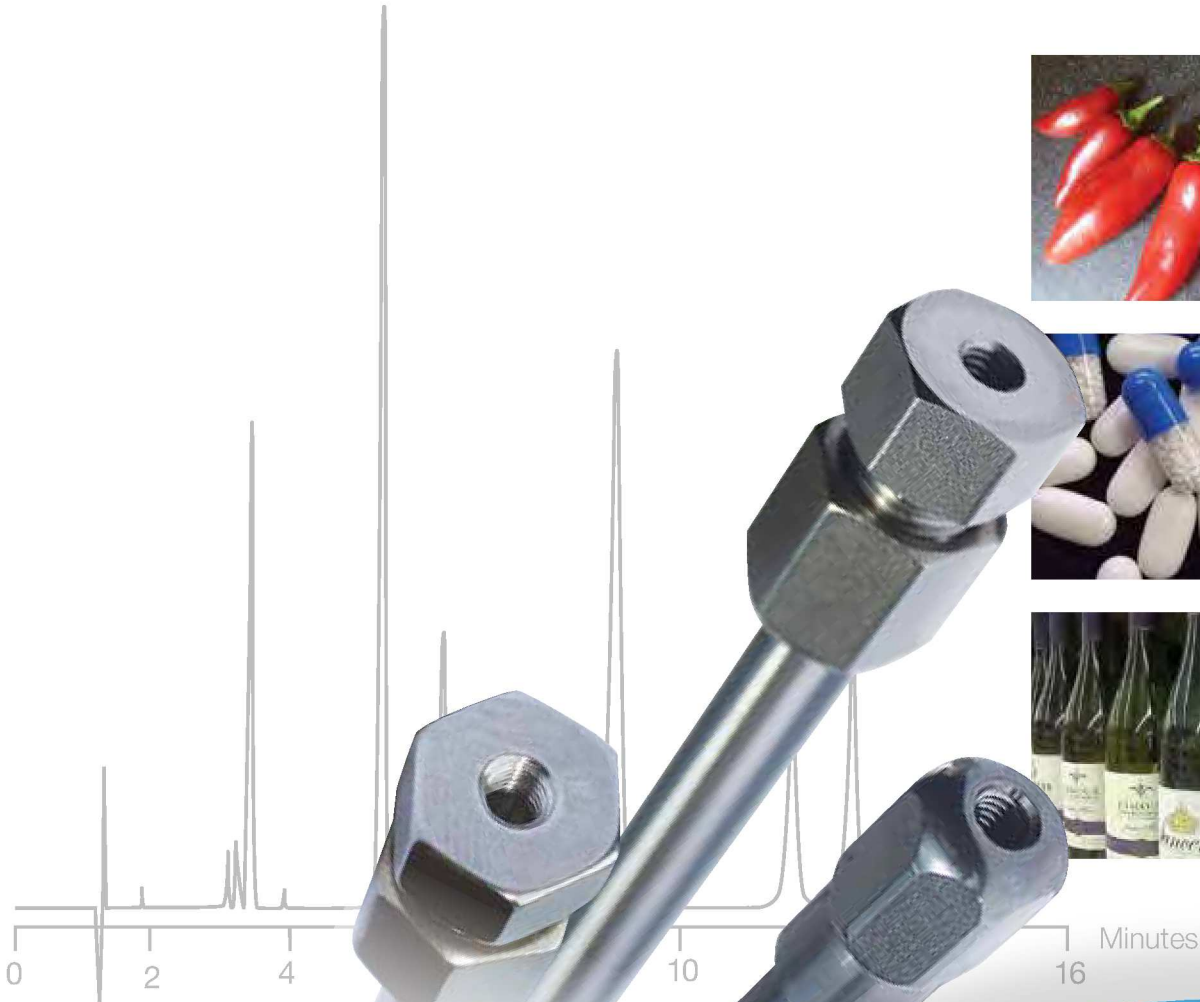
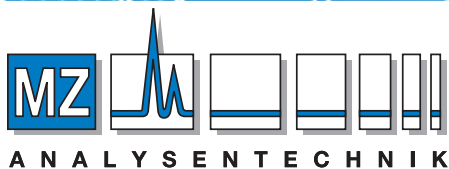


# PRINCETON

## CHROMATOGRAPHY INC



constantly innovating & pushing the limits of HPLC & SFC



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## **ABOUT US**

**Princeton Chromatography Inc., based in Cranbury, New Jersey, USA, was founded in 1994. We have over 40 years experience in chromatography and are one of the earliest developers of novel commercial SFC phases.**

Princeton Chromatography Inc. delivers the highest quality, cutting edge products backed by unmatched technical support. From SFC to HPLC, analytical to preparative, all columns are manufactured on-site and subjected to rigid quality standards.

Every SFC and HPLC column is tested and shipped with an original chromatogram. All stationary phase media are bonded at our facility, so the quality and reproducibility of each batch can be closely monitored. All columns are packed and tested on-site by our team of production specialists to ensure the highest level of satisfaction for our customers.

Princeton Chromatography manufactures a wide range of phases for SFC and both reversed-phase and normal-phase HPLC. We are one of the world leaders in the development of innovative SFC phases.

With so many stationary phases and column dimensions to choose from, we can make your scale up easy and worry free. From 2.0 mm screening columns for LC-MS to kilograms of bulk media, we are with you every step of the way.

## **PRINCETON CHROMATOGRAPHY INC. OFFERS:**

- Widest selection of bonded achiral SFC phases on the market
- Wide range of HPLC phases for analytical and preparative applications
- Bulk materials for HPLC
- Custom column packing services for SFC, SMB and preparative applications
- Chiral media repacking services
- Small scale purification service

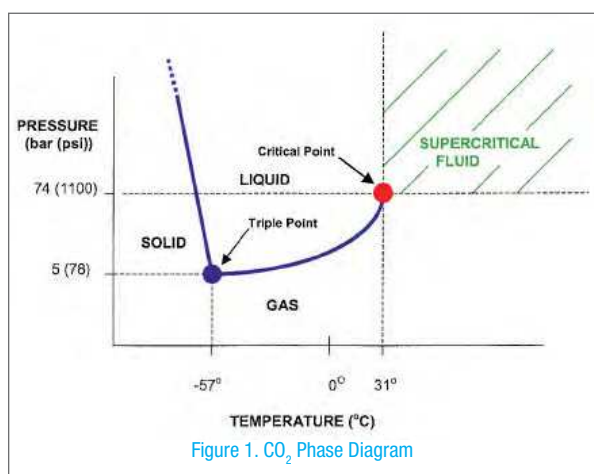
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Other Services.....Page 18

## SFC Overview

Supercritical Fluid Chromatography (SFC) is a chromatographic technique which uses a supercritical fluid as the mobile phase. Although SFC has been around for some time, its adaptation as an orthogonal technique to HPLC, particularly in the pharmaceutical industry, has seen an increase over the last few years. This interest has been fuelled by the increasing requirement for high throughput and a desire for 'green' techniques. Large reductions in the use of solvents have significant benefits in terms of decreased sample processing and drying-down times in preparative SFC, as well as providing cost and safety benefits.



Liquefied CO<sub>2</sub> is most commonly used as the main fluid in SFC, with the addition of a modifier such as methanol (typically 2% to 60% v/v) to aid elution of very polar or ionic compounds. The modifier improves the solvating power of the supercritical fluid and enhances the selectivity of the separation. Supercritical fluids can have solvating powers similar to organic solvents but with higher diffusivity, lower

viscosity and lower surface tension. The lower viscosity allows higher flow rates compared to HPLC, leading to faster methods. Any solute soluble in methanol or a less polar organic solute will elute in SFC. For polar compounds, a more polar additive may also be added to the mobile phase to facilitate elution and improve peak shape.

Packed column SFC has developed from HPLC instrumentation and columns. The mobile phase is kept supercritical by an electronically controlled variable pressure restrictor positioned after the detector.

### Key Benefits of SFC

- Fast analyses
- Reduced solvent consumption
- High flow rates possible
- Lower cost per sample
- Compatible with MS
- Excellent for preparative separations

Retention mechanisms in SFC are currently not well understood, but depend mainly on the nature of the stationary phase. SFC is generally seen as a normal-phase technique, predominantly using polar stationary phases, along with less polar mobile phases. However, hydrophobic C18 bonded silica phases offer a reversed-phase retention mode and different selectivity. In fact any HPLC phase can be used for SFC, in addition to the wide range of available phases specifically designed for SFC.

