

## Ultra-Fast Analysis of Water-Soluble Vitamins in Nutritional Drinks Using Kinetex® Core-Shell HPLC | UHPLC Columns

Shimadzu Scientific Instruments, 7102 Riverwood Drive, Columbia, MD 21046 USA

Water soluble vitamins such as thiamine (vitamin B1) and riboflavin (vitamin B2) are generally analyzed by reversed phase ion-pair chromatography. An ultra fast analysis of nutritional drinks by gradient elution is demonstrated.

### Introduction

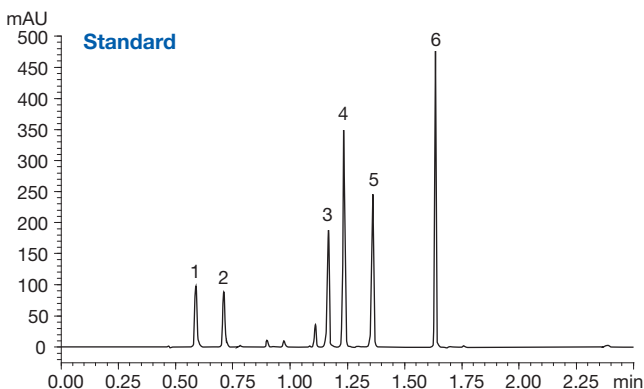
This technical note introduces an example of ultra-fast analysis performed on water-soluble vitamins by gradient elution using a Shimadzu® Nexera® UHPLC system and Phenomenex Kinetex 2.6 μm C18 core-shell column.

### Materials and Methods

**Figure 1** demonstrates good repeatability of retention time and peak area for standard mixtures (100 μg/mL each, 20 μg/mL only for riboflavin), while **Table 1** documents the retention time and peak area of each peak. **Figure 2** depicts examples of analysis performed on commercially available nutrition drinks.

**Figure 1.**

Batch analysis of six water-soluble vitamins



#### Conditions for all separations:

**Column:** Kinetex 2.6 μm C18 100 Å  
**Dimensions:** 100 x 4.6 mm  
**Part No.:** 00D-4462-E0  
**Mobile Phase:** A: 20 mmol/L Sodium phosphate buffer, pH 2.5, 2 mmol/L Sodium 1-hexanesulfonate  
 B: Mobile phase A / Acetonitrile (40:60)  
**Gradient:** A/B (95:5) to A/B (77:23) in 1 min to A/B (0:100) in 2-2.5 min  
**Flow Rate:** 2.5 mL/min  
**Temperature:** 40 °C  
**Injection Volume:** 5 μL  
**Detection:** UV @ 275 nm  
**Flow Cell:** Semi-micro cell  
**Instrument:** Shimadzu Nexera  
**Pressure:** 48 MPa  
**Sample:** 1. Niacin  
 2. Nicotinamide  
 3. Pyridoxine  
 4. Riboflavin phosphate  
 5. Thiamine  
 6. Riboflavin

**Table 1.**

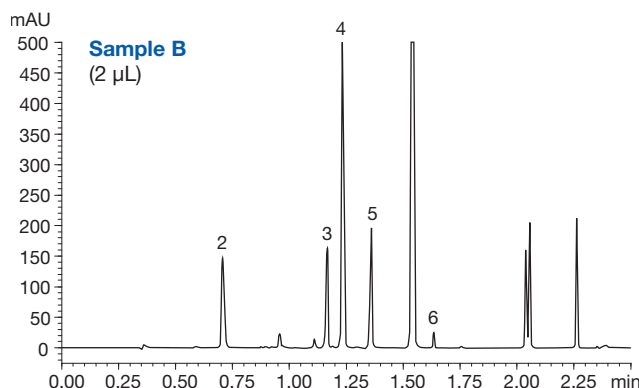
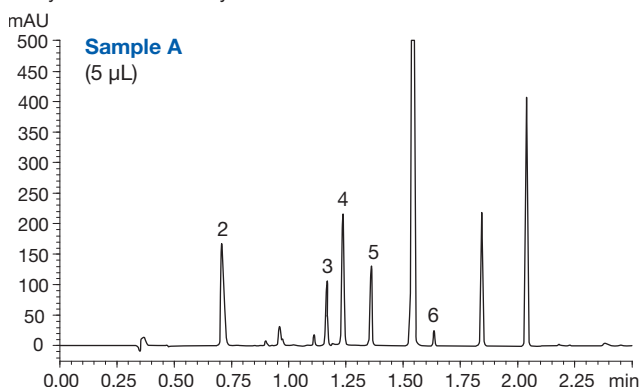
Repeatability of retention time and peak area

| Peak No. | Retention Time %RSD | Peak Area %RSD |
|----------|---------------------|----------------|
| 1        | 0.051               | 0.071          |
| 2        | 0.051               | 0.067          |
| 3        | 0.019               | 0.085          |
| 4        | 0.015               | 0.084          |
| 5        | 0.015               | 0.075          |
| 6        | 0.010               | 0.094          |

(n=6)

**Figure 2.**

Analysis of commercially available nutrition drinks



### Results and Conclusion

The results demonstrate the advantages of analyzing water-soluble vitamins by pairing the ultra-high performance of Phenomenex Kinetex core-shell columns with the high accuracy gradient performance and excellent injection volume repeatability of the Shimadzu Nexera instrument.

