Comparison data of 6 kinds of core shell C18 columns

<table>
<thead>
<tr>
<th>Column name</th>
<th>ChromaNik Technologies Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Company P C18, 2.6 μm</td>
<td>Kinetex C18</td>
</tr>
<tr>
<td>2. Company T C18, 2.6 μm</td>
<td>Accucore C18</td>
</tr>
<tr>
<td>3. Company W C18, 2.7 μm</td>
<td>Cortecs C18</td>
</tr>
<tr>
<td>4. Company A C18, 2.7 μm</td>
<td>PoroShell C18 EC</td>
</tr>
<tr>
<td>5. Company S C18, 2.7 μm</td>
<td>Ascentis Express C18</td>
</tr>
<tr>
<td>6. SunShell C18, 2.6 μm</td>
<td></td>
</tr>
</tbody>
</table>
Comparison of standard samples

**Column:**
- Company P C18, 2.6 μm 150 x 4.6 mm (26.1 MPa, 30,800 plate)
- Company T C18, 2.6 μm 150 x 4.6 mm (22.7 MPa, 31,600 plate)
- Company W C18, 2.7 μm 150 x 4.6 mm (18.5 MPa, 23,300 plate)
- Company A C18, 2.7 μm 150 x 4.6 mm (30.6 MPa, 30,200 plate)
- Company S C18, 2.7 μm 150 x 4.6 mm (22.2 MPa, 31,800 plate)
- SunShell C18, 2.6 μm 150 x 4.6 mm (21.8 MPa, 31,900 plate)

**Mobile phase:** CH$_3$OH/H$_2$O=75/25
**Flow rate:** 1.0 mL/min
**Temperature:** 40 ºC

**Sample:** 1 = Uracil, 2 = Caffeine, 3 = Phenol, 4 = Butylbenzene, 5 = o-Terphenyl, 6 = Amylbenzene, 7 = Triphenylene

<table>
<thead>
<tr>
<th></th>
<th>Hydrogen bonding (Caffeine/Phenol)</th>
<th>Hydrophobicity (Amylbenzene/Butylbenzene)</th>
<th>Steric selectivity (Triphenylene/o-Terphenyl)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company P C18</strong></td>
<td>0.48</td>
<td>1.54</td>
<td>1.20</td>
</tr>
<tr>
<td><strong>Company T C18</strong></td>
<td>0.35</td>
<td>1.56</td>
<td>1.50</td>
</tr>
<tr>
<td><strong>Company W C18</strong></td>
<td>0.38</td>
<td>1.59</td>
<td>1.32</td>
</tr>
<tr>
<td><strong>Company A C18</strong></td>
<td>0.42</td>
<td>1.57</td>
<td>1.25</td>
</tr>
<tr>
<td><strong>Company S C18</strong></td>
<td>0.44</td>
<td>1.60</td>
<td>1.31</td>
</tr>
<tr>
<td><strong>SunShell C18</strong></td>
<td>0.39</td>
<td>1.60</td>
<td>1.46</td>
</tr>
</tbody>
</table>
Comparison of pyridine

Column:
- Company P C18, 2.6 µm 150 x 4.6 mm
- Company T C18, 2.6 µm 150 x 4.6 mm
- Company W C18, 2.7 µm 150 x 4.6 mm
- Company A C18, 2.7 µm 150 x 4.6 mm
- SunShell C18, 2.6 µm 150 x 4.6 mm

Mobile phase: CH$_3$OH/H$_2$O=30/70
Flow rate: 1.0 mL/min
Temperature: 40 °C
Detection: UV@250nm

Sample:
- Uracil
- Pyridine
- Phenol
Comparison of oxine, metal chelating compound

Column:
- Company P C18, 2.6 μm 150 x 4.6 mm
- Company T C18, 2.6 μm 150 x 4.6 mm
- Company W C18, 2.7 μm 150 x 4.6 mm
- Company A C18, 2.7 μm 150 x 4.6 mm
- Company S C18, 2.7 μm 150 x 4.6 mm
- SunShell C18, 2.6 μm 150 x 4.6 mm