The table below shows typical starting conditions for an achiral analytical SFC assay. For basic analytes, a pyridine based column is a good starting point. For acidic compounds, a diol type column may be more retentive. Neutral compounds do not generally require an additive for elution.

### Typical Analytical Conditions for Achiral SFC

<b>Stationary Phase</b>	Silica, Diol, 2-Ethylpyridine etc.
<b>Column Dimensions</b> Length i.d.	5, 10, 75, 150, 250 mm 2.0, 3.0, 4.0, 4.6 mm
<b>Mobile Phase</b> CO <sub>2</sub> Modifier Additive 1*	Flow rate: 1 – 5 ml/min Methanol 0.1% Diethylamine or 15mM ammonium acetate (for basic compounds) 0.1% TFA or 0.1% formic acid (for acidic compounds)
<b>Gradient</b>	5 – 50% modifier
<b>Pressure</b>	100 - 200 bar
<b>Temperature</b>	35 – 45°C
<b>Detection</b>	UV, MS, ELSD, CAD

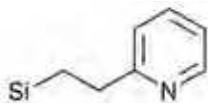

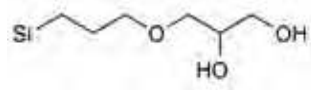
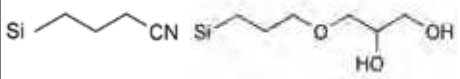

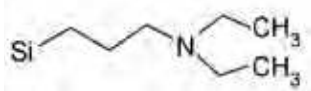
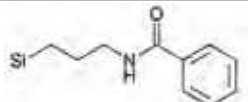
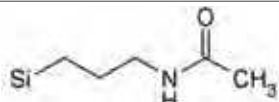
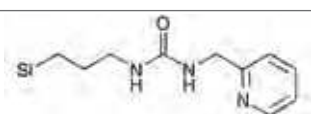
\* 1 - 5% water may also be added if required

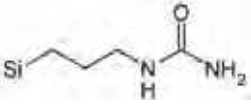
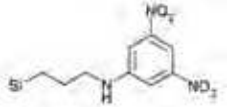
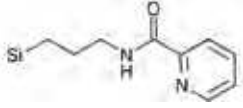
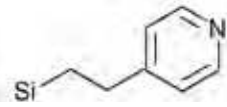
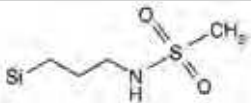
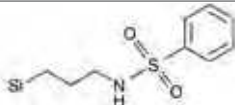
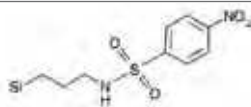
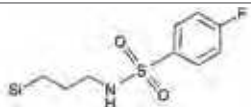
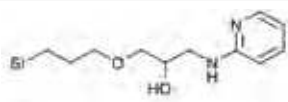
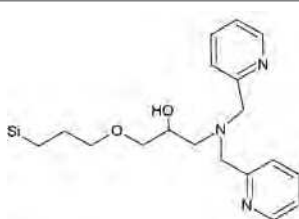
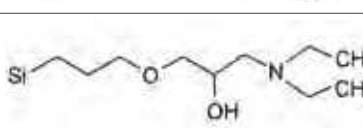
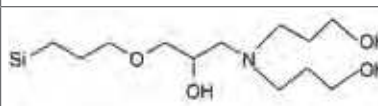
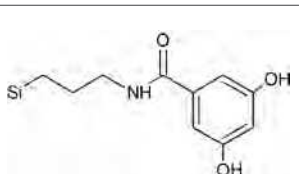
## PrincetonSFC Phases

**Achiral SFC separations typically require ‘normal-phase’ type polar stationary phases, such as silica, amino, cyano and diol. Although these phases are adequate for many applications, there is still a need for additional polar phases to meet the demands of difficult separations.**

At Princeton Chromatography we have led the way in developing a series of novel amide, urea and pyridine phases that enhance the capability of the SFC technique by providing increased selectivity and loading capacity. Princeton Chromatography was the first company to develop and market the popular 2-Ethylpyridine which was launched in 2001 and later the 4-Ethylpyridine phase. PrincetonSFC 2-Ethylpyridine is non-encapped and has become the column of choice for achiral SFC analysis of basic compounds. This phase generally requires no addition of amines to the eluent, producing excellent peak shape and reproducibility.

A diol phase is a popular and versatile stationary phase for SFC. We have also developed several different hydroxylated stationary phases, most notably the HA Series, which offer excellent selectivity and retention characteristics. These phases are a great starting point for impurity analysis.

Phase	Pore Size (Å)	Particle Size (µm)	Structure	Phase Code
2-Ethylpyridine	60 100 300	3, 5, 10 2.5, 3, 5, 10 3, 5, 10		77
Silica	60 100	3, 5, 10 3, 5, 10	Si—OH	10
Cyano	60 100	3, 5, 10 3, 5, 10		07
DIOL	60 100	3, 5, 10 3, 5, 10		09
DIOL-HL	60	5, 10		79
2CN:DIOL	60 100	3, 5, 10 3, 5, 10		86
Amino	60 100	3, 5, 10 3, 5, 10		08
DEAP (Diethylamino)	60	3, 5, 10		75
Benzamide	100	3, 5, 10		76
PA (Propylacetamide)	60	3, 5, 10		80
PPU (Propylpyridylurea)	100	3, 5, 10		82

Phase	Pore Size (Å)	Particle Size (µm)	Structure	Phase Code
Propylurea	100	3, 5, 10		36
DNP (Dinitrophenyl)	100	3, 5, 10		93
Pyridine Amide	60	3, 5, 10		83
4-Ethylpyridine	60 100	3, 5, 10 3, 5, 10		90
Methane Sulfonamide	60	3, 5, 10		91
Benzene Sulfonamide	100	3, 5, 10		92
4-Nitrobenzene Sulfonamide	100	3, 5, 10		95
4-Fluorobenzene Sulfonamide	100	3, 5, 10		96
HA-Pyridine	60	3, 5, 10		87
HA-Dipyridyl	100	3, 5, 10		88
HA-DEA (Diethylamino)	60	3, 5, 10		65
HA-DHP (Dihydroxypropyl)	100	3, 5, 10		69
3,5-Dihydroxyphenyl	100	3, 5, 10		45



## PrincetonSFC Analytical Columns

PrincetonSFC analytical columns are available with lengths of 50 to 250 mm and internal diameters of 2.0, 3.0, 4.0 and 4.6 mm. All PrincetonSFC columns are individually quality assured by SFC. Available particle sizes are 3, 5 and 10  $\mu\text{m}$ , with an additional 2.5  $\mu\text{m}$  particle size phase available for the PrincetonSFC 2-Ethylpyridine columns. Pore sizes of 60, 100 and 300 $\text{\AA}$  (for 2-Ethylpyridine phase) are available.

### Ordering Information

In order to determine the part number of your required PrincetonSFC analytical column, just insert the phase code **X** from the table below into the part number table (e.g. for a 150 x 4.6 mm 2-Ethylpyridine column with a pore size of 60  $\text{\AA}$  and a particle size of 5  $\mu\text{m}$ , the part number is 150046-01577).

