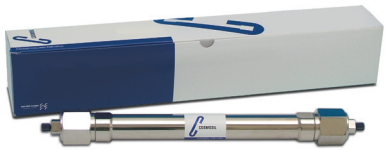
COSMOSIL

Normal Phase HPLC Column

# COSMOSIL SL-II

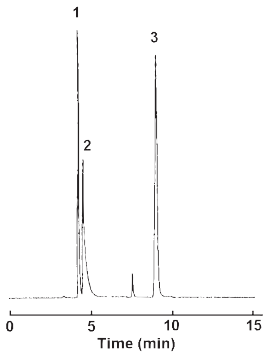
- ***High purity silica gel (>99.99%) with special treatment***
- ***Suitable for preparative separation***



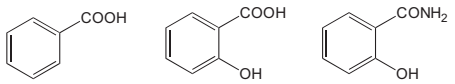
Ultra-pure silica gel of more than 99.99% purity is used for the COSMOSIL SL-II packed column series. This column provides improved separation and reproducibility for compounds with carbonyl or phenol hydroxyl groups, which are often problematic to separate using conventional silica gel columns because of interference of metallic impurities. The followings are applications of COSMOSIL SL-II column on organic acids, acid amides and phenols. COSMOSIL SL-II provides improved separation for these compounds without ionic additives by using mobile phases of hexane and ethanol.

## Comparison with Competitors' Columns in Separation of Organic Acids and Acid Amides

**COSMOSIL 5SL-II**

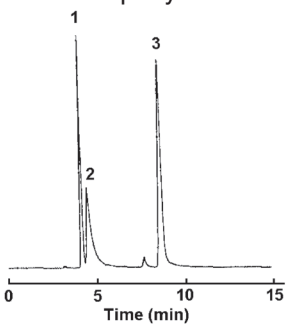



| | | | |
|---|---|---|---|
| Column Size | 4.6 mm I.D. x 250 mm | Sample | 1. Benzoic Acid (4.0 µg) |
| Mobile Phase | Ethanol : Hexane = 10 : 90 | | 2. Salicylic Acid (6.0 µg) |
| Flow Rate | 1.0 ml/min | | 3. Salicylamide (4.0 µg) |
| Temperature | 30°C | | |
| Detection | UV 254 nm 0.32 AUFS | | |

