New C18-PFP core-shell particles for increased resoluion

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INTRODUCTION

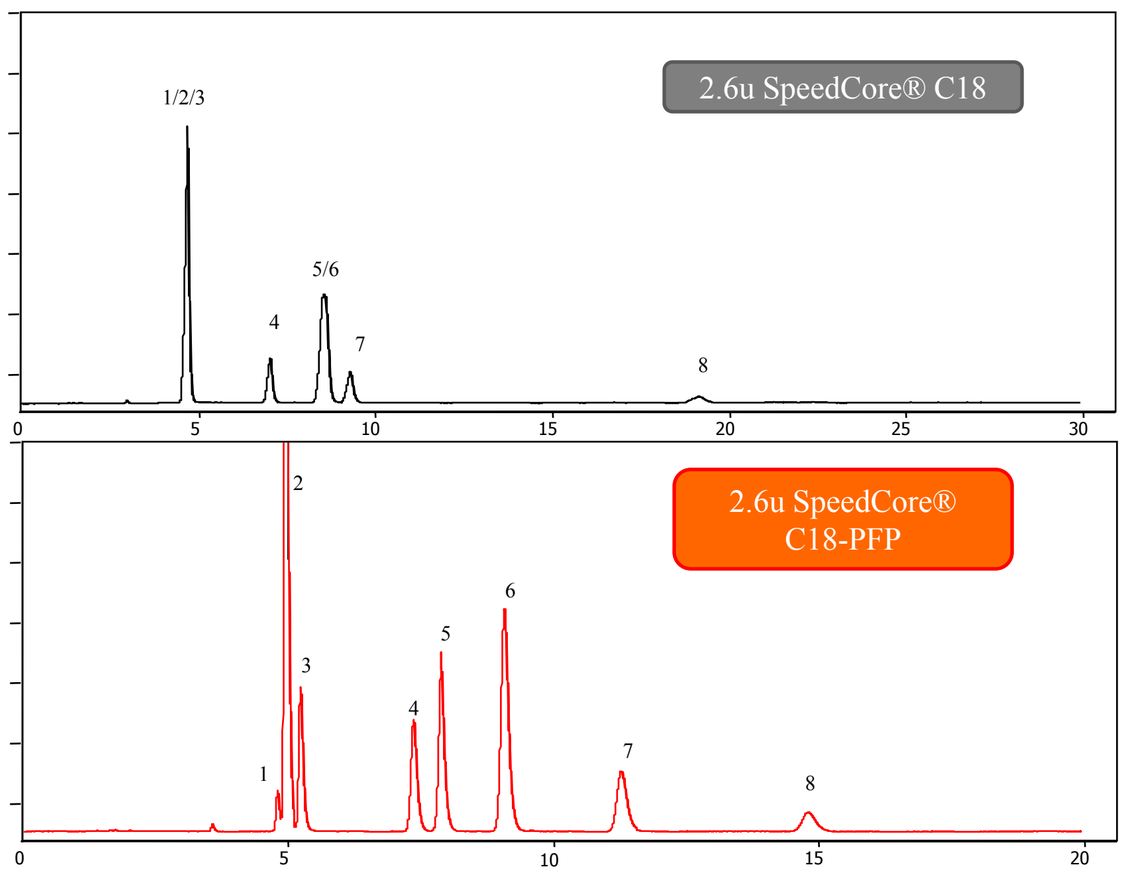
In this poster we discuss the use of a new core-shell C18-PFP (pentafluorophenyl) stationary phase for use in chromatographic separations. Whilst C18 and C8 alkyl chain stationary phases are the most common choice for starting method development, they cannot achieve all separations with required resolution, sufficient to achieve accurate qualitative results. The use of orthogonal stationary phases such as PFP allows multiple different mechanisms to be utilised including pi-pi, electron donation and a steric term due to the differing nature of the ring structure.

When combined as a single stationary phase then orthogonal selectivity can be achieved for many samples. We discuss the use of a mixed stationary phase which allows more mechanisms of interaction be used in the separation process therefore imparting more resolution. We highlight applications where this mixed stationary phase can be utilised to alter the selectivity of complex samples, gaining extra selectivity over a traditional C18 bonded phase.

Alternative Selectivity, Increased Resolution

Figure 1. shows the separation of substituted methylbenzenzes. On a traditional C18 alkyl chain phase, even a high efficiency core-shell one, it can clearly be seen that resolution is not achieved for all of the compounds. Switching to the new SpeedCore C18-PFP stationary phase improves the resolution of all critical pairs.

