

Evaluation of 5 Kinds of 2 μm and Sub 2 μm C18 Columns Based on Separation Behavior

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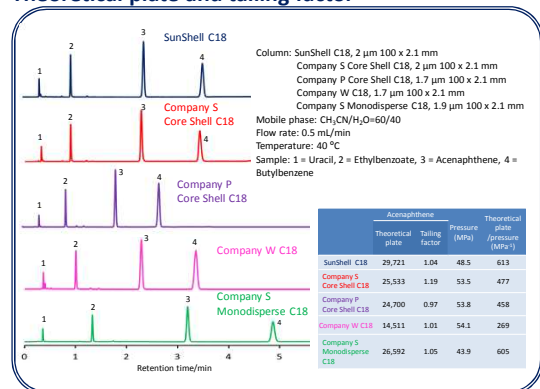
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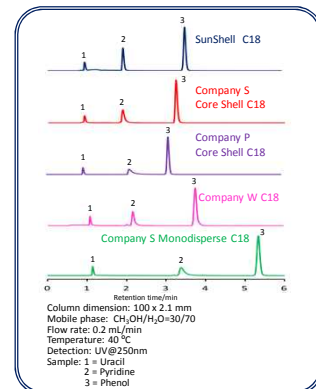
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A column packed with 2.6 μm or 2.7 μm superficially porous particle has been widely used on HPLC and UHPLC, because it showed not only excellent column efficiency but also lower back pressure than sub-2 μm column. Recently 2.0 μm and less than 2.0 μm superficially porous C18 columns were developed and have been available. In this study, 3 kinds of 2.0 μm and 1.7 μm superficially porous C18s and one totally porous hybrid C18, one totally porous monodisperse C18 were evaluated regarding efficiency, hydrogen bonding capacity, hydrophobicity, steric selectivity as well as peak shape of acidic, basic and metal chelating compounds. Compared C18 columns were SunShell C18 2 μm , Ascentis Express C18 2 μm , Kinetex C18 1.7 μm , Acquity BEH C18 1.7 μm and Titan C18 1.9 μm . Furthermore, efficiency loss due to frictional heating which yielded under high pressure and at high flow rate was observed. This efficiency loss was larger for a totally porous C18 than a superficially porous C18. Especially totally porous hybrid C18 showed the largest efficiency loss because of the lowest thermal conductivity.

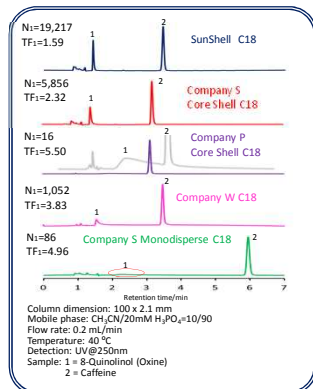
Theoretical plate and tailing factor



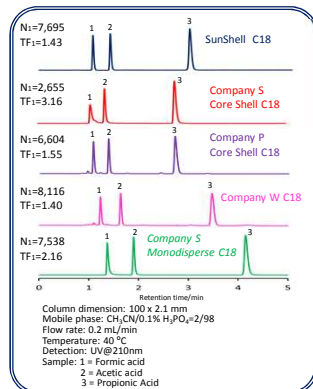
Comparison of Pyridine (2) as a basic compound



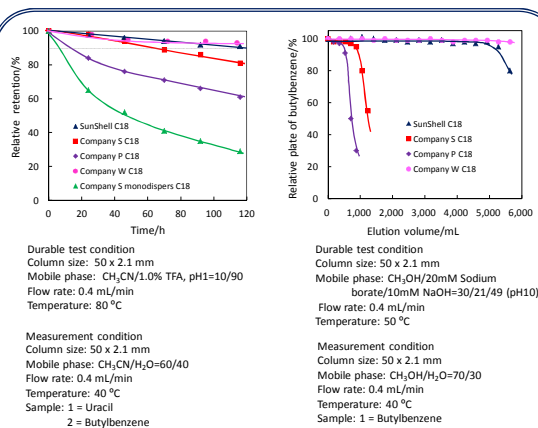
Comparison of Oxine (1) as a metal chelating compound



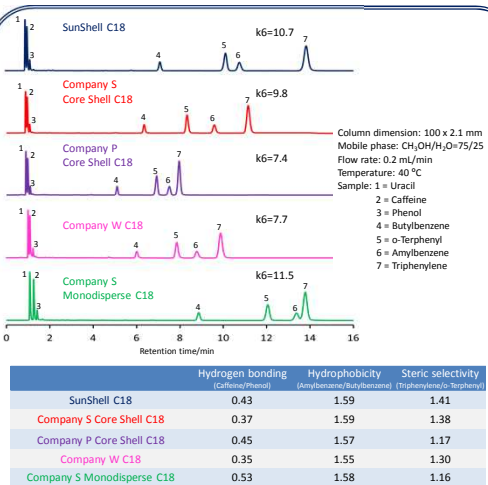
Comparison of Formic acid (1) as an acidic compound



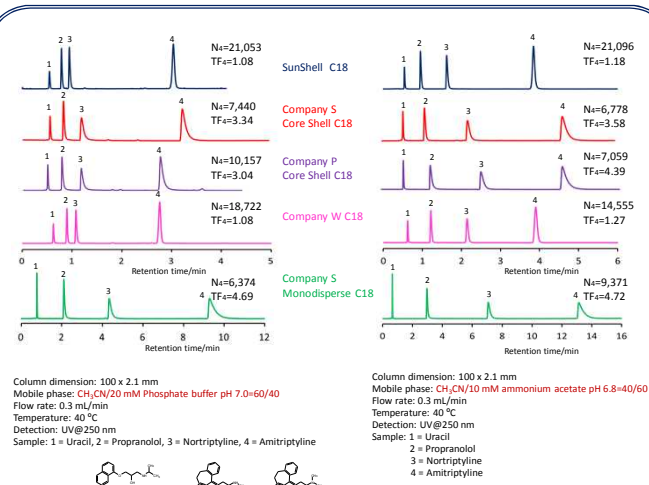
Stability under pH1 and 10 Conditions



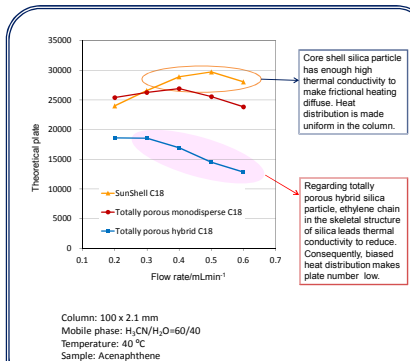
Separation of standard samples



Comparison of Amitriptyline (4) as a strong basic compound



Decreasing of theoretical plate due to frictional heating effect



Conclusion

- SunShell C18 column provided highly inert phases that deliver excellent chromatographic performance for acidic, basic, neutral and metal chelating analytes.
- SunShell C18 column showed excellent stability under both acidic and basic pH conditions as well as company W C18.
- A core shell C18 like SunShell showed much lower frictional heating effect than a totally porous C18 or totally porous hybrid C18.