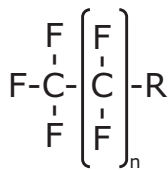


ENVIRONMENTAL

Fast and High-Resolution LC-MS Separation of PFAS

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PFAS (Per- and poly-fluoroalkyl substances) are persistent, man-made organic compounds, widely found in the environment. Recent awareness about their toxicity has led the U.S. Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA) to initiate actions against PFAS. Hence reliable and fast methods for their determination are needed.

PFASs are commonly measured using liquid chromatography–mass spectrometry (LC-MS). The column of choice for PFAS analysis by LC-MS(/MS) is a C18 column. The Ascentis® Express PFAS columns are based on superficially porous silica particles (SPP)

with C18 modification and are specifically tested using a PFAS compound mixture. This ensures the suitability and reliable performance of these columns for an efficient PFAS analysis.

PFAS compounds originating from the HPLC system and materials used for the analysis are a concern. Therefore, it is recommended to place a delay column before the injection port in the system (Figure 1). The Ascentis® Express PFAS Delay column provides exceptionally high retention of PFAS compounds across the various mobile phase conditions. It efficiently delays the PFAS background contamination that originates from the instrument and therefore prevents co-elution with the PFAS compound present in the sample (Figure 1).

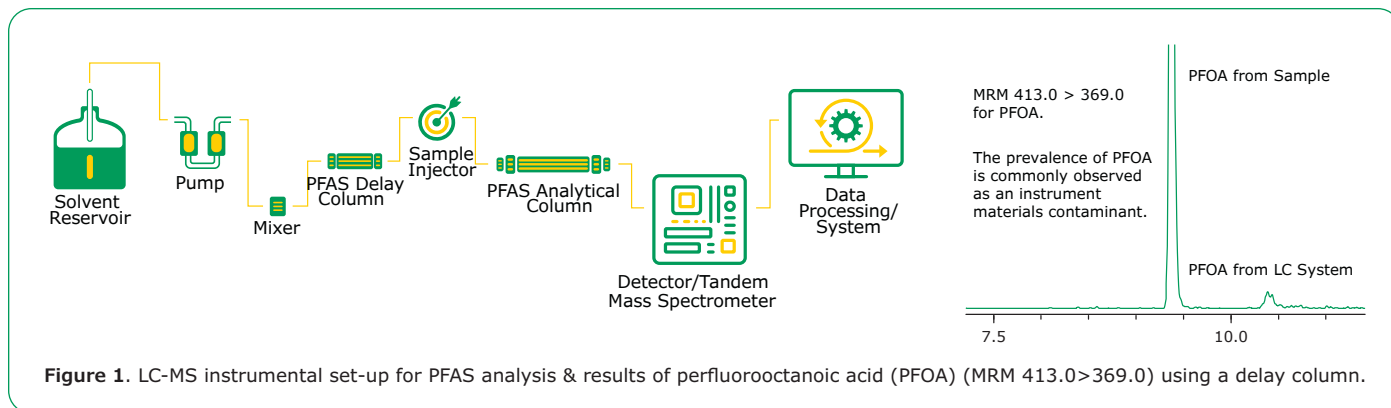


Figure 1. LC-MS instrumental set-up for PFAS analysis & results of perfluorooctanoic acid (PFOA) (MRM 413.0>369.0) using a delay column.

Millex® PES Syringe Filters for PFAS Analysis

- Ideal for PFAS analysis of particle loaded samples
- Polyethersulfone (PES) membrane
- Polypropylene housing

SigmaAldrich.com/onemillex



Milipore®
Preparation, Separation,
Filtration & Monitoring Products

LC-MS Analysis of PFAS - 33 Compounds in 5 minutes

The rapid separation of 33 PFAS compounds found in EPA 537.1, EPA 533, and EPA 8327 demonstrates that the Fused-Core® technology of Ascentis® Express PFAS HPLC columns benefits the PFAS analysis for fast, efficient, and rugged separations—paramount to environmental analysis (Figure 2).