### PHASE CODES:

Phase	Code X	Phase	Code X	Phase	Code X
2-Ethylpyridine	77	Benzamide	76	Benzene Sulfonamide	92
Silica	10	PA	80	4-Nitrobenzene Sulfonamide	95
Cyano	07	PPU	82	4-Fluorobenzene Sulfonamide	96
DIOL	09	Propylurea	36	HA-Pyridine	87
DIOL-HL	79	DNP	93	HA-Dipyridyl	88
2CN:DIOL	86	Pyridine Amide	83	HA-DEA	65
Amino	08	4-Ethylpyridine	90	HA-DHP	69
DEAP	75	Methane Sulfonamide	91	3,5-Dihydroxyphenyl	45

Pore Size ( $\text{\AA}$ )	Particle Size ( $\mu\text{m}$ )	Column Length (mm)	Column i.d. (mm)			
			2.0	3.0	4.0	4.6
60	3	50	050020-013X	050030-013X	050040-013X	050046-013X
60	3	75	075020-013X	075030-013X	075040-013X	075046-013X
60	3	100	100020-013X	100030-013X	100040-013X	100046-013X
60	3	150	150020-013X	150030-013X	150040-013X	150046-013X
60	3	250	250020-013X	250030-013X	250040-013X	250046-013X
60	5	50	050020-015X	050030-015X	050040-015X	050046-015X
60	5	75	075020-015X	075030-015X	075040-015X	075046-015X
60	5	100	100020-015X	100030-015X	100040-015X	100046-015X
60	5	150	150020-015X	150030-015X	150040-015X	150046-015X
60	5	250	250020-015X	250030-015X	250040-015X	250046-015X
60	10	50	050020-010X	050030-010X	050040-010X	050046-010X
60	10	75	075020-010X	075030-010X	075040-010X	075046-010X
60	10	100	100020-010X	100030-010X	100040-010X	100046-010X
60	10	150	150020-010X	150030-010X	150040-010X	150046-010X
60	10	250	250020-010X	250030-010X	250040-010X	250046-010X
100	3	50	050020-033X	050030-033X	050040-033X	050046-033X
100	3	75	075020-033X	075030-033X	075040-033X	075046-033X
100	3	100	100020-033X	100030-033X	100040-033X	100046-033X
100	3	150	150020-033X	150030-033X	150040-033X	150046-033X
100	3	250	250020-033X	250030-033X	250040-033X	250046-033X
100	5	50	050020-035X	050030-035X	050040-035X	050046-035X
100	5	75	075020-035X	075030-035X	075040-035X	075046-035X
100	5	100	100020-035X	100030-035X	100040-035X	100046-035X
100	5	150	150020-035X	150030-035X	150040-035X	150046-035X
100	5	250	250020-035X	250030-035X	250040-035X	250046-035X
100	10	50	050020-030X	050030-030X	050040-030X	050046-030X
100	10	75	075020-030X	075030-030X	075040-030X	075046-030X
100	10	100	100020-030X	100030-030X	100040-030X	100046-030X
100	10	150	150020-030X	150030-030X	150040-030X	150046-030X
100	10	250	250020-030X	250030-030X	250040-030X	250046-030X
300	3	50	050020-083X	050030-083X	050040-083X	050046-083X
300	3	75	075020-083X	075030-083X	075040-083X	075046-083X
300	3	100	100020-083X	100030-083X	100040-083X	100046-083X
300	3	150	150020-083X	150030-083X	150040-083X	150046-083X
300	3	250	250020-083X	250030-083X	250040-083X	250046-083X
300	5	50	050020-085X	050030-085X	050040-085X	050046-085X
300	5	75	075020-085X	075030-085X	075040-085X	075046-085X

Guard cartridges are available for PrincetonSFC analytical columns – please enquire.

## PrincetonSFC Analytical Columns (continued)

Pore Size (Å)	Particle Size (µm)	Column Length (mm)	Column i.d. (mm)			
			2.0	3.0	4.0	4.6
300	5	100	100020-085X	100030-085X	100040-085X	100046-085X
300	5	150	150020-085X	150030-085X	150040-085X	150046-085X
300	5	250	250020-085X	250030-085X	250040-085X	250046-085X
300	10	50	050020-080X	050030-080X	050040-080X	050046-080X
300	10	75	075020-080X	075030-080X	075040-080X	075046-080X
300	10	100	100020-080X	100030-080X	100040-080X	100046-080X
300	10	150	150020-080X	150030-080X	150040-080X	150046-080X
300	10	250	250020-080X	250030-080X	250040-080X	250046-080X

Guard cartridges are available for PrincetonSFC analytical columns – please enquire.

## PrincetonSFC Semi-preparative and Preparative SFC Columns

All Princeton semi-preparative and preparative SFC columns are packed using the same high quality bonded phases as the corresponding analytical columns, making scale up from analytical dimensions seamless and straightforward. Princeton preparative columns are available with internal diameters from 7.8 to 50.0 mm and in lengths from 50 mm to 250 mm. All columns are quality controlled by SFC and individual SFC documentation is included with each column.



### Ordering Information

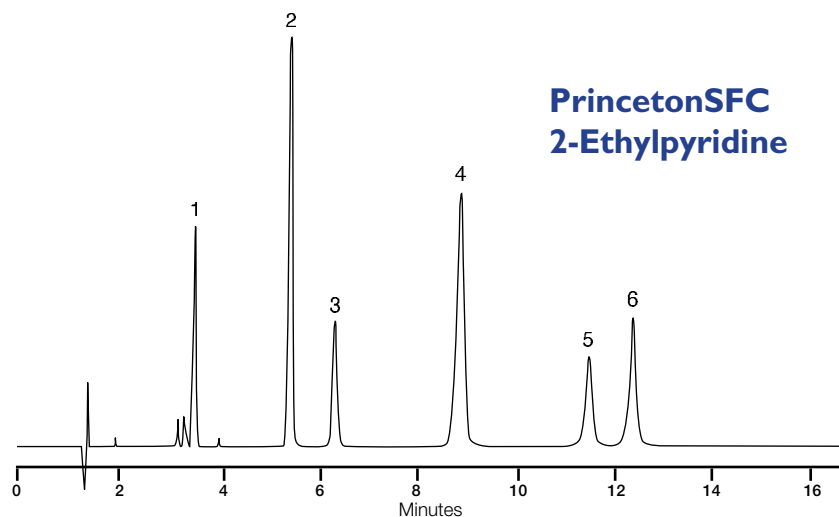
Part numbers are determined using the same phase codes as for analytical columns (see page 4 for phase code table). e.g. for a 250 x 21.2 mm Propylurea column with a pore size of 100 Å and particle size of 10 µm, the part number is 250212-03036

Pore Size (Å)	Particle Size (µm)	Column Length (mm)	Column i.d. (mm)				
			7.8	10.0	21.2	30.0	50.0
60	5	50	050078-015X	050100-015X	050212-015X	050300-015X	050500-015X
60	5	100	100078-015X	100100-015X	100212-015X	100300-015X	100500-015X
60	5	150	150078-015X	150100-015X	150212-015X	150300-015X	150500-015X
60	5	250	250078-015X	250100-015X	250212-015X	250300-015X	250500-015X
60	10	50	050078-010X	050100-010X	050212-010X	050300-010X	050500-010X
60	10	100	100078-010X	100100-010X	100212-010X	100300-010X	100500-010X
60	10	150	150078-010X	150100-010X	150212-010X	150300-010X	150500-010X
60	10	250	250078-010X	250100-010X	250212-010X	250300-010X	250500-010X
100	5	50	050078-035X	050100-035X	050212-035X	050300-035X	050500-035X
100	5	100	100078-035X	100100-035X	100212-035X	100300-035X	100500-035X
100	5	150	150078-035X	150100-035X	150212-035X	150300-035X	150500-035X
100	5	250	250078-035X	250100-035X	250212-035X	250300-035X	250500-035X
100	10	50	050078-030X	050100-030X	050212-030X	050300-030X	050500-030X
100	10	100	100078-030X	100100-030X	100212-030X	100300-030X	100500-030X
100	10	150	150078-030X	150100-030X	150212-030X	150300-030X	150500-030X
100	10	250	250078-030X	250100-030X	250212-030X	250300-030X	250500-030X
300	5	50	050078-085X	050100-085X	050212-085X	050300-085X	050500-085X
300	5	100	100078-085X	100100-085X	100212-085X	100300-085X	100500-085X
300	5	150	150078-085X	150100-085X	150212-085X	150300-085X	150500-085X
300	5	250	250078-085X	250100-085X	250212-085X	250300-085X	250500-085X
300	10	50	050078-080X	050100-080X	050212-080X	050300-080X	050500-080X
300	10	100	100078-080X	100100-080X	100212-080X	100300-080X	100500-080X
300	10	150	150078-080X	150100-080X	150212-080X	150300-080X	150500-080X
300	10	250	250078-080X	250100-080X	250212-080X	250300-080X	250500-080X

Guard cartridges are available for PrincetonSFC preparative columns – please enquire.

