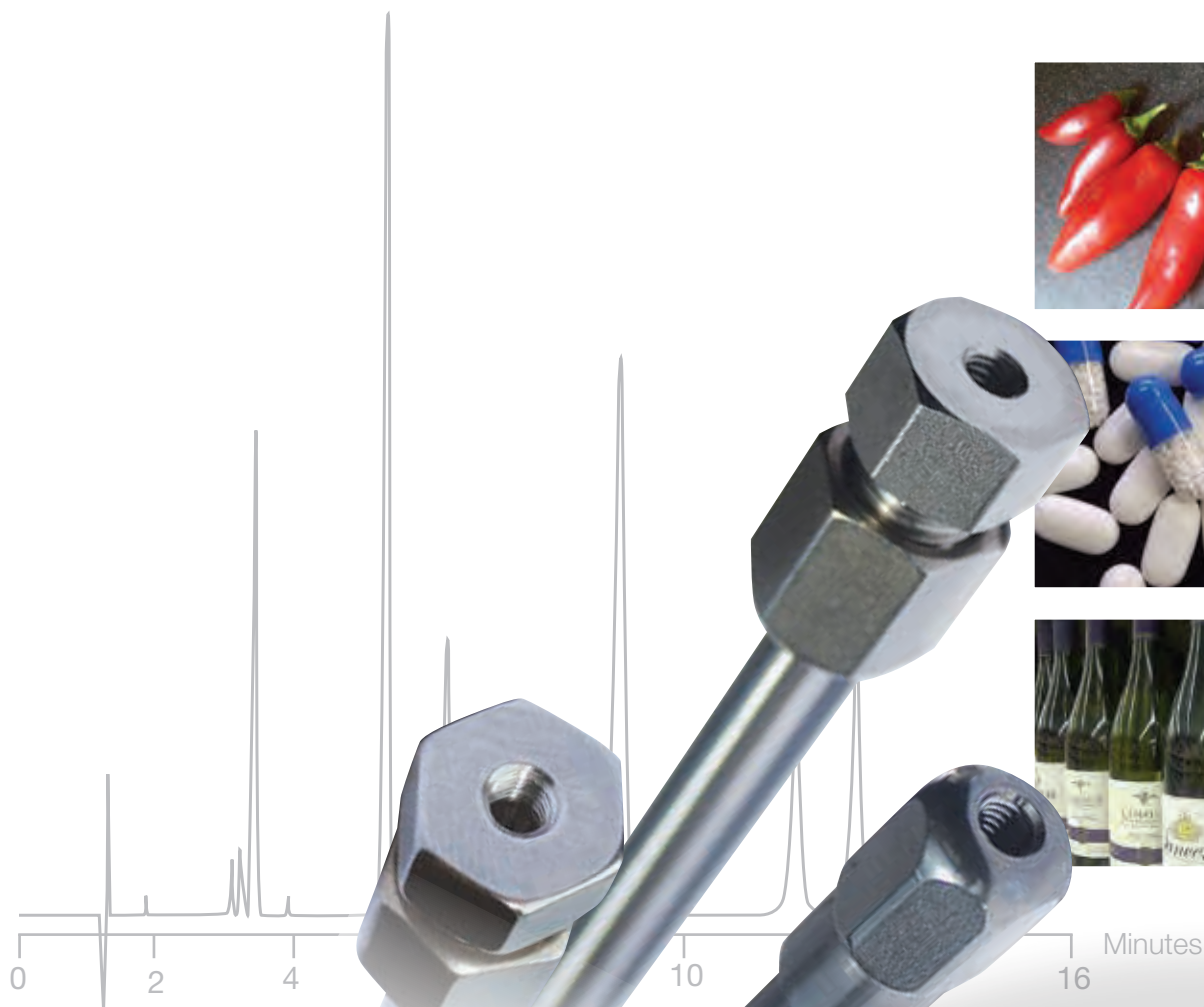


PRINCETON

CHROMATOGRAPHY INC



constantly innovating & pushing the limits of HPLC & SFC



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

PrincetonSFC SFC Columns..... Pages 3-11

PrincetonSPHER HPLC Columns..... Pages 12-17

Other Services..... Page 18



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!