Mobile phase: CH₃CN/20mM H₃PO₄=10/90
Flow rate: 1.0 mL/min
Temperature: 40 ºC
Detection: UV@250nm
Sample: 1 = 8-Quinolinol (Oxine)
2 = Caffeine
Comparison of formic acid

Column:
- Company P C18, 2.6 μm 150 x 4.6 mm
- Company T C18, 2.6 μm 150 x 4.6 mm
- Company W C18, 2.7 μm 150 x 4.6 mm
- Company A C18, 2.7 μm 150 x 4.6 mm
- SunShell C18, 2.6 μm 150 x 4.6 mm

Mobile phase: CH₃CN/0.1% H₃PO₄=2/98
Flow rate: 1.0 mL/min
Temperature: 40 ºC
Detection: UV@210nm
Sample: 1 = Formic acid
  2 = Acetic acid
  3 = Propionic Acid
## Summary of standard samples

<table>
<thead>
<tr>
<th></th>
<th>Pressure</th>
<th>Retention</th>
<th>Plate</th>
<th>Pyridine</th>
<th>Oxine</th>
<th>Formic acid</th>
<th>Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>SunShell C18</td>
<td>○ 21.8</td>
<td>10.4</td>
<td>○ 31,900</td>
<td>◎</td>
<td>◎</td>
<td>◎</td>
<td>14</td>
</tr>
<tr>
<td>Ascentis Express C18</td>
<td>○ 22.2</td>
<td>9.7</td>
<td>○ 31,800</td>
<td>△</td>
<td>△</td>
<td>×</td>
<td>7</td>
</tr>
<tr>
<td>PoroShell C18 EC</td>
<td>× 30.6</td>
<td>9.0</td>
<td>○ 30,002</td>
<td>◎</td>
<td>△</td>
<td>◎</td>
<td>10</td>
</tr>
<tr>
<td>Cortecs C18</td>
<td>◎ 18.5</td>
<td>7.7</td>
<td>× 23,300</td>
<td>×</td>
<td>○</td>
<td>△</td>
<td>6</td>
</tr>
<tr>
<td>Accucore C18</td>
<td>○ 22.7</td>
<td>7.4</td>
<td>○ 31,600</td>
<td>×</td>
<td>×</td>
<td>△</td>
<td>6</td>
</tr>
<tr>
<td>Kinetex C18</td>
<td>△ 26.1</td>
<td>5.4</td>
<td>○ 30,800</td>
<td>×</td>
<td>◎</td>
<td>◎</td>
<td>10</td>
</tr>
</tbody>
</table>

a. Mobile phase; methanol:water=75:25, 40 °C, 1mL/min, 150 x 4.6mm
b. Retention factor of amylbenzene
c. Theoretical plate of amylbenzene

◎: 3 point, ○: 2 point, △: 1 point, ×: 0 point
Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Carbon loading (%)</th>
<th>Specific surface area a (m²/g)</th>
<th>Pore volume a (mL)</th>
<th>Pore diameter a (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SunShell C18</td>
<td>7.3 (7)b</td>
<td>125 (150)b</td>
<td>0.261</td>
<td>8.34 (9)b</td>
</tr>
<tr>
<td>Ascentis Express C18</td>
<td>8.0</td>
<td>133 (150)b</td>
<td>0.278</td>
<td>8.20 (9)b</td>
</tr>
<tr>
<td>PoroShell C18 EC</td>
<td>8.5 (8)b</td>
<td>135 (130)b</td>
<td>0.414</td>
<td>12.3 (12)b</td>
</tr>
<tr>
<td>Accucore C18</td>
<td>8.8 (9)b</td>
<td>130 (130)b</td>
<td>0.273</td>
<td>8.39 (8)b</td>
</tr>
<tr>
<td>Cortecs C18</td>
<td>7.3 (6.6)b</td>
<td>113</td>
<td>0.264</td>
<td>9.32</td>
</tr>
<tr>
<td>Kinetex C18</td>
<td>4.9 (12 effective)b</td>
<td>102 (200 effective)b</td>
<td>0.237</td>
<td>9.25 (10)b</td>
</tr>
</tbody>
</table>

a. Measured after C18 materials were sintered at 600 degree Celsius for 8 hours. The measured value of each sintered core shell silica is considered to be smaller than that of the original core shell silica.