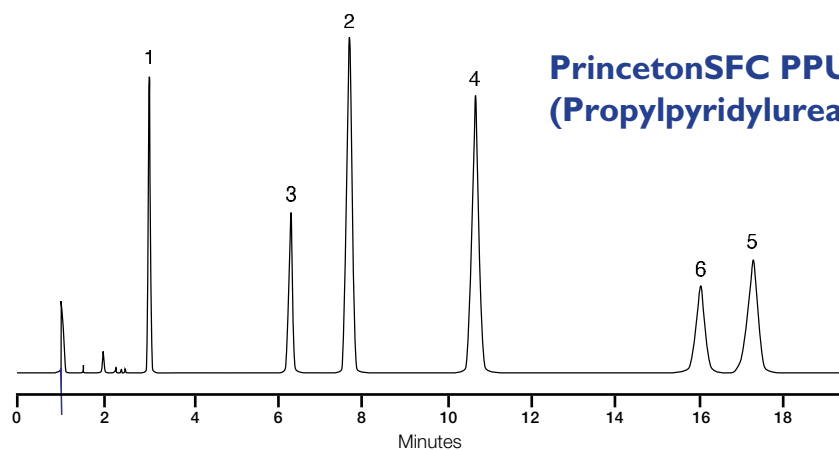
# SFC Applications

## Selectivity of PrincetonSFC 2-Ethylpyridine, PPU and DIOL

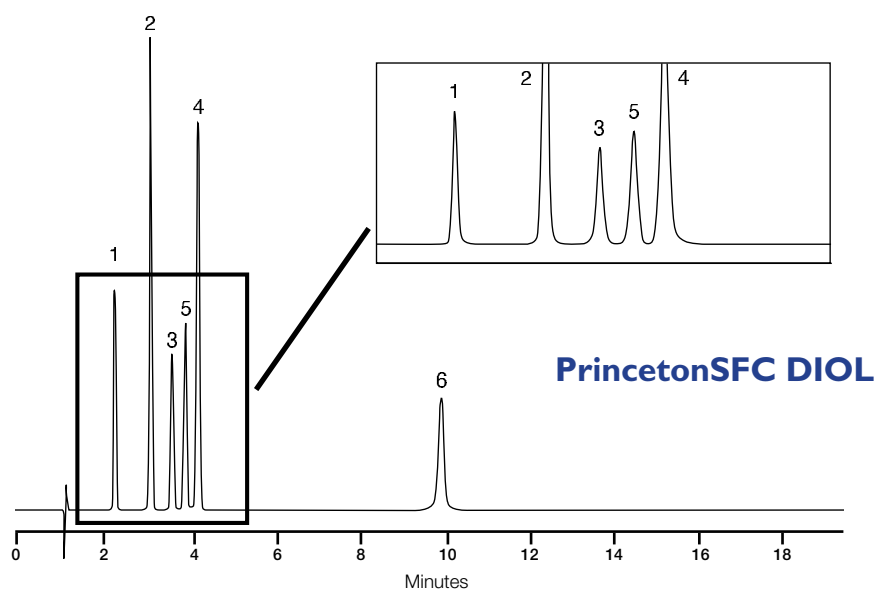


**Column Dimensions:** 250 × 4.6 mm  
**Eluent:** CO<sub>2</sub> - CH<sub>3</sub>OH (80:20)  
**Flow Rate:** 2.0 ml/min  
**Detection:** UV at 230 nm

1. Ibuprofen
2. Aspirin
3. Ketoprofen
4. Indomethacin
5. Diclofenac
6. Sulindac

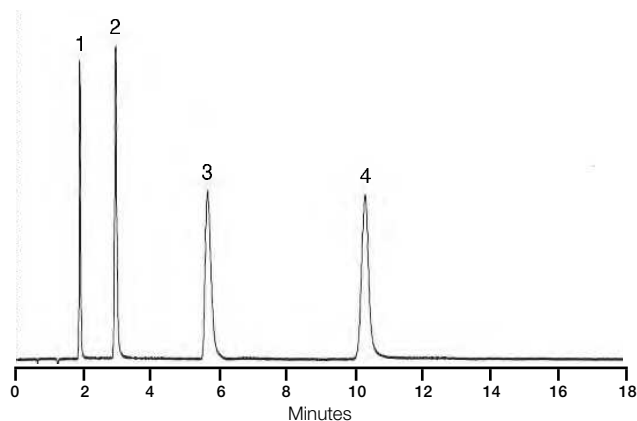


**Changing stationary  
phase is a powerful tool  
for altering selectivity**





## SFC Applications



### Separation of Four $\beta$ -Blockers

**Column:** PrincetonSFC 2-Ethylpyridine, 60 Å, 5  $\mu$ m

**Catalog No:** 250046-01577

**Dimensions:** 250 x 4.6 mm

**Eluent:** CO<sub>2</sub> - CH<sub>3</sub>OH (90:10)

**Additive:** 0.1% N,N-diisopropylethylamine

**Flow Rate:** 5 ml/min

**Temperature:** 40°C

**Detection:** UV at 220 nm

**Injection Volume:** 4  $\mu$ l

1. Metopropol tartrate	7.3 mg/ml
2. dl-Propranolol HCl	2.5 mg/ml
3. Acebutolol HCl	10.8 mg/ml
4. Pindolol	4.8 mg/ml

### Diuretic Compounds

**Column:** PrincetonSFC Benzamide, 100 Å, 5  $\mu$ m

**Catalog No:** 250046-03576

**Dimensions:** 250 x 4.6 mm

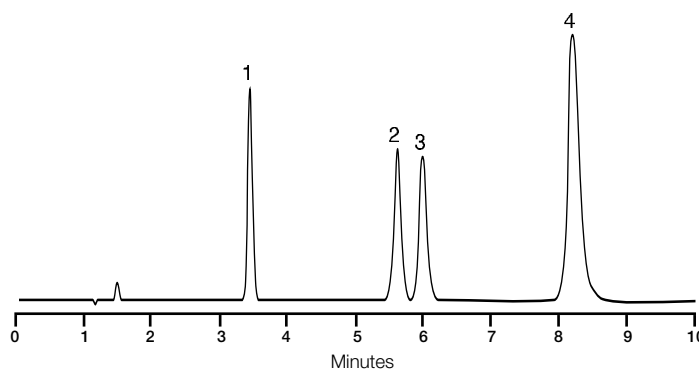
**Eluent:** CO<sub>2</sub> - CH<sub>3</sub>OH (75:25)

**Flow Rate:** 2 ml/min

**Temperature:** 40°C

**Detection:** UV at 220 nm

1. Diazoxide
2. Bendroflumethiazide
3. Hydroflumethiazide
4. Hydrochlorothiazide



### Separation of Basic Compounds

**Column:** PrincetonSFC Propylurea, 100 Å, 5  $\mu$ m

**Catalog No:** 150046-03536

**Dimensions:** 150 x 4.6 mm

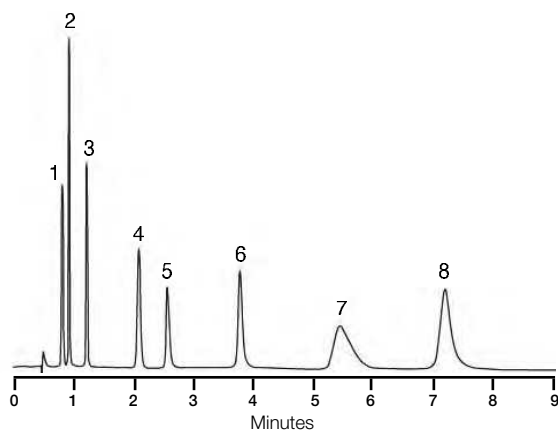
**Eluent:** CO<sub>2</sub> - CH<sub>3</sub>OH (90:10)

**Additive:** 0.1% diethylamine

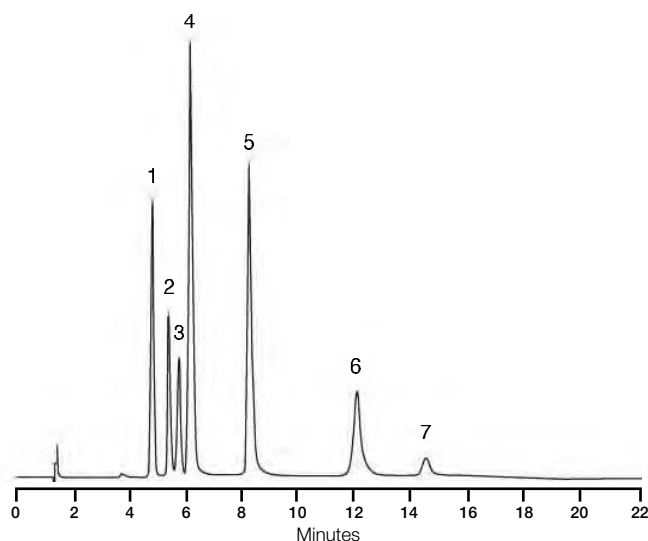
**Flow Rate:** 4.0 ml/min

**Detection:** UV at 254 nm

1. 7-Azaindole
2. 2-Benzylamino-4-methylpyridine
3. 2H-Pyrido[3,2,b]-1,4-oxazin-3(4H)-one
4. 4-Azabenzimidazole
5. Niacinamide
6. 1-Aminoisoquinoline
7. 2,6-Diaminopyridine
8. 1-(2-Pyridyl)piperazine