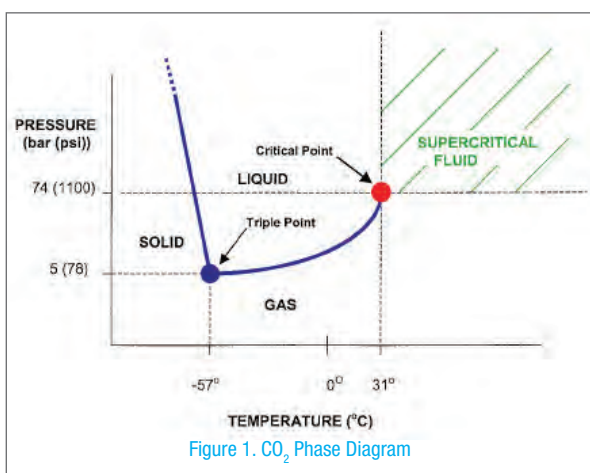
Princeton Chromatography Inc.

259 Prospect Plains Road, Building L, Cranbury, NJ 08512

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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 CO₂ 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

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

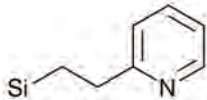

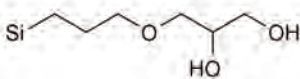
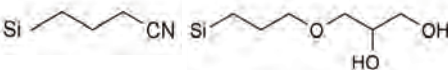

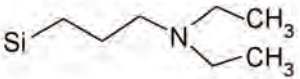
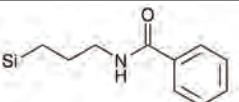
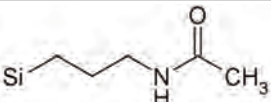
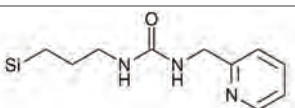
* 1 - 5% water may also be added if required

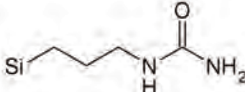
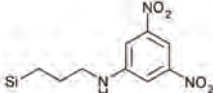
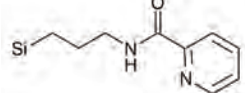
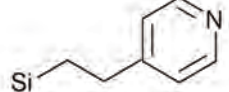
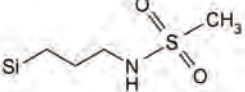
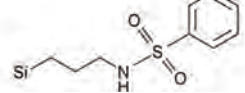
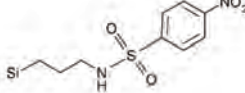
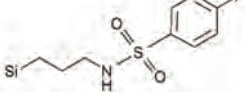
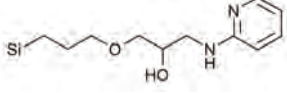
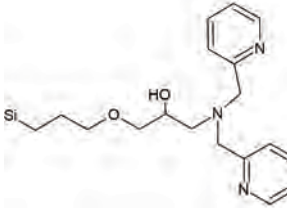
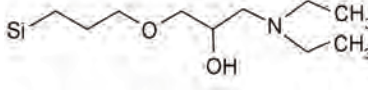
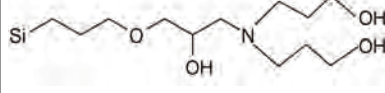
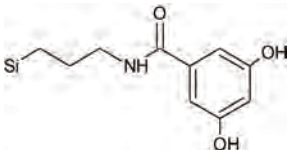
PrincetonSFC Phases

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 phase which was launched in 2001 and later the 4-Ethylpyridine phase. PrincetonSFC 2-Ethylpyridine is non-endcapped 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 µm, with an additional 2.5 µm particle size phase available for the PrincetonSFC 2-Ethylpyridine columns. Pore sizes of 60, 100 and 300Å (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 Å and a particle size of 5 µm, 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 (Å) | Particle Size (µm) | 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