# TN-1108 APPLICATIONS

**Australia**  
t: 02-9428-6444  
f: 02-9428-6445  
auinfo@phenomenex.com

**Austria**  
t: 01-319-1301  
f: 01-319-1300  
anfrage@phenomenex.com

**Belgium**  
t: +31 (0)30-2418700  
f: +31 (0)30-2383749  
beinfo@phenomenex.com

**Canada**  
t: (800) 543-3681  
f: (310) 328-7768  
info@phenomenex.com

**Denmark**  
t: 4824 8048  
f: 4810 6265  
nordicinfo@phenomenex.com

**Finland**  
t: +358 (0)9 4789 0063  
f: +45 4810 6265  
nordicinfo@phenomenex.com

**France**  
t: 01 30 09 21 10  
f: 01 30 09 21 11  
franceinfo@phenomenex.com

**Germany**  
t: 06021-58830-0  
f: 06021-58830-11  
anfrage@phenomenex.com

**India**  
t: 040-3012 2400  
f: 040-3012 2411  
indiainfo@phenomenex.com

**Ireland**  
t: 01 247 5405  
f: +44 1625-501796  
eireinfo@phenomenex.com

**Italy**  
t: 051 6327511  
f: 051 6327555  
italiainfo@phenomenex.com

**Luxembourg**  
t: +31 (0)30-2418700  
f: +31 (0)30-2383749  
nlinfo@phenomenex.com

**Mexico**  
t: 001-800-844-5226  
f: 001-310-328-7768  
tecnicomx@phenomenex.com

**The Netherlands**  
t: 030-2418700  
f: 030-2383749  
nlinfo@phenomenex.com


**New Zealand**  
t: 09-4780951  
f: 09-4780952  
nzinfo@phenomenex.com

**Norway**  
t: +47 810 02 005  
f: +45 4810 6265  
nordicinfo@phenomenex.com

**Puerto Rico**  
t: (800) 541-HPLC  
f: (310) 328-7768  
info@phenomenex.com

**Sweden**  
t: 08 611 6950  
f: 08 611 6951  
nordicinfo@phenomenex.com

**United Kingdom**  
t: 01625-501367  
f: 01625-501796  
ukinfo@phenomenex.com

**All other countries:**   
**Corporate Office USA**  
t: (310) 212-0555  
f: (310) 328-7768  
info@phenomenex.com

## Kinetex® Ordering Information

### 2.6 µm Analytical Columns (mm)

| Phases              | 30 x 4.6    | 50 x 4.6    | 75 x 4.6    | 100 x 4.6   | 150 x 4.6   | SecurityGuard™<br>ULTRA Cartridges* |
|---------------------|-------------|-------------|-------------|-------------|-------------|-------------------------------------|
| <b>XB-C18</b>       | —           | 00B-4496-E0 | 00C-4496-E0 | 00D-4496-E0 | 00F-4496-E0 | AJO-8768                            |
| <b>C18</b>          | 00A-4462-E0 | 00B-4462-E0 | 00C-4462-E0 | 00D-4462-E0 | 00F-4462-E0 | AJO-8768                            |
| <b>C8</b>           | —           | 00B-4497-E0 | 00C-4497-E0 | 00D-4497-E0 | 00F-4497-E0 | AJO-8770                            |
| <b>PFP</b>          | 00A-4477-E0 | 00B-4477-E0 | 00C-4477-E0 | 00D-4477-E0 | 00F-4477-E0 | AJO-8773                            |
| <b>HILIC</b>        | 00A-4461-E0 | 00B-4461-E0 | 00C-4461-E0 | 00D-4461-E0 | 00F-4461-E0 | AJO-8772                            |
| <b>Phenyl-Hexyl</b> | —           | 00B-4495-E0 | —           | 00D-4495-E0 | 00F-4495-E0 | AJO-8774                            |

