 300Å

* Column Dimension (length x i.d.)

50mmx4.6mm
 75mmx4.6mm
 100mmx4.6mm
 150mmx4.6mm
 250mmx4.6mm
 300mmx4.6mm

Catalog Number
 DEAE-10-300/5
 DEAE-10-300/7.5
 DEAE-10-300/10
 DEAE-10-300/15
 DEAE-10-300/25
 DEAE-10-300/30

*Guard column: 20mmx4.0mm; add suffix G to Catalog Number
 +Other dimensions available; Please contact SMT, Inc. for quotation

SMT SCX Columns & 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 on silica substrate. The technique of SAM is used in the bonding process to significantly increase the functional ligand density. Unlike polymer-based SCX, the packing material is mechanically stable at high flow rates and high pressures up to 6,000 psi. SMT SCX packing does not swell with organic solvents, salts, or pH gradients

Special features:

- Superior selectivity and efficiency in 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.

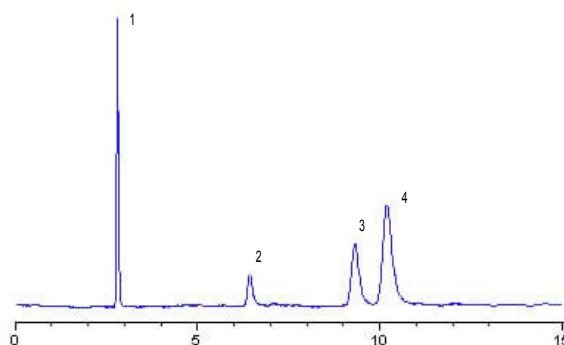
SMT SCX columns are available in various particle and pore sizes: 5 and 10µm; 100 and 300Å are available stock sizes.

Typical Column Specification:	SCX-Columns	
5 µm Silica	100Å	300Å
Surface Area [m ² /g]	340	90
Capacity [meq/g]	0.94	0.36



Separation of Biomolecules: Proteins

Column: SCX-5-300/25
Solutes: 1=cytochrome C
 2=lysozyme
 3=lactoglobulin
 4=albumin
Eluent: A=Potassium phosphate [pH=6] B=A + 0.5M NaCl
 gradient 0-80%B in 20 min
Flow: 1.0 mL/min
Detector: UV; 210nm
Temp: 30°C



Ordering Information

SMT SCX - Columns 5 µm, 100Å

* Column Dimension (length x i.d.)

50mmx4.6mm
 75mmx4.6mm
 100mmx4.6mm
 150mmx4.6mm
 250mmx4.6mm
 300mmx4.6mm

Catalog Number

SCX-5-100/5
 SCX-5-100/7.5
 SCX-5-100/10
 SCX-5-100/15
 SCX-5-100/25
 SCX-5-100/30

SMT SCX - Columns 5 µm, 300Å

* Column Dimension (length x i.d.)

50mmx4.6mm
 75mmx4.6mm
 100mmx4.6mm
 150mmx4.6mm
 250mmx4.6mm
 300mmx4.6mm

Catalog Number

SCX-5-300/5
 SCX-5-300/7.5
 SCX-5-300/10
 SCX-5-300/15
 SCX-5-300/25
 SCX-5-300/30

SMT SCX - Columns 10 µm, 100Å

* Column Dimension (length x i.d.)

50mmx4.6mm
 75mmx4.6mm
 100mmx4.6mm
 150mmx4.6mm
 250mmx4.6mm
 300mmx4.6mm

Catalog Number

SCX-10-100/5
 SCX-10-100/7.5
 SCX-10-100/10
 SCX-10-100/15
 SCX-10-100/25
 SCX-10-100/30

SMT SCX - Columns 10 µm, 300Å

* Column Dimension (length x i.d.)

50mmx4.6mm
 75mmx4.6mm
 100mmx4.6mm
 150mmx4.6mm
 250mmx4.6mm
 300mmx4.6mm

Catalog Number

SCX-10-300/5
 SCX-10-300/7.5
 SCX-10-300/10
 SCX-10-300/15
 SCX-10-300/25
 SCX-10-300/30

*Guard column: 20mmx4.0mm; add suffix G to Catalog Number

+Other dimensions available; Please contact SMT, Inc. for quotation

SMT WCX Columns & 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 on silica substrate. The technique of SAM is used in the bonding process to significantly increase the functional ligand density. Unlike polymer-based WCX, the packing material is mechanically stable at high flow rates and high pressures up to 6,000 psi. SMT WCX packing does not swell with organic solvents, salts, or pH gradients

Special features:

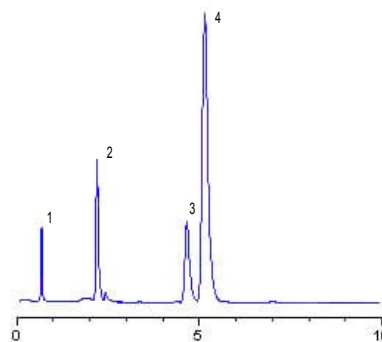
- Superior selectivity and efficiency in separation of proteins and biomolecules high stability under extreme operating conditions.
- High density carboxylic acid functional groups provide much better analyte recovery compared to conventional WCX.

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



Separation of Biomolecules

Column: WCX-5-300/25
Solutes: 1=trypsinogen
 2=ribonuclease A
 3=cytochrome C
 4=chmotrypsinogen
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: 1.0 mL/min
Detector: UV; 280nm
Temp: 30°C



Typical Column Specification:	WCX-Columns	
5 µm Silica	100Å	300Å
Surface Area [m ² /g]	340	90
Capacity [meq/g]	0.91	0.35

Ordering Information

SMT WCX - Columns 5 µm, 100Å

* Column Dimension (length x i.d.)	Catalog Number
50mmx4.6mm	WCX-5-100/5
75mmx4.6mm	WCX-5-100/7.5
100mmx4.6mm	WCX-5-100/10
150mmx4.6mm	WCX-5-100/15
250mmx4.6mm	WCX-5-100/25
300mmx4.6mm	WCX-5-100/30

SMT WCX - Columns 5 µm, 300Å

* Column Dimension (length x i.d.)	Catalog Number
50mmx4.6mm	WCX-5-300/5
75mmx4.6mm	WCX-5-300/7.5
100mmx4.6mm	WCX-5-300/10
150mmx4.6mm	WCX-5-300/15
250mmx4.6mm	WCX-5-300/25
300mmx4.6mm	WCX-5-300/30

*Guard column: 20mmx4.0mm; add suffix G to Catalog Number
 +Other dimensions available; Please contact SMT, Inc. for quotation

SMT WCX - Columns 10 µm, 100Å

* Column Dimension (length x i.d.)	Catalog Number
50mmx4.6mm	WCX-10-100/5
75mmx4.6mm	WCX-10-100/7.5
100mmx4.6mm	WCX-10-100/10
150mmx4.6mm	WCX-10-100/15
250mmx4.6mm	WCX-10-100/25
300mmx4.6mm	WCX-10-100/30

SMT WCX - Columns 10 µm, 300Å

* Column Dimension (length x i.d.)	Catalog Number
50mmx4.6mm	WCX-10-300/5
75mmx4.6mm	WCX-10-300/7.5
100mmx4.6mm	WCX-10-300/10
150mmx4.6mm	WCX-10-300/15
250mmx4.6mm	WCX-10-300/25
300mmx4.6mm	WCX-10-300/30