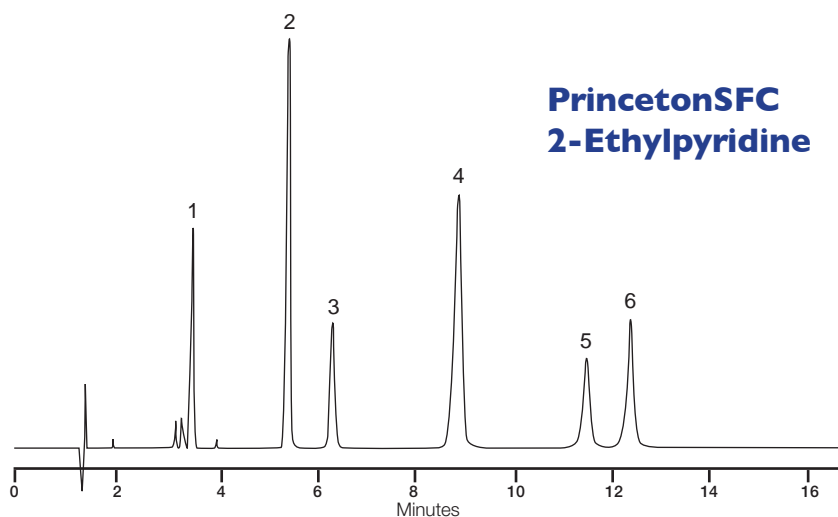
Part numbers are determined using the same phase codes as for analytical columns (see page 4 for phase code table). e.g. for a 250 x 21.2 mm Propylurea column with a pore size of 100 Å and particle size of 10 µm, the part number is 250212-03036

| 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.