for 4.6 mm ID

### 2.6 µm MidBore™ Columns (mm)

| Phases              | 30 x 3.0    | 50 x 3.0    | 75 x 3.0    | 100 x 3.0   | 150 x 3.0   | SecurityGuard<br>ULTRA Cartridges* |
|---------------------|-------------|-------------|-------------|-------------|-------------|------------------------------------|
| <b>XB-C18</b>       | 00A-4496-Y0 | 00B-4496-Y0 | 00C-4496-Y0 | 00D-4496-Y0 | 00F-4496-Y0 | AJO-8775                           |
| <b>C18</b>          | 00A-4462-Y0 | 00B-4462-Y0 | 00C-4462-Y0 | 00D-4462-Y0 | 00F-4462-Y0 | AJO-8775                           |
| <b>C8</b>           | 00A-4497-Y0 | 00B-4497-Y0 | 00C-4497-Y0 | 00D-4497-Y0 | 00F-4497-Y0 | AJO-8777                           |
| <b>PFP</b>          | 00A-4477-Y0 | 00B-4477-Y0 | 00C-4477-Y0 | 00D-4477-Y0 | 00F-4477-Y0 | AJO-8780                           |
| <b>HILIC</b>        | 00A-4461-Y0 | —           | —           | —           | 00F-4461-Y0 | AJO-8779                           |
| <b>Phenyl-Hexyl</b> | —           | —           | —           | —           | —           | AJO-8781                           |

for 3.0 mm ID

### 2.6 µm Minibore Columns (mm)

| Phases              | 30 x 2.1    | 50 x 2.1    | 100 x 2.1   | 150 x 2.1   | SecurityGuard<br>ULTRA Cartridges* |
|---------------------|-------------|-------------|-------------|-------------|------------------------------------|
| <b>XB-C18</b>       | 00A-4496-AN | 00B-4496-AN | 00D-4496-AN | 00F-4496-AN | AJO-8782                           |
| <b>C18</b>          | 00A-4462-AN | 00B-4462-AN | 00D-4462-AN | 00F-4462-AN | AJO-8782                           |
| <b>C8</b>           | 00A-4497-AN | 00B-4497-AN | 00D-4497-AN | 00F-4497-AN | AJO-8784                           |
| <b>PFP</b>          | 00A-4477-AN | 00B-4477-AN | 00D-4477-AN | 00F-4477-AN | AJO-8787                           |
| <b>HILIC</b>        | 00A-4461-AN | 00B-4461-AN | 00D-4461-AN | 00F-4461-AN | AJO-8786                           |
| <b>Phenyl-Hexyl</b> | —           | 00B-4495-AN | 00D-4495-AN | —           | AJO-8788                           |

for 2.1 mm ID

### 1.7 µm Minibore Columns (mm)

| Phases              | 30 x 2.1    | 50 x 2.1    | 100 x 2.1   | 150 x 2.1   | SecurityGuard<br>ULTRA Cartridges* |
|---------------------|-------------|-------------|-------------|-------------|------------------------------------|
| <b>XB-C18</b>       | 00A-4498-AN | 00B-4498-AN | 00D-4498-AN | 00F-4498-AN | AJO-8782                           |
| <b>C18</b>          | 00A-4475-AN | 00B-4475-AN | 00D-4475-AN | 00F-4475-AN | AJO-8782                           |
| <b>C8</b>           | 00A-4499-AN | 00B-4499-AN | 00D-4499-AN | 00F-4499-AN | AJO-8784                           |
| <b>PFP</b>          | 00A-4476-AN | 00B-4476-AN | 00D-4476-AN | 00F-4476-AN | AJO-8787                           |
| <b>HILIC</b>        | 00A-4474-AN | 00B-4474-AN | 00D-4474-AN | —           | AJO-8786                           |
| <b>Phenyl-Hexyl</b> | —           | 00B-4500-AN | 00D-4500-AN | 00F-4500-AN | AJO-8788                           |

for 2.1 mm ID

### 1.7 µm MidBore Columns (mm)

| Phases              | 30 x 3.0    | 50 x 3.0    | 100 x 3.0   | SecurityGuard<br>ULTRA Cartridges* |
|---------------------|-------------|-------------|-------------|------------------------------------|
| <b>XB-C18</b>       | 00A-4498-Y0 | 00B-4498-Y0 | 00D-4498-Y0 | AJO-8775                           |
| <b>C18</b>          | —           | 00B-4475-Y0 | 00D-4475-Y0 | AJO-8775                           |
| <b>C8</b>           | 00A-4499-Y0 | 00B-4499-Y0 | 00D-4499-Y0 | AJO-8777                           |
| <b>PFP</b>          | —           | —           | 00D-4476-Y0 | AJO-8780                           |
| <b>HILIC</b>        | —           | 00B-4474-Y0 | —           | AJO-8779                           |
| <b>Phenyl-Hexyl</b> | —           | —           | —           | AJO-8781                           |

for 3.0 mm ID

\*SecurityGuard ULTRA cartridges require holder, Part No.: AJO-9000



If Kinetex core-shell technology columns do not provide at least an equivalent separation as compared to other products of the same phase and dimensions, return the column with comparative data within 45 days for a FULL REFUND.

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