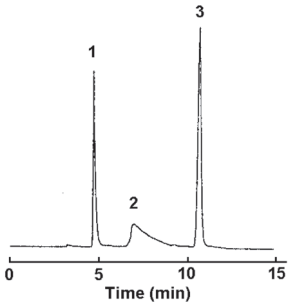



1. Benzoic Acid 2. Salicylic Acid 3. Salicylamide

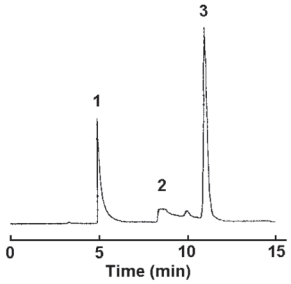
Company A



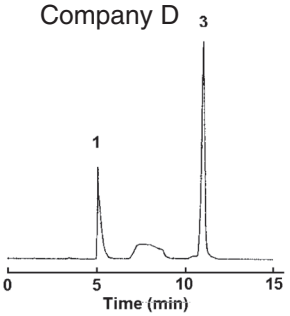

Company B



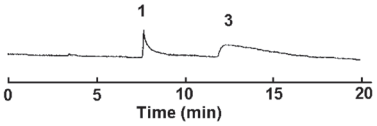

Company C



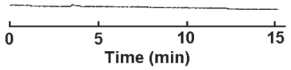

Company D



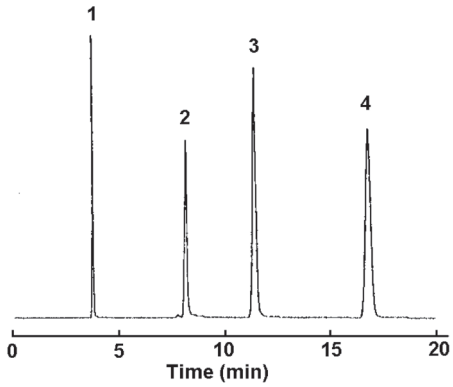

Company E



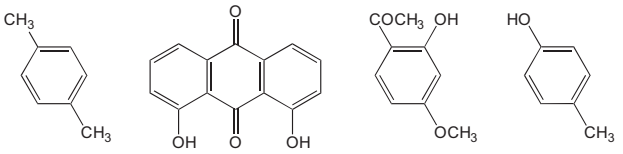

Company F



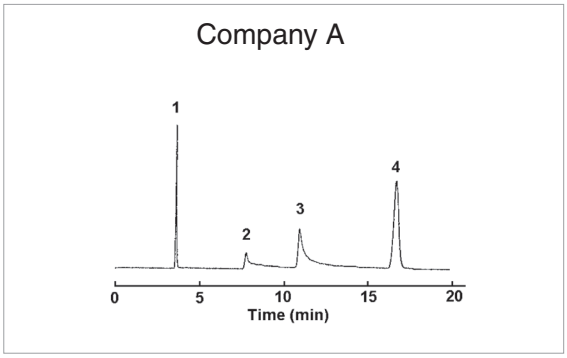
## Comparison with Competitors' Columns in Separation of Phenols

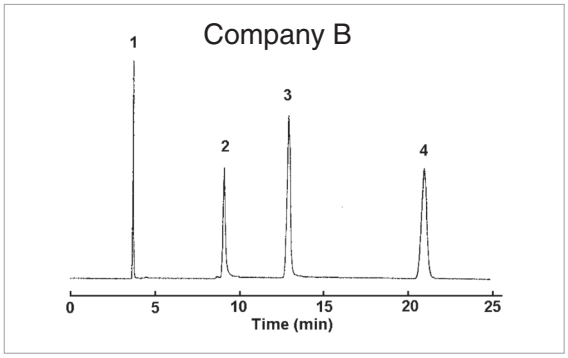


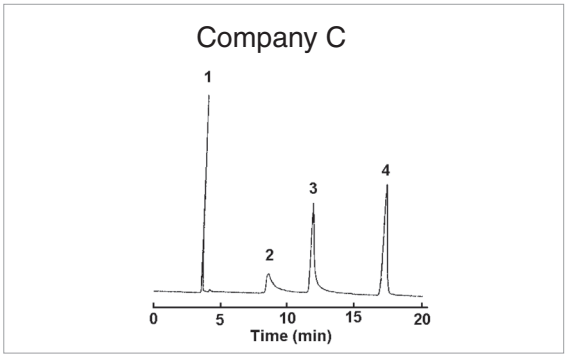

| | | | |
|---|---|---|---|
| Column Size | 4.6 mm I.D. x 250 mm | Sample | 1. *p*-Xylene (0.004 µl) |
| Mobile Phase | Ethyl Acetate : Hexane = 5 : 95 | | 2. Chrysazin (0.2 µg) |
| | | | 3. Paeonol (0.4 µg) |
| Flow Rate | 1.0 ml/min | | 4. *p*-Cresol (0.004 µl) |
| Temperature | 30°C | | |
| Detection | UV 254 nm 0.16 AUFS | | |