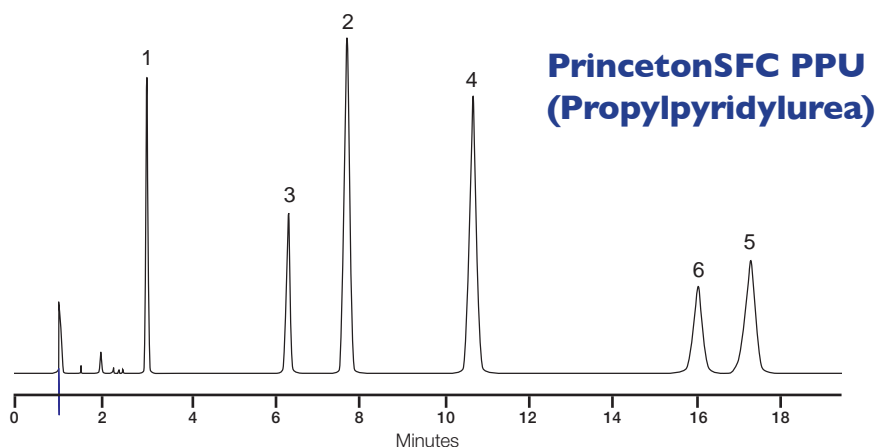
SFC Applications

Selectivity of PrincetonSFC 2-Ethylpyridine, PPU and DIOL

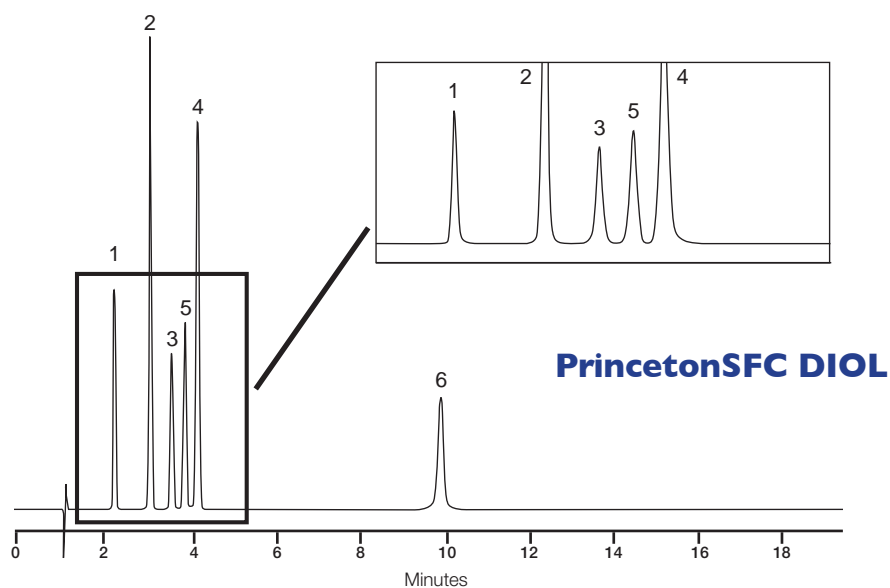


Column Dimensions: 250 x 4.6 mm
Eluent: CO₂ - CH₃OH (80:20)
Flow Rate: 2.0 ml/min
Detection: UV at 230 nm

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

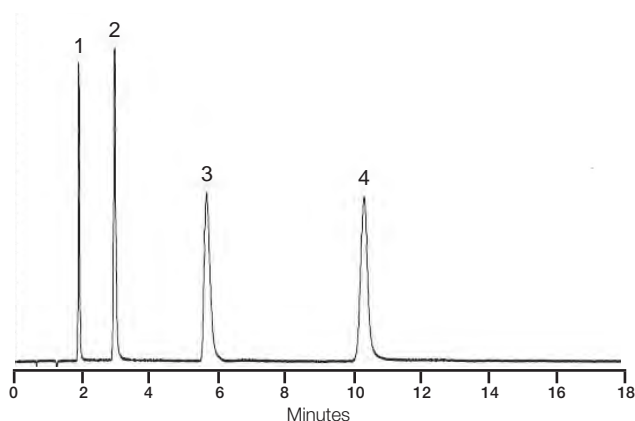


**Changing stationary
phase is a powerful tool
for altering selectivity**



SFC Applications

Separation of Four β -Blockers



Column: PrincetonSFC 2-Ethylpyridine, 60 Å, 5 μ m

Catalog No: 250046-01577

Dimensions: 250 x 4.6 mm

Eluent: CO₂ - CH₃OH (90:10)

Additive: 0.1% N,N-diisopropylethylamine

Flow Rate: 5 ml/min

Temperature: 40°C

Detection: UV at 220 nm

Injection Volume: 4 μ 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 μ m

Catalog No: 250046-03576

Dimensions: 250 x 4.6 mm

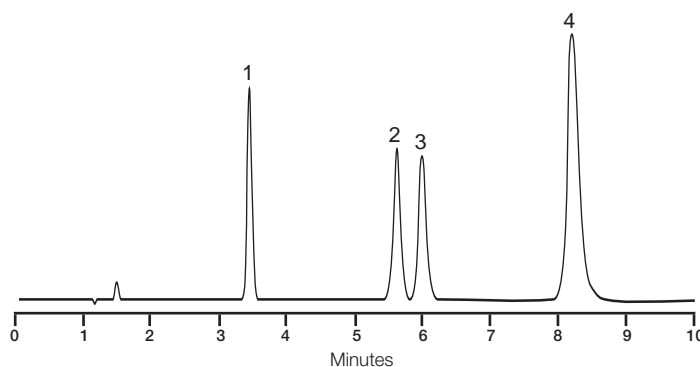
Eluent: CO₂ - CH₃OH (75:25)