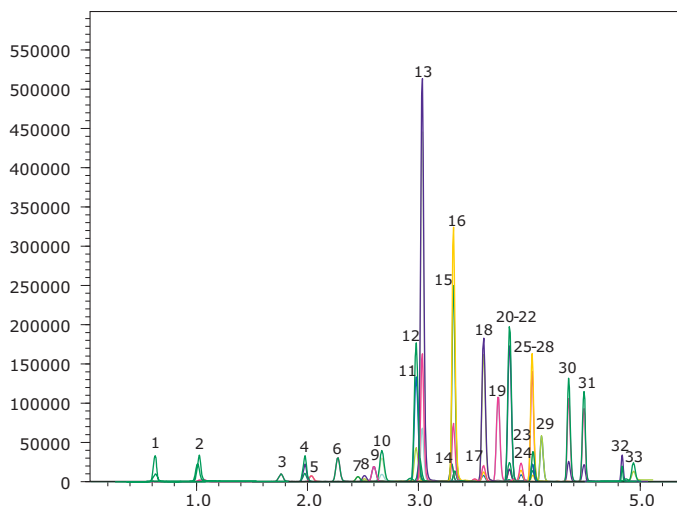


Figure 2. 33 PFAS Compounds in 5 min

LC Conditions

| Analytical col.: | Ascentis® Express 90Å PFAS, 10 cm x 2.1 mm, 2.7 µm (53559-U) | | | | | | | | | | | | | | |
|-------------------------|---|------------|----|-----|------|-----|------|-----|-------|-----|-------|-----|------|-----|-----|
| Delay col.: | Ascentis® Express 90Å PFAS Delay, 5 cm x 3 mm, 2.7 µm (53572-U) | | | | | | | | | | | | | | |
| Mobile phase : | [A]10 mM Ammonium acetate; [B] Methanol | | | | | | | | | | | | | | |
| Gradient: | <table border="1"> <thead> <tr> <th>Time (min)</th> <th>%B</th> </tr> </thead> <tbody> <tr> <td>0.0</td> <td>33.0</td> </tr> <tr> <td>4.0</td> <td>98.0</td> </tr> <tr> <td>4.1</td> <td>100.0</td> </tr> <tr> <td>6.0</td> <td>100.0</td> </tr> <tr> <td>6.1</td> <td>33.0</td> </tr> <tr> <td>7.5</td> <td>End</td> </tr> </tbody> </table> | Time (min) | %B | 0.0 | 33.0 | 4.0 | 98.0 | 4.1 | 100.0 | 6.0 | 100.0 | 6.1 | 33.0 | 7.5 | End |
| Time (min) | %B | | | | | | | | | | | | | | |
| 0.0 | 33.0 | | | | | | | | | | | | | | |
| 4.0 | 98.0 | | | | | | | | | | | | | | |
| 4.1 | 100.0 | | | | | | | | | | | | | | |
| 6.0 | 100.0 | | | | | | | | | | | | | | |
| 6.1 | 33.0 | | | | | | | | | | | | | | |
| 7.5 | End | | | | | | | | | | | | | | |
| Flow rate: | 0.4 mL/min | | | | | | | | | | | | | | |
| Pressure: | 479 bar (6947 psi) | | | | | | | | | | | | | | |
| Temperature: | 35 °C | | | | | | | | | | | | | | |
| Detection: | ESI (-) MS/MS; ESI LCMS system: Shimadzu LCMS-8040; Spray voltage: -2.0 kV; Nebulizing gas: 2 L/min; Drying gas: 15 L/min; DL temp: 250 °C; Heat block: 400 °C | | | | | | | | | | | | | | |
| Inj. vol.: | 2.0 µL | | | | | | | | | | | | | | |
| Sample solvent: | methanol (96%) water (4%) | | | | | | | | | | | | | | |

Find an overview of all HPLC columns at:
[SigmaAldrich.com/HPLC](https://www.sigmaaldrich.com/HPLC)

See our portfolio of PFAS standards under Organic Pollutant Standards at
[SigmaAldrich.com/standards](https://www.sigmaaldrich.com/standards)