b. Value written in each brochure or literature

All data were measured in ChromaNik laboratory.
Particle distribution

*Measured using Beckman Coulter Multisizer 3 after C18 materials were sintered at 600 degree Celsius for 8 hours. The value measure by Coulter Counter method is smaller than the real value because a porous material includes an electrolyte solution and the resistance value decreases.

a. Median particle size
Loading capacity of amitriptyline I

Mobile phase: Acetonitrile/20mM phosphate buffer pH7.0=(60:40)
Column dimension: 150 x 4.6 mm, Flow rate: 1.0 mL/min, Temp.: 40°C

Sample: 1=Uracil, 2=Propranolol, 3=Nortriptyline, 4=Amitriptyline

Theoretical plate was calculated by 5σ method using peak width at 4.4% of peak height.
Loading capacity of amitriptyline I

Mobile phase: Acetonitrile/20mM phosphate buffer pH7.0=(60:40)
Column dimension: 150 x 4.6 mm, Flow rate: 1.0 mL/min, Temp.: 40°C

Theoretical plate was calculated by 5σ method using peak width at 4.4% of peak height.

Sample weight/μg

Sample: 1=Uracil, 2=Propranolol, 3=Nortriptyline, 4=Amitriptyline
Loading capacity of amitriptyline II

Mobile phase: Acetonitrile/10mM ammonium acetate pH6.8=(40:60)
Column dimension: 150 x 4.6 mm, Flow rate: 1.0 mL/min, Temp.: 40°C

Theoretical plate was calculated by 5σ method using peak width at 4.4% of peak height.

Sample: 1=Uracil, 2=Propranolol, 3=Nortriptyline, 4=Amitriptyline
In the case of using acetonitrile /0.1% formic acid as a mobile phase, amitriptyline peak shows more tailing because a loading capacity decreases in an acidic, low-ionic-strength mobile phase.
Stability under acidic pH condition

Durable test condition
Column size: 50 x 2.1 mm
Mobile phase: CH$_3$CN/1.0% TFA, pH1=10/90
Flow rate: 0.4 mL/min
Temperature: 80 °C

Measurement condition
Column size: 50 x 2.1 mm
Mobile phase: CH$_3$CN/H$_2$O=60/40
Flow rate: 0.4 mL/min
Temperature: 40 °C
Sample: 1 = Uracil
2 = Butylbenzene
Stability under basic pH condition

Durable test condition
Column size: 50 x 2.1 mm
Mobile phase:
   \( \text{CH}_3\text{OH}/20\text{mM Sodium borate/10mM NaOH=30/21/49 (pH10)} \)
Flow rate: 0.4 mL/min
Temperature: 50 ºC

Measurement condition
Column size: 50 x 2.1 mm
Mobile phase: \( \text{CH}_3\text{OH/H}_2\text{O=70/30} \)
Flow rate: 0.4 mL/min
Temperature: 40 ºC
Sample: 1 = Butylbenzene
# Summary of stability

<table>
<thead>
<tr>
<th></th>
<th>Acidic condition pH 1</th>
<th>Basic condition pH 10</th>
<th>pH range written in each brochure</th>
</tr>
</thead>
<tbody>
<tr>
<td>SunShell C18</td>
<td>☀</td>
<td>☀</td>
<td>1.5 - 10</td>
</tr>
<tr>
<td>Ascentis Express C18</td>
<td>○</td>
<td>○</td>
<td>2 - 9</td>
</tr>
<tr>
<td>Cortecs C18</td>
<td>○</td>
<td>not tested</td>
<td>2 - 8</td>
</tr>
<tr>
<td>PoroShell C18 EC</td>
<td>△</td>
<td>△</td>
<td>2 - 9</td>
</tr>
<tr>
<td>Accucore C18</td>
<td>△</td>
<td>△</td>
<td>1 - 11</td>
</tr>
<tr>
<td>Kinetex C18</td>
<td>△</td>
<td>△</td>
<td>1.5 - 10</td>
</tr>
</tbody>
</table>