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 μ m

Catalog No: 150046-03536

Dimensions: 150 x 4.6 mm

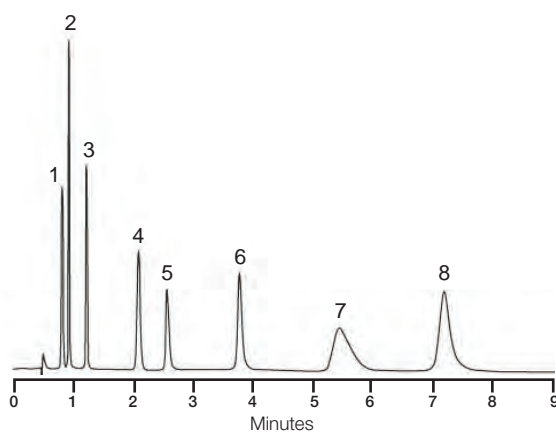
Eluent: CO₂ - CH₃OH (90:10)

Additive: 0.1% diethylamine

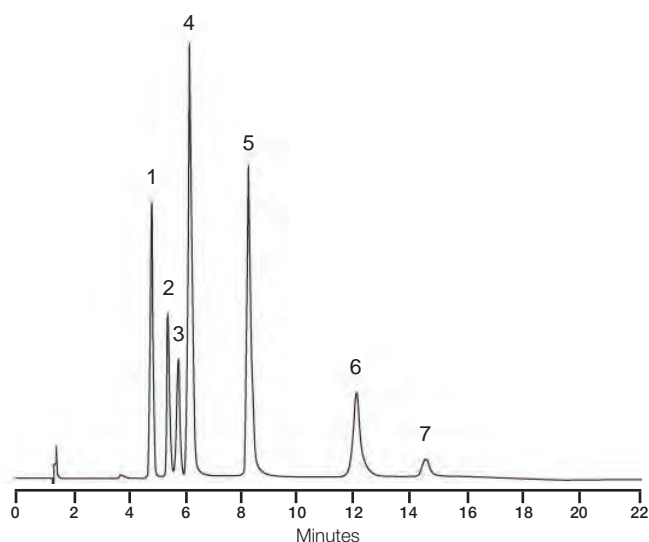
Flow Rate: 4.0 ml/min

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 β -Blockers

Column: PrincetonSFC Silica, 5 μ m

Dimensions: 250 x 4.6 mm

Eluent: CO₂ - CH₃OH (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 μ m

Dimensions: 250 x 4.6 mm

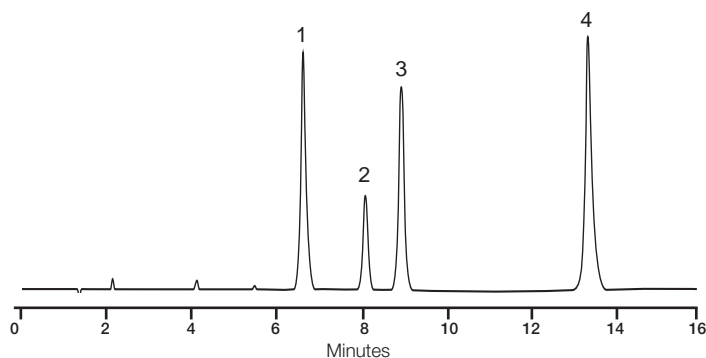
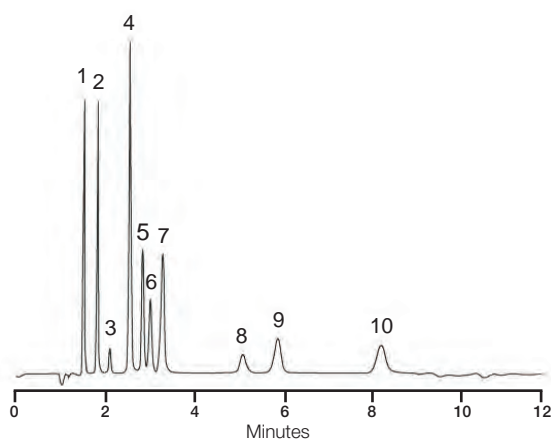
Eluent: CO₂ - CH₃OH (60:40)