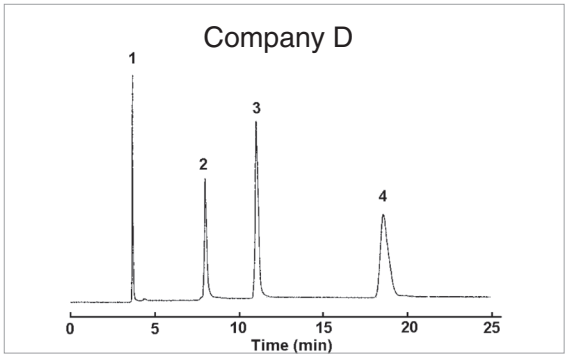


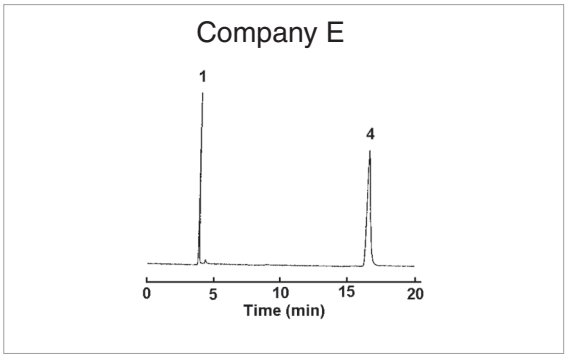

1. *p*-Xylene 2. Chrysazin 3. Paeonol 4. *p*-Cresol

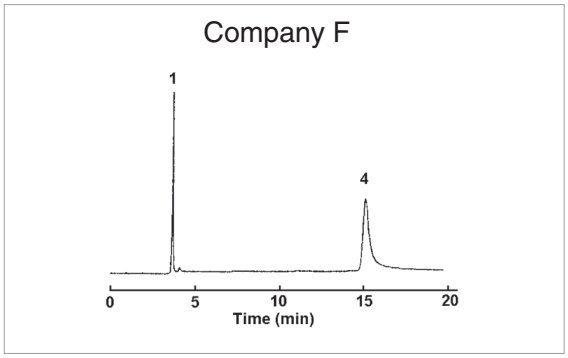



• Comparison of Purity of Silica Gel with Competitors' columns

| Column | Purity of Silica Gel | Particle Size |
|---|---|---|
| COSMOSIL SL-II | 99.99% and more | 5 µm |
| Company A | No guaranteed value (metallic impurities 5 ppm or less) | 5 µm |
| Company B | No guaranteed value (high purity) | 5 µm |
| Company C | 99.999% | 5 µm |
| Company D | 99.999% | 5 µm |
| Company E | No guaranteed value | 5 µm |
| Company F | No guaranteed value | 5 µm |

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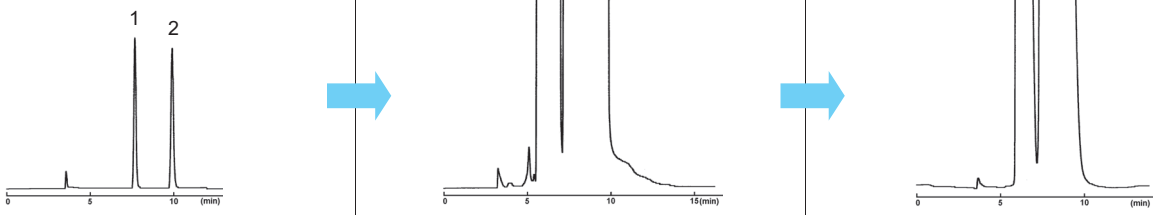
## Scaling up from Analytical to Preparative Separation

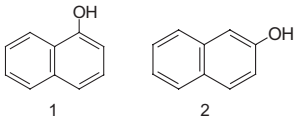
Normal phase chromatography, with non-polar mobile phase and low boiling point is used for preparative separation because solvent removal is generally easier for normal phase chromatography than for reversed chromatography. The followings are how to scale up from analytical (4.6 mm I.D.) to preparative (20.0 mm I.D.) separation.

| Step 1 | Step 2 | Step 3 |
|---|---|---|
| Mobile phase is optimized by using COSMOSIL SL-II (4.6 mm I.D. x 250 mm) | Maximum load capacity is optimized by using COSMOSIL SL-II (4.6 mm I.D. x 250 mm) | Preparative separation by using COSMOSIL SL-II (4.6 mm I.D. x 250 mm) |
| As mobile phase, highly soluble solvent for sample is suitable. | Maximum injection volume 56 µl (28 mg) | Maximum injection volume 1,050 µl (525 mg) (19 times higher than 4.6 mm I.D.) |




Mobile Phase: Ethyl Acetate : Hexane = 10 : 90
Flow Rate: 4.6 mm I.D. 1.0 ml/min; 20.0 mm I.D. 18.9 ml/min
Temperature: Room Temperature
Detection: UV 254 nm