FIGURE 1. Orthogonal Selectivity – Substituted Benzenes



Both columns 150x4.6mm 2.6um
50:50 Water : MeOH
Flow: 1ml/min
Wavelength: 254nm

1. 1,2,3-trimethoxybenzene
2. 1,2,4-trimethoxybenzene
3. 1,2-dimethoxybenzene
4. 1,4-dimethoxybenzene
5. Methoxybenzene
6. 1,3-dimethoxybezene
7. 1,3,5-trimethoxybezene
8. Toluene

One advantage of a stationary phase that provides multiple interactions is the reduced dependence on mobile phase additives, therefore simplifying the method development process. By the addition of multiple mechanisms of interaction on the stationary phase we are potentially allowing simplified mobile phases to be used. If the analyst instead had to add ion-pair reagents, chiral agents, precise pH control, they can all add an element of complexity that will reduce reproducibility, robustness and transferability.

Structure - Mechanism

The structure of this stationary phase is a combination of C18 alkyl chain ligands and PFP (Pentafluorophenyl) ligands. By bonding both to the same core-shell particle, high efficiency is combined with high resolution capability.

FIGURE2. SpeedCore® C18-PFP structure

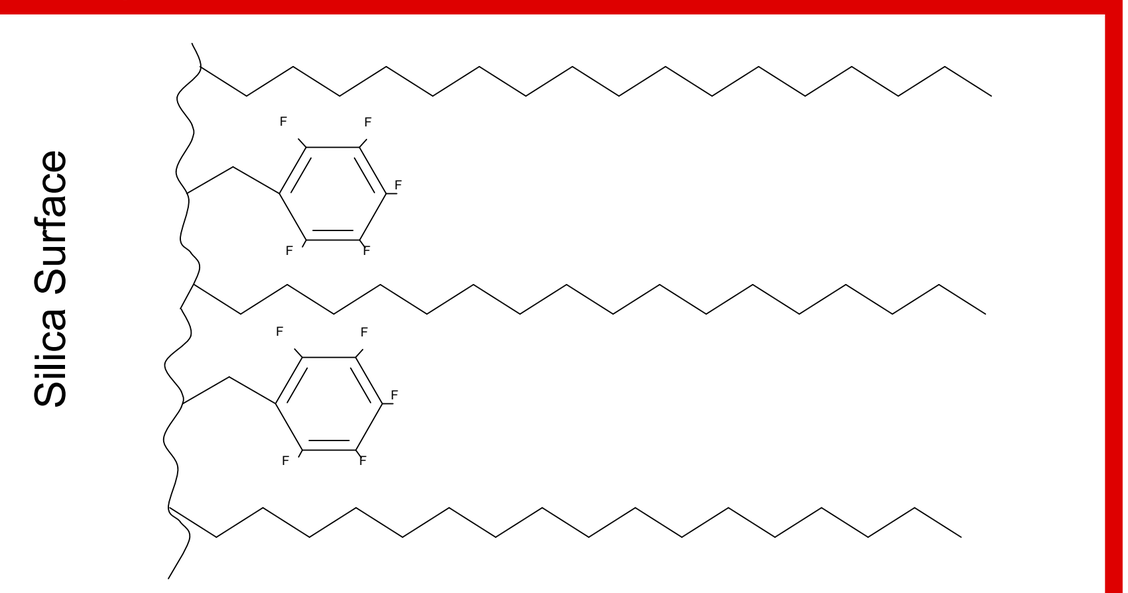


Figure 2. Shows the stationary phase structure and highlights how it is possible to gain controlled mechanisms of pi-pi (high selectivity), steric selectivity and hydrophobicity (highly stable) all within one LC column in order to offer orthogonal selectivity to separations.

FIGURE 3. Orthogonal Selectivity

Both columns 150x4.6mm 2.6um
A: 0.1% Formic acid in Water
B: 0.1% Formic acid in ACN
Gradient : 5-100% B in 10mins
Flow: 1ml/min
Wavelength: 254nm

1. Paracetamol
2. Hydrochlorothiazide
3. Methylphenylsulfoxide
4. Methylphenylsulfone

Conclusion

In this poster we have discussed the use of a new column chemistry and how it can affect separations by providing multiple mechanisms of interaction, how it can simplify method development and speed up throughput. It gives the analyst a new tool in order to separate complex mixtures.

By coupling this novel chemistry with a SpeedCore particle it offers the ability to resolve complex mixtures with high speed, high sensitivity and high resolution, even switching elution orders in some cases.