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: CO₂ - CH₃OH (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% CH₃OH (0.1% diethylamine)

1-18 min 5%-40% CH₃OH

18-22 min 40% CH₃OH

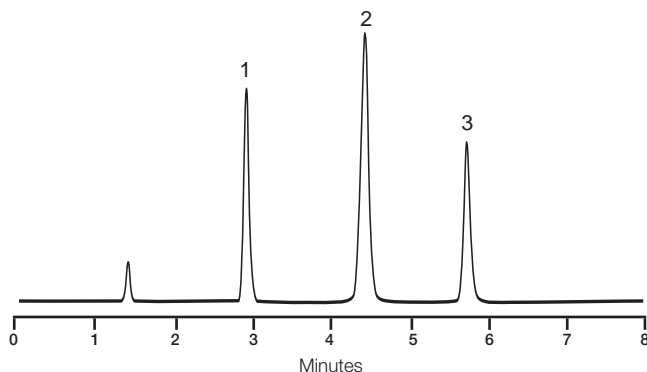
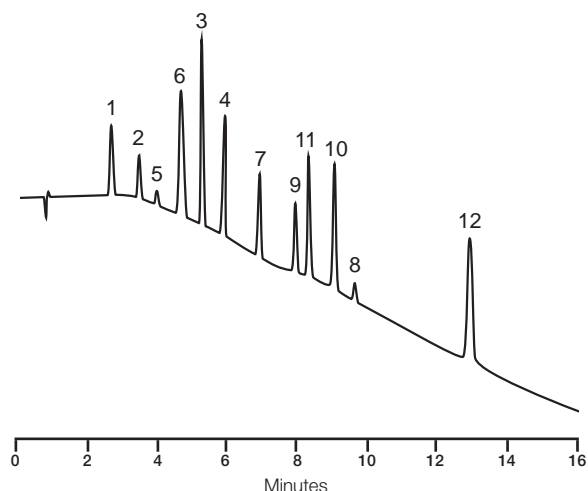
22-30 min - initial conditions

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: CO₂ - CH₃OH (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

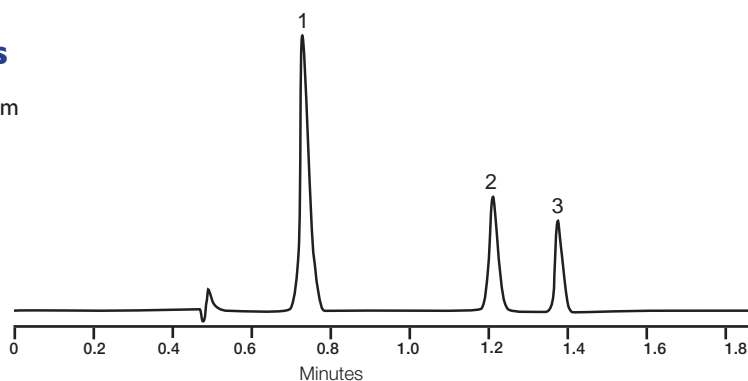
Eluent: CO₂ - CH₃OH (85:15)

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 m²/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 m²/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 ² /g) | Carbon Load (%) | Endcapped | USP | Phase Code |
|----------------------------------|--------------------|---------------|----------------------------------|-----------------|-----------|-----|------------|
| PrincetonSPHER-60 Series | | | | | | | |
| 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 |
| PrincetonSPHER-100 Series | | | | | | | |
| 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 |
| PrincetonSPHER-300 Series | | | | | | | |
| 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 |
| PrincetonSPHER-Phases | | | | | | | |
| 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 |
| ULTIMA Phases | | | | | | | |
| 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 |
| PharmaBOND Phases | | | | | | | |
| 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 μ m 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 (μ m) | 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