Sample: 1. *1*-Naphthol, 2. *2*-Naphthol



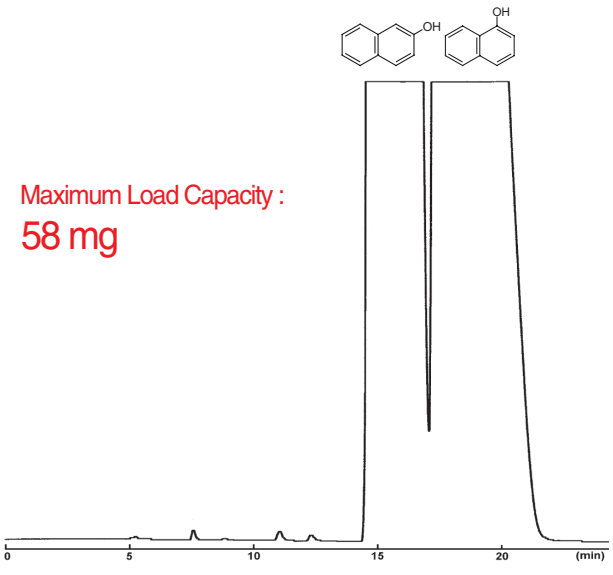

## Preparative Scale Comparison of Normal Phase and Reversed Phase

Normal phase chromatography is more suitable for preparative separation than reversed phase chromatography as larger amount of sample can be loaded in normal phase chromatography. The following are preparative scale comparison of normal phase (COSMOSIL 5C18-MS-II) and reversed phase (COSMOSIL 5SL-II).

### COSMOSIL 5C18-MS-II

20.0 mm I.D. x 250 mm
Mobile Phase Methanol : Water = 50 : 50

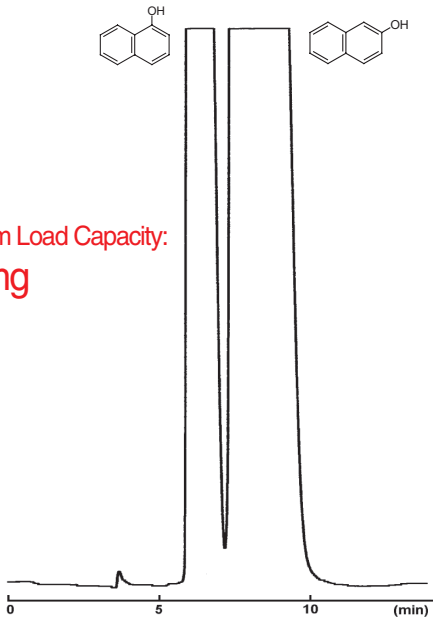
Maximum Load Capacity :
58 mg




### COSMOSIL 5SL-II

20.0 mm I.D. x 250 mm
Mobile phase Ethyl acetate : Hexane = 10 : 90

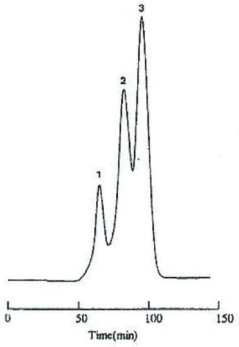
Maximum Load Capacity:
525 mg



## Preparative HPLC as an Alternative Approach to Open Column Chromatography

Open column chromatography has limitations, such as low separations and long separation time. To overcome these disadvantages, preparative HPLC chromatography can be an alternative approach. Preparative HPLC offers high separations and shorter analysis time. Furthermore it is environmentally friendly as it can be used repeatedly and there is no need to dispose silica gel.

### Open Column Chromatography

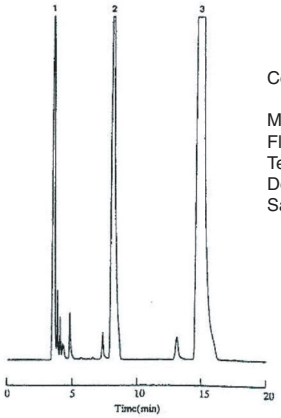



| | |
|---|---|
| Column Size | Silica Gel 60 (150–325 mesh)<br>20.0 mm I.D. x 300 mm |
| Mobile Phase | Ethanol : Hexane = 50 : 50 |
| Flow Rete | 1.0 ml/min |
| Temperature | Room Temperature (21℃) |
| Detection | UV 254 nm 0.16 AUFS |
| Sample | 1. *p*-Xylene (0.14 mg)<br>2. Cinnamyl Alcohol (0.005 mg)<br>3. *p*-Nitrobenzyl Alcohol (0.03 mg) |

* Analyzed by closed column at the same condition as open chromatography.