## SFC Applications



### Separation of $\beta$ -Blockers

**Column:** PrincetonSFC Silica, 5  $\mu$ m

**Dimensions:** 250 x 4.6 mm

**Eluent:** CO<sub>2</sub> - CH<sub>3</sub>OH (70:30)

**Additive:** 0.1% TEA

**Flow Rate:** 2.0 ml/min

**Detection:** UV at 273 nm

1. Timolol
2. Oxprenolol
3. Metoprolol
4. Propranolol
5. Pindolol
6. Acebutolol
7. Atenolol

### SFC Separation of Test Compounds on PrincetonSFC Methane Sulfonamide

**Column:** PrincetonSFC Methane Sulfonamide, 5  $\mu$ m

**Dimensions:** 250 x 4.6 mm

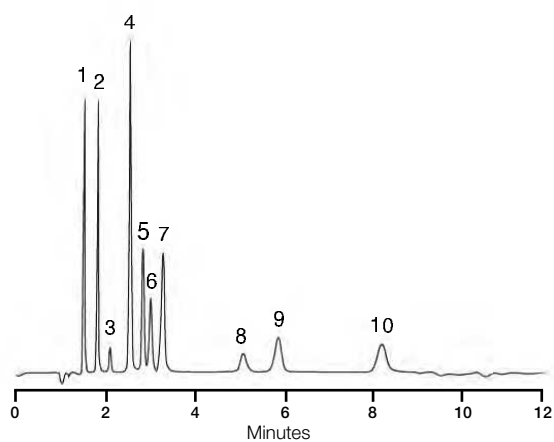
**Eluent:** CO<sub>2</sub> - CH<sub>3</sub>OH (60:40)

**Additive:** 0.2% diethylamine

**Flow Rate:** 2.35 ml/min

**Detection:** UV at 254 nm

- |                 |                     |
|-----------------|---------------------|
| 1. Caffeine     | 6. 5-Fluorouracil   |
| 2. Theophylline | 7. Adenine          |
| 3. Theobromine  | 8. Hypoxanthine     |
| 4. Thymine      | 9. 5-Fluorocytosine |
| 5. Uracil       | 10. Cytosine        |



### Separation of Steroids

**Column:** PrincetonSFC Benzamide

**Dimensions:** 250 x 4.6 mm

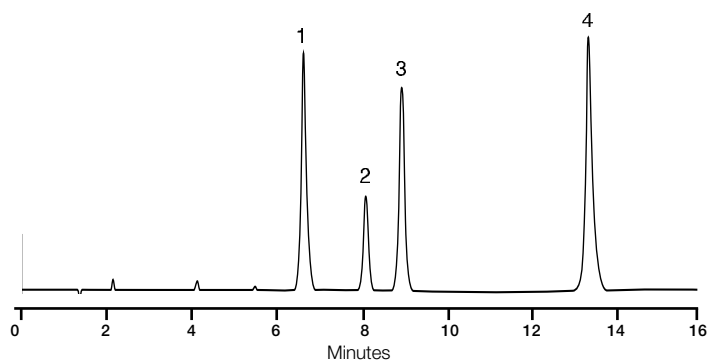
**Eluent:** CO<sub>2</sub> - CH<sub>3</sub>OH (90:10)

**Flow Rate:** 2 ml/min

**Temperature:** 40°C

**Detection:** UV at 254 nm

1. Corticosterone
2. Cortisone
3. Prednisone
4. Prednisolone



## SFC Applications

### Test Mixture on PrincetonSFC 2CN:DIOL

**Column:** PrincetonSFC 2CN:DIOL, 100 Å, 5 µm

**Dimensions:** 150 x 4.6 mm

**Gradient:** 0-1 min 5% CH<sub>3</sub>OH (0.1% diethylamine)

1-18 min 5%-40% CH<sub>3</sub>OH

18-22 min 40% CH<sub>3</sub>OH

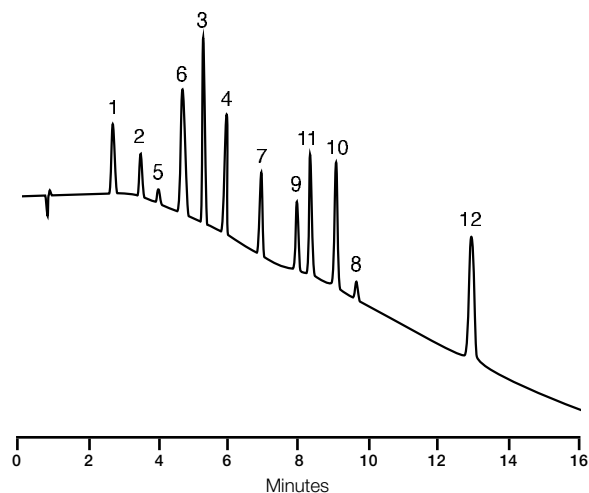
22-30 min - initial conditions

**Flow Rate:** 3 ml/min

**Temperature:** 40°C

**Detection:** UV at 254 nm

- |                 |                      |
|-----------------|----------------------|
| 1. Caffeine     | 7. Prednisone        |
| 2. Theophylline | 8. Hypoxanthine      |
| 3. Thymine      | 9. Hydrocortisone    |
| 4. Uracil       | 10. Sulfamerazine    |
| 5. Fenoprofen   | 11. Sulfamethoxazole |
| 6. Flurbiprofen | 12. Sulfaguanidine   |



### Separation of Antimicrobials

**Column:** PrincetonSFC Propylacetamide

**Dimensions:** 250 x 4.6 mm

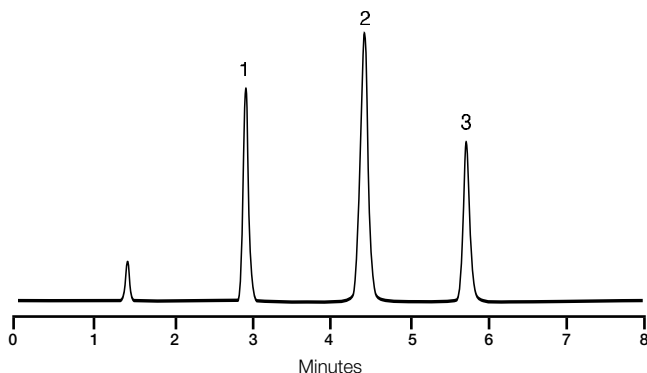
**Eluent:** CO<sub>2</sub> - CH<sub>3</sub>OH (80:20)

**Flow Rate:** 2 ml/min

**Temperature:** 40°C

**Detection:** UV at 254 nm

1. Furazolidone
2. Sulfadimethoxine
3. Sulfaquinoxiline



### Separation of Pyridine Amides

**Column:** PrincetonSFC 2-Ethylpyridine, 100 Å, 5 µm

**Dimensions:** 150 x 4.6 mm

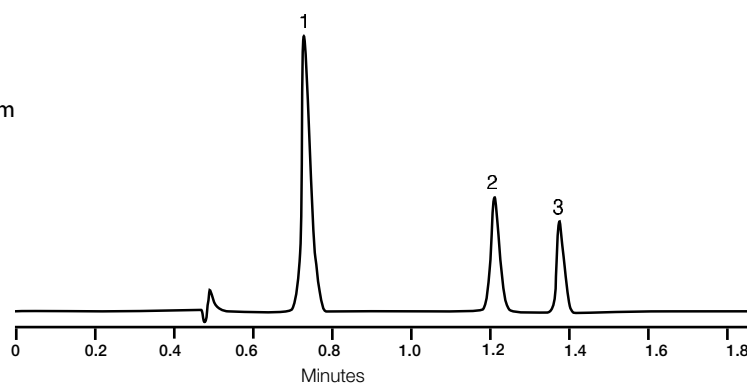
**Eluent:** CO<sub>2</sub> - CH<sub>3</sub>OH (85:15)

**Flow Rate:** 4.0 ml/min

**Temperature:** 40°C

**Detection:** UV at 220 nm

1. Picolinamide
2. Niacinamide
3. Isonicotinamide



## PrincetonSPHER HPLC Phases

**At Princeton Chromatography we have been developing and manufacturing HPLC columns for over 20 years. We offer a wide variety of bonded phases in a range of particle and pore sizes.**

**PrincetonSPHER-60 Series** phases (60 Å pore size) are optimal for compounds under 1000 Da molecular weight. In most cases, the high surface area (500 m<sup>2</sup>/g) leads to longer retention times than with the corresponding 100 Å materials. All PrincetonSPHER-60 columns are packed with high purity silica media that are custom bonded at our facility to ensure the highest standards of quality.

