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## INTRODUCTION

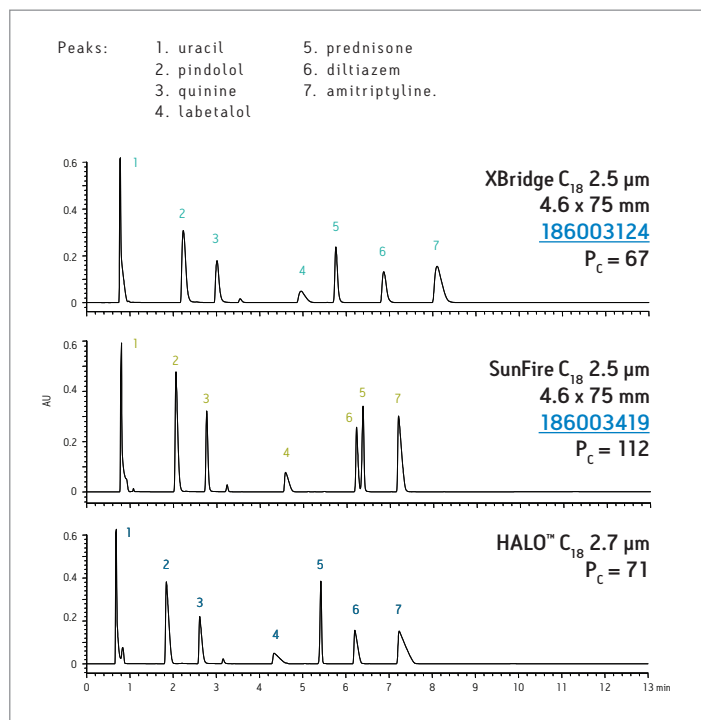
Since the introduction of high-performance liquid chromatography (HPLC) nearly 40 years ago, many improvements have been made to column stationary phases to achieve faster, more efficient separations. HPLC columns containing superficially porous (sometimes called fused-core) particles have recently gained increasing attention. Though this technology is not entirely new, it has been improved to the point where rapid, highly efficient separations can be achieved for some applications.

The goal of this work is to investigate the differences in separation performance between fully and superficially porous particle columns for routine analysis of basic pharmaceutical drug compounds. Major parameters of comparison are chemical stability, peak capacity (PC), and column efficiency at different mass loads.

## RESULTS

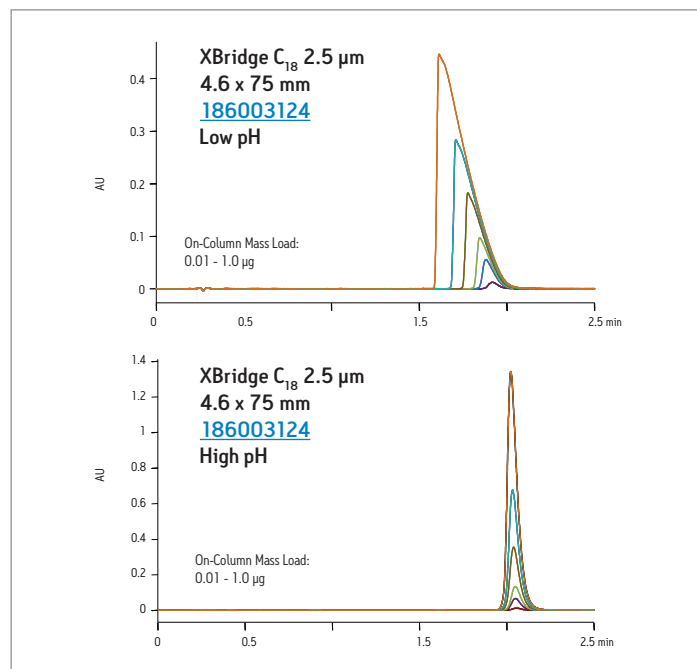
Figure 1 shows the comparison between XBridge™, SunFire™, and HALO™ columns for the separation of a standard mixture of basic compounds in a low pH mobile phase. The peak capacity for XBridge and HALO columns are nearly identical. The SunFire column has almost 60% higher peak capacity than the HALO column under the same conditions.

**Figure 1: Peak Capacity Comparison for a Standard Mixture of Basic Compounds.**



The best conditions for analyzing basic compounds by HPLC are with high pH mobile phases. It is possible to operate XBridge columns at pH values up to 12 with exceptional lifetime. Figure 2 shows the difference in peak shape and signal intensity for amitriptyline run at low and high pH on an XBridge C<sub>18</sub> column. The efficiency for the XBridge column was more than 10X higher than that at low pH.

**Figure 2: Analysis of Amitriptyline in Low and High pH Mobile Phases on an XBridge C<sub>18</sub> Column.**



## CONCLUSIONS

The benefits of using appropriate fully porous particle HPLC columns with comparable particle size clearly outweigh those of using current superficially porous (fused-core) particle columns for the analysis of basic compounds. At high pH, XBridge columns demonstrated a 10-fold increase in column efficiency over that at low pH at the same mass loads. This dramatic advantage of hybrid particle technology is most important for increasing throughput in preparative HPLC separations and as well as increasing capacity when developing superior stability indicating methods for impurity detection in APIs.

## ORDERING INFORMATION

Products Used in this Application	Part Number
XBridge C <sub>18</sub> 2.5 µm, 4.6 x 75 mm	<a href="#">186003124</a>
SunFire C <sub>18</sub> 2.5 µm, 4.6 x 75 mm	<a href="#">186003419</a>

For the complete UPLC application note, visit [www.waters.com](http://www.waters.com) and search for: [720002825EN](#)