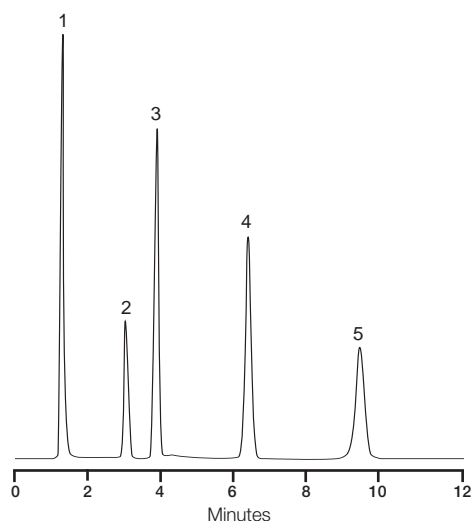


Holder for
10.0 mm
i.d. cartridges



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 $\text{NH}_2\text{H}_2\text{PO}_4$, 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_3PO_4 , pH 2.0

B: Methanol

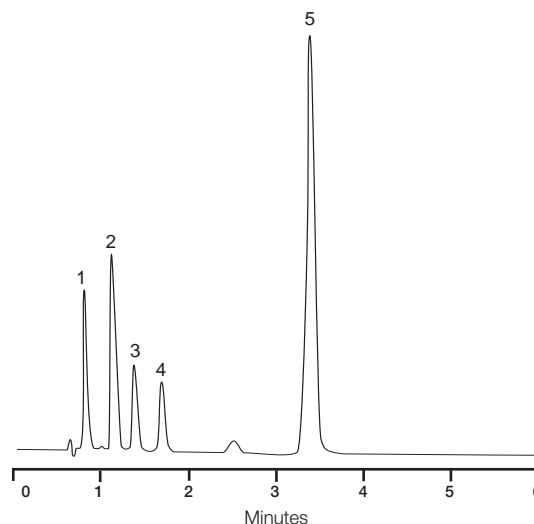
Flow Rate: 1.5 ml/min

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

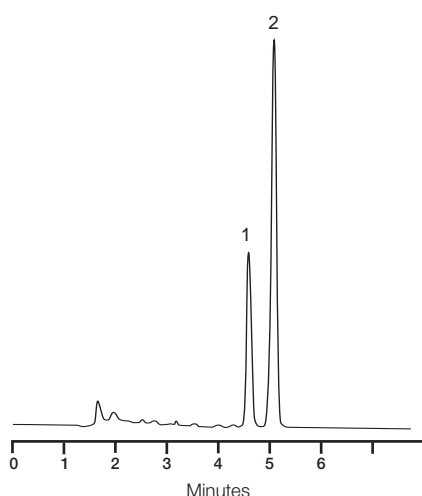
Flow Rate: 1.0 ml/min

Temperature: 20°C

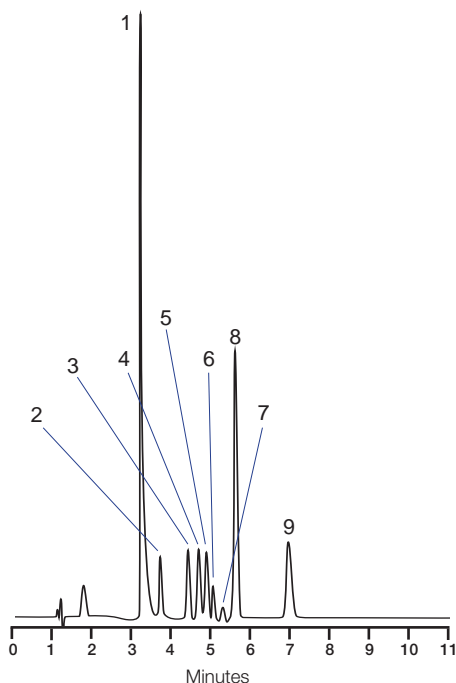
Detection: UV at 200 nm

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

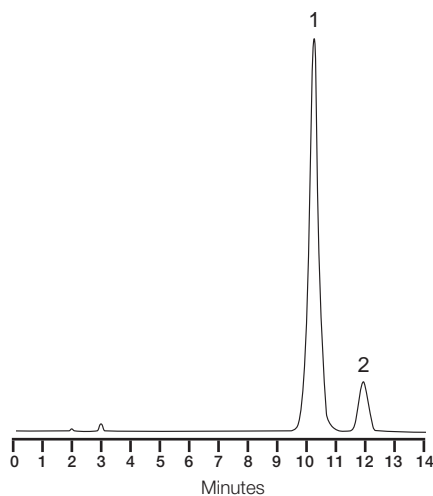
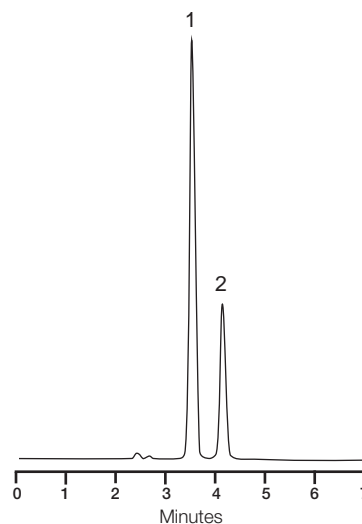
FlowRate: 1.0 ml/min

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% H₃PO₄

B: Acetonitrile