**PrincetonSPHER-100 Series** columns are our most versatile, with a large variety of phases available. With a pore size of 100 Å, an average surface area of 325 m<sup>2</sup>/g and excellent batch-to-batch reproducibility, these columns are excellent for method development.

**PrincetonSPHER-300 Series** (300 Å pore size) are the columns of choice for reversed-phase separations of large molecules such as proteins and peptides. The low surface area of these packing materials is beneficial for separations requiring low percentages of organic modifiers.

**PrincetonSPHER-HTS** is a 60 Å pore size C12 phase designed for High Throughput Screening and semi-preparative applications. This small pore size phase shows sufficient capacity for complex mixtures analysed in the gradient elution mode. The unique structure of this C12 ligand facilitates rapid equilibration between gradient runs.

**PrincetonSPHER C30** is a 200 Å pore size material bonded with a distribution of long chain hydrocarbons that have an average length of C30. This material has been found to successfully separate many isomers in the carotenoid family of long chain molecules. It has also proved useful for the analysis of some larger molecules such as proteins and peptides.

**PrincetonSPHER PFP** (Pentafluorophenyl) has been shown to be very effective in separating natural products such as taxol and related taxanes. The PFP column is an effective alternative to conventional phenyl columns for difficult separations and is useful for differentiating halogen-containing compounds from their non-halogenated analogues.

**PrincetonSPHER FO** is effective in the separation of natural products such as flavanones, as well as halogen containing aromatics. PrincetonSPHER FO columns are useful for differentiating halogen-containing compounds from their non-halogenated analogues.

**Princeton ULTIMA** bonded phases contain an amide polar embedded functionality, which deactivates neighbouring free silanol groups and enhances the wettability of the bonded ligands. Enhanced ligand wettability makes the ULTIMA C18 column especially suited for applications requiring the use of 100% aqueous mobile phases.

**PharmaBOND** columns are packed with 125 Å pore size 10 µm (or 5 µm for C18 phase) irregular silica particles. C18, Phenyl, CN, Amino and Silica phases are available and are suitable for legacy and pharmacopoeia methods specifying this phase type. They are equivalent to Waters µBondapak and are supplied with internal diameters of 3.9 and 4.6 mm.



# Specifications of PrincetonSPHER HPLC Phases

Phase	Particle Size (µm)	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	Endcapped	USP	Phase Code
<b>PrincetonSPHER-60 Series</b>							
C18	3, 5, 10	60	500	23	Yes	L1	01
C8	3, 5, 10	60	500	15	Yes	L7	02
C6	3, 5, 10	60	500	10	Yes	L15	03
C4	3, 5, 10	60	500	8	No	L26	04
Phenyl	3, 5, 10	60	500	16	Yes	L11	05
Diphenyl	5	60	500	10	Yes	L11	51
PFP	3, 5, 10	60	500	12	Yes	L43	06
CN	3, 5, 10	60	500	8	No	L10	07
AMINO	3, 5, 10	60	500	6	No	L8	08
DIOL	3, 5, 10	60	500	6	No	L20	09
DIOL-HL	5, 10	60	500	9	No	L20	79
Silica	3, 5, 10	60	500	n/a	n/a	L3	10
<b>PrincetonSPHER-100 Series</b>							
C18	3, 5, 10	100	325	19	Yes	L1	01
C8	3, 5, 10	100	325	11	Yes	L7	02
C6	3, 5, 10	100	325	8	Yes	L15	03
C4	3, 5, 10	100	325	6	No	L26	04
Phenyl	3, 5, 10	100	325	12	Yes	L11	05
PFP	3, 5, 10	100	325	9	Yes	L43	06
CN	3, 5, 10	100	325	6	No	L10	07
AMINO	3, 5, 10	100	325	4	No	L8	08
DIOL	3, 5, 10	100	325	4	No	L20	09
Silica	3, 5, 10	100	325	n/a	n/a	L3	10
<b>PrincetonSPHER-300 Series</b>							
C18	5, 10	300	100	8	Yes	L1	01
C8	5, 10	300	100	5	Yes	L7	02
C4	5, 10	300	100	3	No	L26	04
Phenyl	5, 10	300	100	5	Yes	L11	05
CN	5, 10	300	100	3	No	L10	07
AMINO	5, 10	300	100	3	No	L8	08
DIOL	5, 10	300	100	2	No	L20	09
Silica	5, 10	300	100	n/a	n/a	L3	10
<b>PrincetonSPHER-Phases</b>							
C30	3, 5, 10	200	200	19	No	L62	74
HTS (C12)	3, 5, 10	60	500	16	Yes	-	70
Cyclohexyl	3, 5, 10	60	500	12	Yes	-	43
Fluorooctyl	5, 10	100	325	8	Yes	-	42
Fluoropropyl	5, 10	100	325	5	No	-	41
DEAP	5, 10	60	500	10.5	No	-	75
<b>ULTIMA Phases</b>							
C18	3, 5, 10	100	325	16	Yes	L1	21
C8	3, 5, 10	100	325	13	Yes	L7	22
Phenyl	3, 5, 10	100	325	12	Yes	L11	23
<b>PharmaBOND Phases</b>							
C18	5, 10	125	300	10	Yes	L1	01
Phenyl	10	125	300	8	Yes	L11	05
CN	10	125	300	6	No	L10	07
Amino	10	125	300	4	No	L8	08
Silica	10	125	300	n/a	n/a	L3	10



# PrincetonSPHER HPLC Columns

## Column Dimensions

Analytical HPLC columns can be supplied with lengths of 50, 75, 100, 150 and 250 mm and with i.d.s of 2.0, 4.0 and 4.6 mm.

Semi-preparative and Preparative HPLC columns can be supplied with lengths of 50, 100, 150 and 250 mm and with i.d.s of 7.8, 10.0, 21.2, 30.0 and 50.0 mm.

## Creating a Part Number

All Princeton Chromatography column part numbers are of the format XY-ABC

where X = column length in mm      A = code for pore size  
       Y = code for column i.d.        B = code for particle size  
   C = code for phase type (included in main phase specification table)

When creating a part number, please substitute the appropriate codes into this basic format.  
 e.g. for a 3 µm 150 x 4.6 mm i.d. PrincetonSPHER-100 C18 column, the part number is 150046-03301.

Column i.d. (mm)	2.0	3.0	4.0	4.6	7.8	10.0	21.2	30.0	50.0
Code	020	030	040	046	078	100	212	300	500

Pore Size (Å)	60	100	125	200	300	Particle Size (µm)	3	5	10
Code	01	03	05	07	08	Code	3	5	0

## Princeton Guard Column System

We recommend that you use guard cartridges in order to extend the lifetime of your column, especially when analyzing samples that are known to contain components which can irreversibly adsorb to the silica phase. The cartridge should be replaced when the column pressure increases, or when the chromatography starts to degrade.

The PrincetonGUARD (Analytical and Preparative) column system (holder and cartridge) conveniently attaches to any HPLC column. Princeton Analytical and Preparative guard cartridges (5/pack) can be prepared with the same lot of packing material that is in the analytical or preparative column, if requested.

Part numbers for guard cartridges are created in the same way as for the analytical columns, by substituting values for A, B and C from the tables above.