* Length of column = Bed height of open column chromatography.

### Preparative HPLC




| | |
|---|---|
| Column Size | COSMOSIL 5SL-II<br>20.0 mm I.D. x 250 mm |
| Mobile Phase | Ethanol : Hexane = 5 : 95 |
| Flow Rete | 18 ml/min |
| Temperature | 30℃ |
| Detection | UV 254 nm 0.16 AUFS |
| Sample | 1. *p*-Xylene (18.6 mg)<br>2. Cinnamyl Alcohol (0.4 mg)<br>3. *p*-Nitrobenzyl Alcohol (2.0 mg) |

| | Open Column Chromatography | | Preparative HPLC |
|---|---|---|---|
| Separation Capacity (Theoretical Plate Number) [1] | approx. 200 | → 100-fold → | approx. 20,000 |
| Preparative Time | approx.120 min. | → 1/8 → | 16 min |
| The number of use | 1 | → 1/8 → | approx. 1,000 |
| Loading Capacity [1] | 0.03 mg | → 70-fold → | 2.0 mg |
| Repeatability | △ | | ◎ |
| Quantitative Performance | △ | | ◎ |
| Detection | Difficult | | Easy |
| Adjustment of Column | Necessary | | Unnecessary |
| Disposal of Silica Gel | Necessary | | Unnecessary |
| Pretreatment of Sample | Unnecessary | | Necessary |
| Equipment | Unnecessary | | Necessary |

Note: [1] Compared by peak of *p*-Nitrobenzyl Alcohol.

## Ordering Information

### • Particle Size: 5 µm (Analytical/Preparative Columns)

| Product Name | Column Size | Product Number |
|---|---|---|
| COSMOSIL 5SL-II Packed Column | 4.6 mm I.D. x 50 mm | 37999-81 |
| | 4.6 mm I.D. x 100 mm | 38000-01 |
| | 4.6 mm I.D. x 150 mm | 38001-91 |
| | 4.6 mm I.D. x 250 mm | 38002-81 |
| | 6.0 mm I.D. x 150 mm | 38003-71 |
| | 6.0 mm I.D. x 250 mm | 38004-61 |
| | 10.0 mm I.D. x 250 mm | 38005-51 |
| | 20.0 mm I.D. x 250 mm | 38006-41 |
| | 28.0 mm I.D. x 250 mm | 34358-61 |
| COSMOSIL 5SL-II Gurad Column | 4.6 mm I.D. x 10 mm | 37997-01 |
| | 10.0 mm I.D. x 20 mm | 37998-91 |
| | 20.0 mm I.D. x 20 mm | 05874-91 |
| | 20.0 mm I.D. x 50 mm | 05875-81 |
| | 28.0 mm I.D. x 50 mm | 34359-51 |

### • Particle Size: 15 µm (Preparative Columns)

| Product Name | Column Size | Product Number |
|---|---|---|
| COSMOSIL 15SL-II Packed Column | 28.0 mm I.D. x 250 mm | 05893-41 |
| | 50.0 mm I.D. x 250 mm | 05895-21 |
| | 50.0 mm I.D. x 500 mm | 05896-11 |
| COSMOSIL 15SL-II Gurad Column | 28.0 mm I.D. x 50 mm | 05892-51 |
| | 50.0 mm I.D. x 50 mm | 05894-31 |

### • Particle Size: 3 µm (Fast LC Columns)

| Product Name | Column Size | Product Number |
|---|---|---|
| COSMOSIL 3SL-II Packed Column | 4.6 mm I.D. x 10 mm | 38059-61 |
| | 4.6 mm I.D. x 50 mm | 38060-21 |
| | 4.6 mm I.D. x 100 mm | 38061-11 |

Other size may be available. Please enquire.

For research use only, not intended for diagnostic or drug use.

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