

Application Note

¹ Stephen Edwards ² Mark Woodruff
¹ U.K. LCMS Services Ltd, Ellesmere Port, UK
² Fortis Technologies Ltd, Cheshire, UK

PFAS Analysis (Polyfluoroalkyl substances)

Introduction

Analysis of Polyfluoroalkyl substances (PFAS) is a current topic of interest in HPLC/UHPLC as they are discussed in relation to the effect they may have on the environment, public and mammalian health. Organic in nature they possess multiple fluorine atoms attached to an alkyl chain. PFOS, PFOA and other PFAS's are commonly described as persistent organic pollutants or "forever chemicals" due to the fact they remain in the environment for long periods of time. US EPA has issued drinking water health advisories for PFOS and PFOA combined. In terms of the analysis of these compounds the resolution between the closely

“Perfluoroalkyl substances, in use for many years, are becoming known as "forever chemicals" due to their persistence in the environment”

related species will be critical in order to obtain qualitative and quantitative results.

Experimental Analysis

There can be several impediments to the analysis of these compounds, including trying to have one comprehensive method for all compounds, trace amounts of PFAS originating in sample collection and sample prep equipment such as filters and pipettes tips, background LC system and mobile phase. A delay column is necessary pre-injection to help differentiate background PFAS's from those in the sample.

In this application note we show the ability of a monodisperse fully porous particle (MFPP) with two alternative stationary phase chemistries attached. The ability to have orthogonal selectivity for compounds that are so similar in nature is a great tool to have when developing any new method.

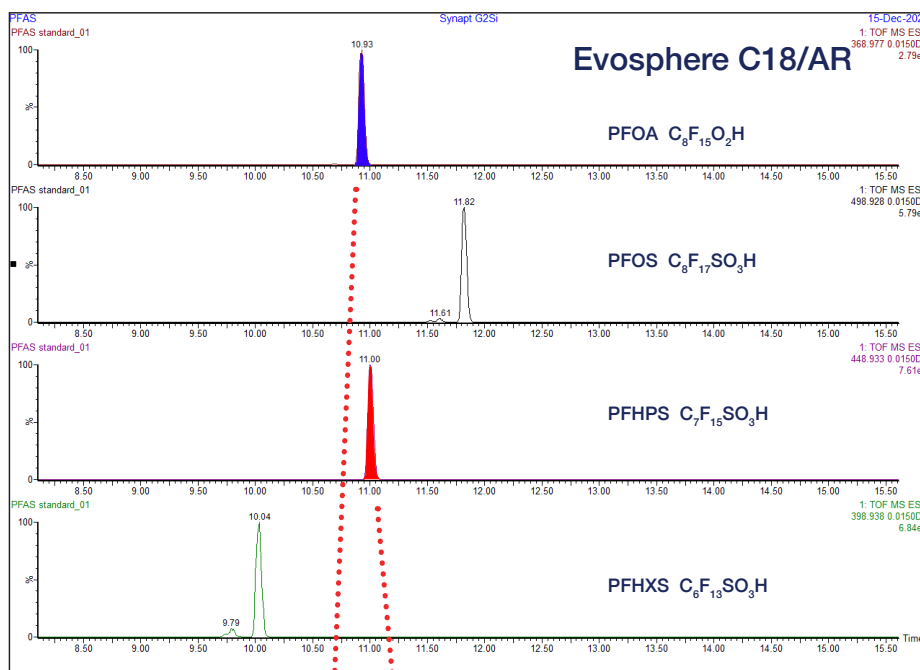


Figure 1. Separation of PFAS on Evosphere C18/AR

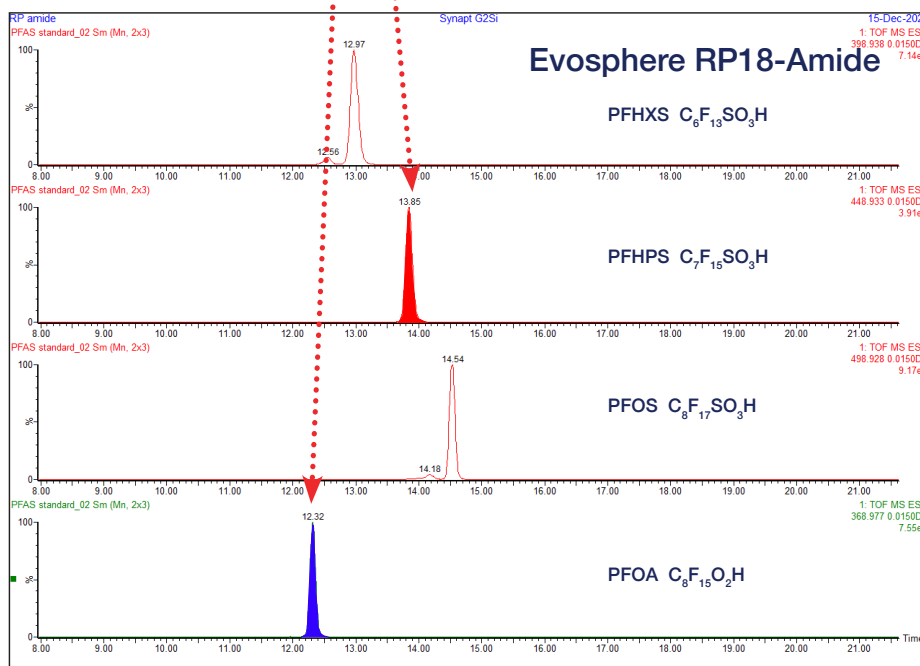


Figure 2. Separation of PFAS on Evosphere RP18-Amide

The mobile phase conditions were kept constant across both columns and fast analysis time allows for high throughput of samples if required. The conditions used will aid in producing a robust and repeatable method for the multitude of PFAS analytes.

The Evosphere C18/AR and Evosphere RP18-

Amide column used are designed around a monodisperse particle with a high surface coverage. Good sensitivity and resolution are key aspects of this phase.

It can be seen how the two columns give differing selectivity between peaks allowing for high resolution to be achieved.

Experimental Conditions

Columns:

1.7µm Evosphere C18/AR 100x2.1mm
1.7µm Evosphere RP18-Amide 100x2.1mm

Mobile phase

A: 95:5 Water : MeOH + 2mM ammonium acetate

B: Methanol + 2mM ammonium acetate

Gradient:

Time	%B
0	0
1	20
6	45
13	80
14	95
17	95
18	0

Flow Rate: 0.3ml/min

Temp: 35°C

Detection: Synapt G2Si QTOF

Conclusion

In this application note we have shown a robust LC method development strategy for the retention and resolution of the some of the main short chain PFAS compounds of concern. The analysis is completed quickly, ensuring full resolution is achieved before MS quantitation is performed. However if further gains in speed were required there is scope to decrease the size of the column or to increase the organic proportion of the mobile phase or increase the temperature to obtain a faster run time. Or if other metabolites were found then there is plenty of scope to slow the method down to gain increased resolution of a more complex sample set.

The use of a two diverse stationary phases on a monodisperse particle has provided a significant gain in performance in terms of speed and sensitivity for these compounds.

Fortis® and Evosphere® are a registered trademark of Fortis Technologies. All columns are original manufacturers own.



45 Coalbrookdale Road
Clayhill Industrial Park
Neston
Cheshire, UK
CH64 3UG

t: +44 151 336 2266
f: +44 151 336 2669
www.fortis-technologies.com
e: info@fortis-technologies.com

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