Sample Compounds

| Peak | Compound | Transition | Retention Time (min) |
|------|--------------|-------------|----------------------|
| 1 | PFBA | 213.0>169.0 | 0.755 |
| 2 | 4:2FTS | 229.0>85.0 | 1.031 |
| 3 | PFPeA | 263.0>219.0 | 1.762 |
| 4 | PFBS | 299.0>80.0 | 1.979 |
| 5 | PFHpS | 279.0>85.0 | 2.035 |
| 6 | PFPeS | 315.0>135.0 | 2.273 |
| 7 | PFMPA | 327.0>307.0 | 2.454 |
| 8 | PFHxA | 313.0>269.0 | 2.514 |
| 9 | PFEEESA | 349.0>80.0 | 2.599 |
| 10 | HFPO-DA | 285.0>169.0 | 2.670 |
| 11 | PFHxS | 399.0>80.0 | 3.013 |
| 12 | NaDONA | 377.0>251.0 | 3.033 |
| 13 | ADONA | 377.0>250.9 | 3.034 |
| 14 | FOSA | 427.0>407.0 | 3.299 |
| 15 | PFOA | 413.0>369.0 | 3.316 |
| 16 | PFMBA | 449.0>80.0 | 3.328 |
| 17 | PFHpA | 363.0>319.0 | 3.388 |
| 18 | PFOS | 499.0>80.0 | 3.588 |
| 19 | 9CI-PF3ONS | 530.9>351.0 | 3.719 |
| 20 | 8:2FTS | 549.0>80.0 | 3.816 |
| 21 | PFNS | 527.0>507.0 | 3.820 |
| 22 | PFDA | 513.0>469.0 | 3.822 |
| 23 | N-MeFOSAA | 570.0>419.0 | 3.925 |
| 24 | PFNA | 463.0>419.0 | 3.942 |
| 25 | NFDHA | 599.0>80.0 | 4.015 |
| 26 | PFUnA | 563.0>519.0 | 4.025 |
| 27 | N-EtFOSAA | 584.0>419.0 | 4.029 |
| 28 | 6:2FTS | 498.0>78.0 | 4.033 |
| 29 | 11CI-PF3OUdS | 630.7>451.0 | 4.110 |
| 30 | PFTrDA | 663.0>619.0 | 4.355 |
| 31 | PFDOA | 613.0>569.0 | 4.496 |
| 32 | PFTeDA | 713.0>669.0 | 4.745 |
| 33 | PFDS | 295.0>201.0 | 4.921 |

Featured Products

| Description | Cat. No. |
|---|----------|
| Ascentis® Express 90Å PFAS, 10 cm x 2.1 mm, 2.7 µm, | 53559-U |
| Ascentis® Express 90Å PFAS Delay, 5 cm x 3 mm, 2.7 µm | 53572-U |
| Solvents & Reagents | |
| Methanol for chromatography (LC-MS grade) LiChrosolv® | 1.06035 |
| Water for chromatography (LC-MS grade) LiChrosolv® or tap fresh from an appropriate Milli-Q® system | 1.15333 |
| Ammonium acetate suitable for mass spectrometry (MS), LiChropur™, eluent additive for LC-MS | 73594 |

Related products

| Description | Cat. No. |
|---|----------|
| Analytical Standards | |
| Perfluorobutanoic acid, neat | 68808 |
| Perfluoropentanoic acid, neat | 68542 |
| Perfluorohexanoic acid, neat | 43809 |
| Perfluorooctanoic acid, neat | 33824 |
| Perfluorononanoic acid, neat | 91977 |
| Perfluorodecanoic acid, neat | 43929 |
| Perfluorododecanoic acid, neat | 92291 |
| Perfluorotetradecanoic acid, neat | 80312 |
| Pentadecafluorooctanoic acid, 100 µg/mL in methanol | 33603 |
| Heptadecafluorooctanoic acid, 100 µg/mL in methanol | 33607 |
| Perfluorooctane sulfonic acid, neat | 33829 |