* with 1.4 mg/ml dodecyl sulfate sodium

Flow Rate: 1.0 ml/min

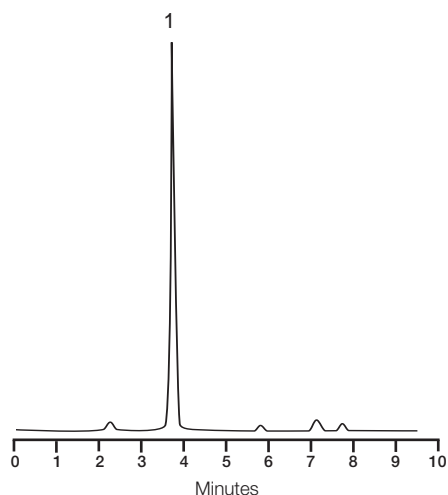
Temperature: 20°C

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% H₃PO₄

Flow Rate: 1.0 ml/min

Temperature: 20°C

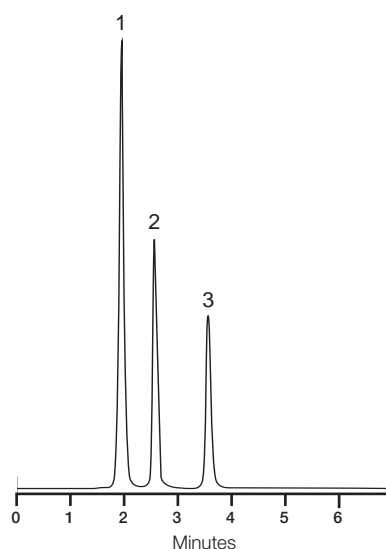
Detection: UV at 254 nm

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% H₃PO₄

B: Acetonitrile

Flow Rate: 1.0 ml/min

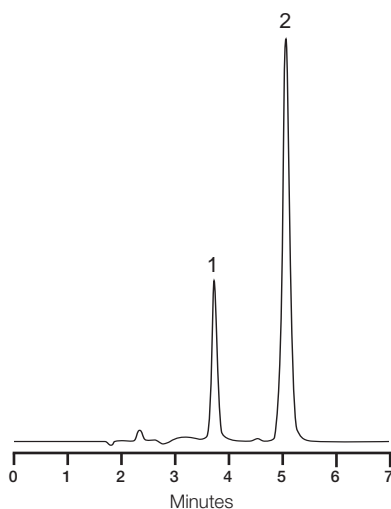
Temperature: 20°C

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 μm to 20 μm 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 an 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:

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Email: sales@pci-hplc.com



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