### Princeton AnalyticalGUARD

	Part Number
10 x 4.0 mm cartridges (5/pk)	14104-ABC
10 x 2.0 mm cartridges (5/pk)	14102-ABC
Holder for 4.0 and 2.0 mm i.d. cartridges	1410

### Princeton PreparativeGUARD

	Part Number
10 x 10.0 mm cartridges (5/pk)	143010-ABC
10 x 21.2 mm cartridges (1/pk)	144021-ABC
Holder for 10.0 mm i.d. cartridges	1430
Holder for 21.2 mm i.d. cartridges	1440



Holder for 4.0 and 2.0 mm i.d. cartridges



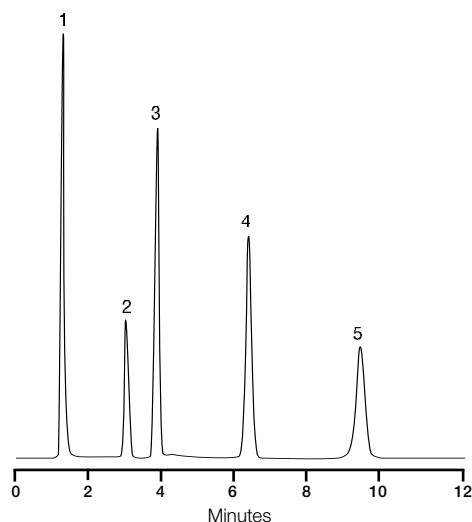
Holder for 10.0 mm i.d. cartridges



Holder for 21.2 mm i.d. cartridges



## HPLC Applications



### Diuretics

**Column:** PrincetonSPHER C18, 100 Å, 5 µm

**Catalog No:** 150046-03501

**Dimensions:** 150 x 4.6 mm

**Eluent:** 60:40 A:B

**A:** 20 mM NH<sub>2</sub>H<sub>2</sub>PO<sub>4</sub>, pH 3.2

**B:** Acetonitrile

**Flow Rate:** 1.5 ml/min

**Temperature:** 40°C

**Detection:** UV at 280 nm

**Injection:** 10 µl (1 mg/ml sample)

1. Hydrochlorothiazide
2. Chlorthalidone
3. Diazoxide
4. Furosemide
5. Bendroflumethiazide

### Aromatic Acids

**Column:** PrincetonSPHER C18, 100 Å, 5 µm

**Catalog No:** 100046-03501

**Dimensions:** 100 x 4.6 mm

**Eluent:** 50:50 A:B

**A:** 0.1M H<sub>3</sub>PO<sub>4</sub>, pH 2.0

**B:** Methanol

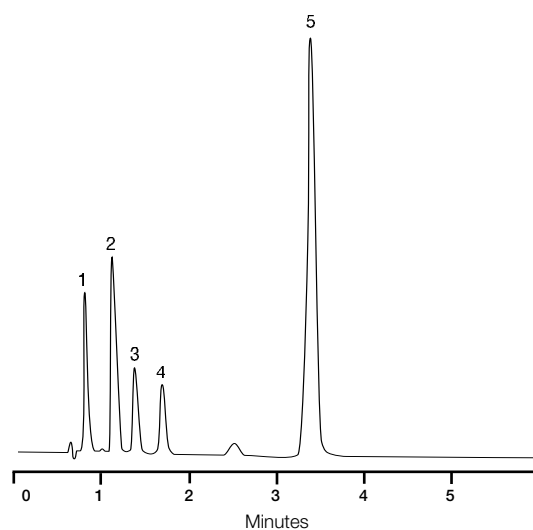
**Flow Rate:** 1.5 ml/min

**Temperature:** Ambient

**Detection:** UV at 240 nm

**Injection:** 5 µl (1 mg/ml sample)

1. p-Aminobenzoic acid
2. p-Hydroxybenzoic acid
3. o-Aminobenzoic acid
4. Benzyl alcohol
5. Salicylic acid



### Steroids

**Column:** PrincetonSPHER C18, 100 Å, 5 µm

**Catalog No:** 250046-03501

**Dimensions:** 250 x 4.6 mm

**Eluent:** 66:34 A:B

**A:** Acetonitrile

**B:** Water

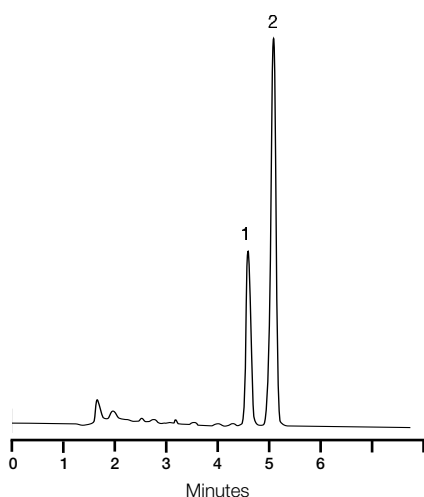
**Flow Rate:** 1.0 ml/min

**Temperature:** 20°C

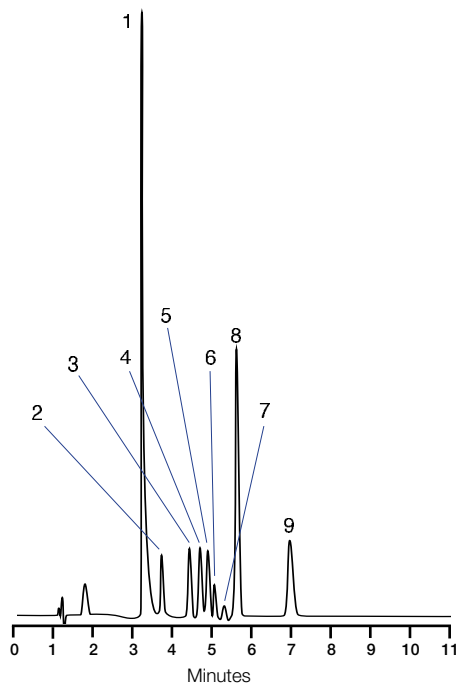
**Detection:** UV at 200 nm

**Injection:** 10 µl (1 mg/ml sample)

1. Ethinyl estradiol
2. Norethindrone



## HPLC Applications



### Explosives

**Column:** PrincetonSPHER C18, 60 Å, 5 µm

**Catalog No:** 250046-01501

**Dimensions:** 250 x 4.6 mm

**Eluent:** 70:30 A:B

**A:** Acetonitrile

**B:** Water

**Flow Rate:** 1.5 ml/min

**Temperature:** 30°C

**Detection:** UV at 254 nm

**Injection:** 10 µl (1 mg/ml sample)

1. 2,4-DNT
2. 4,4'-DPA
3. 4N-DPA
4. NNO-DPA
5. 2,4-DPA
6. 2,2'-DPA
7. 2,4-DPA
8. DPA
9. 2N-DPA

### Uracil and 5-Fluorouracil

**Column:** PrincetonSPHER DIOL, 60 Å, 5 µm

**Catalog No:** 250046-01509

**Dimensions:** 250 x 4.6 mm

**Eluent:** 80:20 A:B

**A:** Acetonitrile

**B:** Water

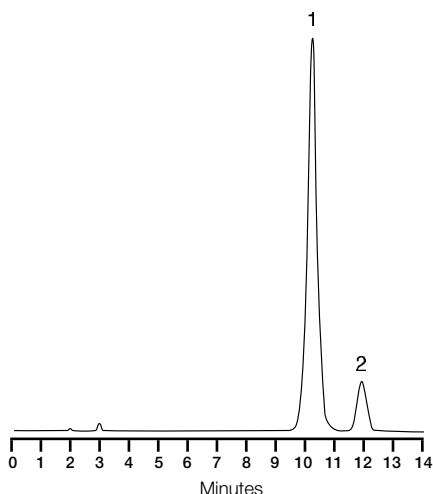
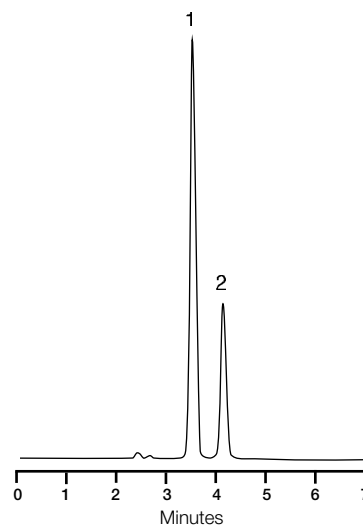
**FlowRate:** 1.0 ml/min

**Temperature:** 20°C

**Detection:** UV at 254 nm

**Injection:** 10 µl (1 mg/ml sample)

1. 5-Fluorouracil
2. Uracil



### Creatine and Creatinine

**Column:** PharmaBOND C18, 125 Å, 10 µm

**Catalog No:** 300039-05001

**Dimensions:** 300 x 3.9 mm

**Eluent:** 70:30 A:B\*

**A:** 0.2% H<sub>3</sub>PO<sub>4</sub>

**B:** Acetonitrile

\* with 1.4 mg/ml dodecyl sulfate sodium

**Flow Rate:** 1.0 ml/min

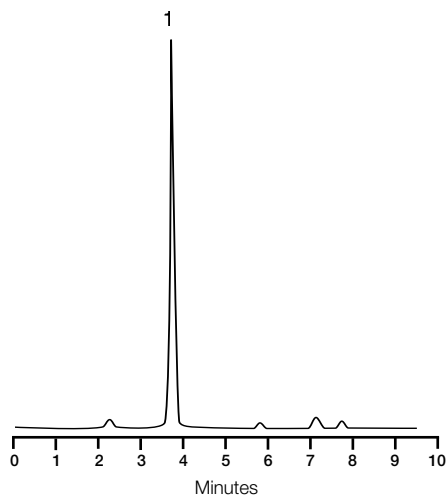
**Temperature:** 20°C

**Detection:** UV at 210 nm

**Injection:** 5 µl (1 mg/ml sample)

1. Creatine
2. Creatinine

## HPLC Applications



### Taxol

**Column:** PrincetonSPHER PFP, 60 Å, 5 µm

**Catalog No:** 250046-01506

**Dimensions:** 250 x 4.6 mm

**Eluent:** 50:50 A:B

**A:** Acetonitrile

**B:** Water

**Flow Rate:** 1.0 ml/min

**Temperature:** 30°C

**Detection:** UV at 230 nm

**Injection:** 10 µl (1 mg/ml sample)

1. Taxol

### Vanillins

**Column:** PrincetonSPHER FO, 60 Å, 5 µm

**Catalog No:** 150046-01542

**Dimensions:** 150 x 4.6 mm

**Eluent:** 30:70 A:B

**A:** Acetonitrile

**B:** 0.1% H<sub>3</sub>PO<sub>4</sub>

**Flow Rate:** 1.0 ml/min

**Temperature:** 20°C

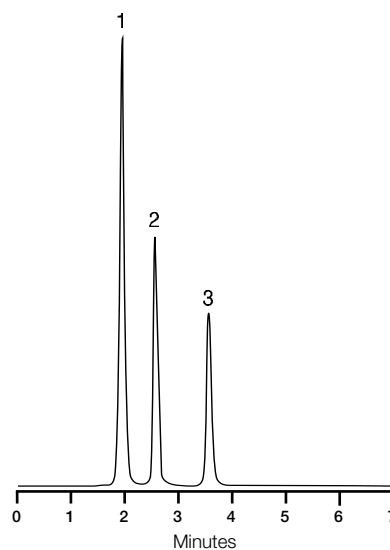
**Detection:** UV at 254 nm

**Injection:** 5 µl (1 mg/ml sample)

1. Vanillic acid

2. Vanillin

3. Ethyl vanillin



### Flavonoids

**Column:** PrincetonSPHER FO, 60 Å, 5 µm

**Catalog No.** 250046-01542

**Dimensions:** 250 x 4.6 mm

**Eluent:** 60:40 A:B

**A:** 0.1% H<sub>3</sub>PO<sub>4</sub>

**B:** Acetonitrile

**Flow Rate:** 1.0 ml/min

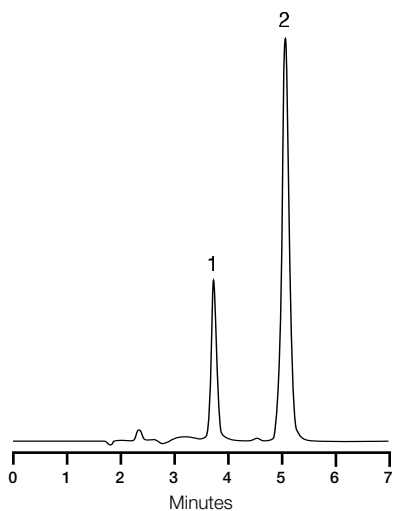
**Temperature:** 20°C

**Detection:** UV at 254 nm

**Injection:** 10 µl (1 mg/ml sample)

1. Quercetin

2. Naringenin



## Other Princeton Chromatography Services

### Bulk Media

At Princeton Chromatography, it is our mission to provide our customers with a complete chromatography solution. To that end, we offer the majority of our stationary phases in bulk form. Each SFC and HPLC stationary phase is available in a variety of particle sizes, ranging from 10  $\mu\text{m}$  to 20  $\mu\text{m}$  for spherical and larger for irregular silica. We have the capacity to produce multiple kilogram quantities of media and can support even the largest projects. Our bulk bonded media have been proven time and time again to be highly scalable and extremely reliable. All bulk media provided by Princeton Chromatography are custom bonded on site and are subjected to extremely stringent quality standards.

### Custom Column Packing

We are proud to offer custom column packing services at our facility in Cranbury, NJ. At Princeton Chromatography, we have the capability to pack up to 50 mm i.d. columns. No job is too big or too small. With over 40 years of column packing experience, our production team is highly skilled. We can provide one or two day turnaround times on smaller jobs. We are flexible and willing to meet your challenges. Princeton Chromatography also specializes in packing matched sets of columns for SMB applications, with a heavy focus on repacking bulk chiral media (supplied by the customer). We have provided these columns to many satisfied customers all over the world. Please contact us for more detailed information about our column packing services.

### Contract Purification

At Princeton Chromatography, we have cutting-edge instrumentation to meet your demanding purification needs. We offer a SFC and HPLC purification service for everything from a few milligrams to multiple gram quantities of material.

### Method Development

Our staff of skilled chromatographers is waiting to help develop your next method. From technical advice and column selection assistance, to validation, Princeton Chromatography can provide solutions for all of your method development needs. Please contact one of our chromatography experts for more information.

### Contact Us:

Princeton Chromatography Inc.

T: 1-609-860-1803

Email: [sales@pci-hplc.com](mailto:sales@pci-hplc.com)

### Alternatively Contact our Global Partner:

Hichrom Ltd,

T: +44 (0) 118 9303660

Email: [technical@hichrom.co.uk](mailto:technical@hichrom.co.uk)



# PRINCETON CHROMATOGRAPHY INC

## OUR MISSION

Our mission at Princeton Chromatography, Inc. is to provide all our customers with the highest quality HPLC and SFC solutions the market has to offer. With over 40 years of combined HPLC experience and close to 15 years serving the SFC market, we are able to provide an unmatched variety of products with custom tailored answers for even the most difficult separations. Our team of professional chromatographers is available to assist you not only in the selection and purchase of your columns, but with long-term support. Here at Princeton Chromatography we are constantly innovating and pushing the limits of HPLC and SFC. Quality. Choices. Flexibility. Innovation. Support. Five words – one goal. The complete and total satisfaction of our customers.

### Quality

Each and every column is tested and shipped with an original chromatogram. All stationary phase media are bonded at our facility, so the quality and reproducibility of each batch can be closely monitored. All columns are packed and tested on-site by our team of production specialists to ensure the highest level of satisfaction for our customers.

### Choices

We offer a wide range of stationary phases. With new innovative phases still being added periodically, we feel certain we can meet all of your HPLC and SFC needs. All phases are available in a range of particle sizes. From standard to highly specialized custom requirements, nothing is out of reach. We also offer a complete array of column diameters and lengths. Everything from 2.0 mm i.d. through to 50.0 mm i.d.

### Flexibility

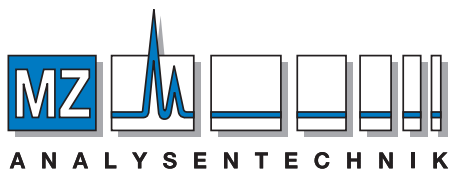
With so many stationary phases and column dimensions to choose from, we can make your scale up easy and worry free. From 2.0 mm screening columns for LC-MS to kilograms of bulk media, we are with you every step of the way.

### Innovation

Chromatography technology is always moving forward and the challenges facing our customers are constantly changing. We have the ability to react quickly to the changing environment and offer a wide range of products to meet all your needs.

### Support

With over 40 years of hands-on experience, we are here to help you with your most difficult problems. Our staff are eager to assist you. Please let us know how we can be of service!



### AUTHORIZED DISTRIBUTOR

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e-mail: [info@mz-at.de](mailto:info@mz-at.de), [www.mz-at.de](http://www.mz-at.de)

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