

Ascentis[®] Express PFAS HPLC Columns

LC-MS Analysis of PFAS Compounds in EPA Methods 537.1, 533 and 8327

PFAS (Per- and poly-fluoroalkyl substances) are persistent, man-made organic compounds, widely found in the environment. Recent awareness has brought attention to the toxicity of these substances. The U.S. Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA) have initiated actions against PFAS. For determination of PFASs, liquid chromatography–mass spectrometry (LC-MS) is a commonly used technique.

EPA has developed, validated, and published three methods to support the analysis of 29 PFAS in drinking water, Method 533, 537 and 537.1. EPA 8327 covers the analysis of selected per- and

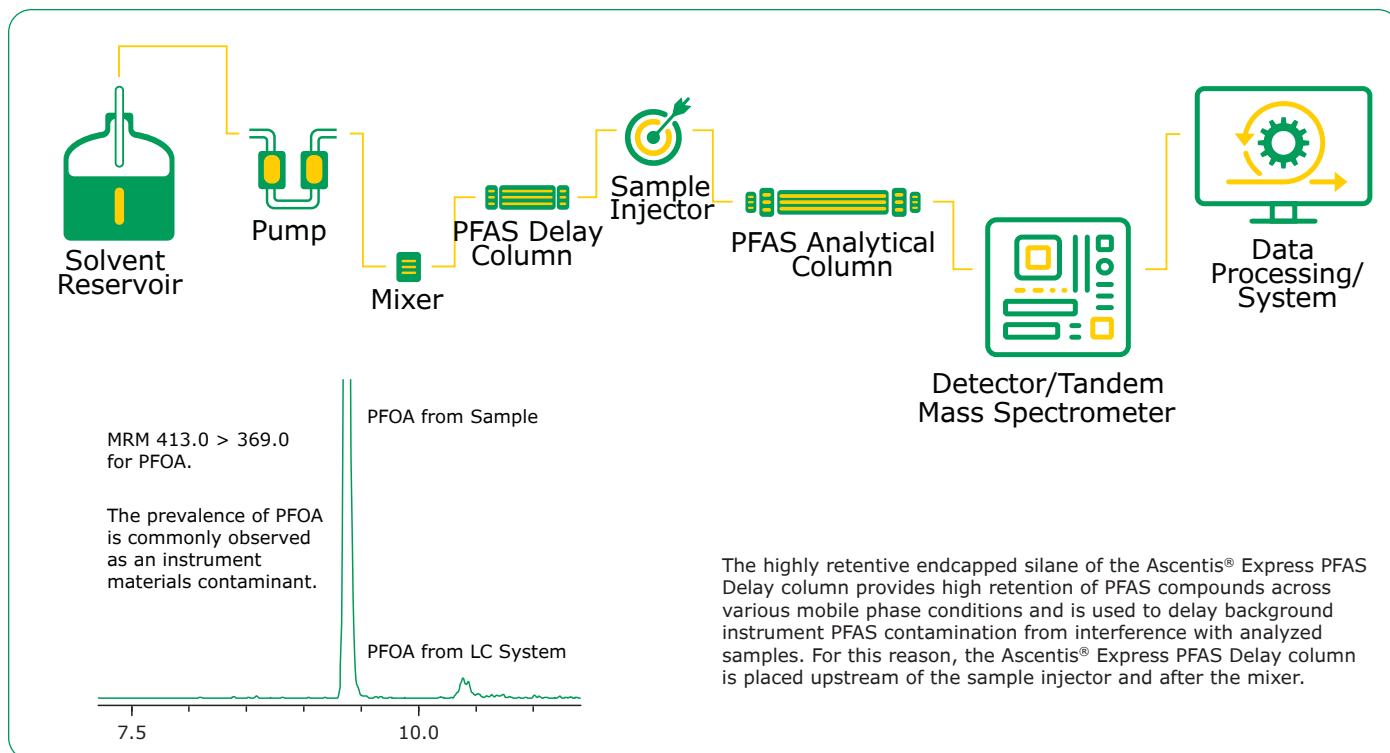
polyfluoroalkyl substances (PFAS) in prepared extracts of various matrices (e.g., waters and solids) by liquid chromatography/tandem mass spectrometry (LC/MS/MS) analysis.

The Ascentis[®] Express PFAS HPLC column is designed for the separation of novel and legacy short chain and long chain PFAS compounds containing branched and linear isomers, whilst adhering to EPA methodology requirements. Furthermore, a specific PFAS delay column prevents background PFAS contamination from interfering with the sample results in quantitative LC-MS methods.

Sample Preparation

Reference Standards

Instrument LC-MS



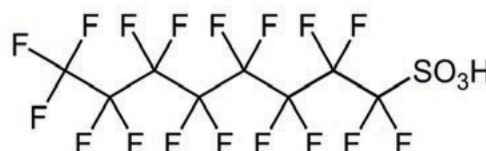
EPA Method 537.1

LC Conditions:															
Analytical Column:	Ascentis® Express PFAS 90 Å, 10 cm x 2.1 mm I.D., 2.7 µm (53559-U)														
Delay Column:	Ascentis® Express PFAS Delay, 5 cm x 3 mm I.D., 2.7 µm (53572-U)														
Mobile Phase:	[A] 10 mM Ammonium acetate; [B] methanol														
Gradient:	<table border="1"> <thead> <tr> <th>Time</th> <th>%B</th> </tr> </thead> <tbody> <tr> <td>0.0</td> <td>33.0</td> </tr> <tr> <td>18.0</td> <td>98.0</td> </tr> <tr> <td>18.1</td> <td>100.0</td> </tr> <tr> <td>21.0</td> <td>100.0</td> </tr> <tr> <td>21.1</td> <td>33.0</td> </tr> <tr> <td>26.0</td> <td>End</td> </tr> </tbody> </table>	Time	%B	0.0	33.0	18.0	98.0	18.1	100.0	21.0	100.0	21.1	33.0	26.0	End
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0.0	33.0														
18.0	98.0														
18.1	100.0														
21.0	100.0														
21.1	33.0														
26.0	End														
Flow Rate:	0.4 mL/min														
Pressure:	485 bar														
Temperature:	35 °C														
Injection Volume:	2.0 µL														
Sample Solvent:	Methanol:water (96:4)														

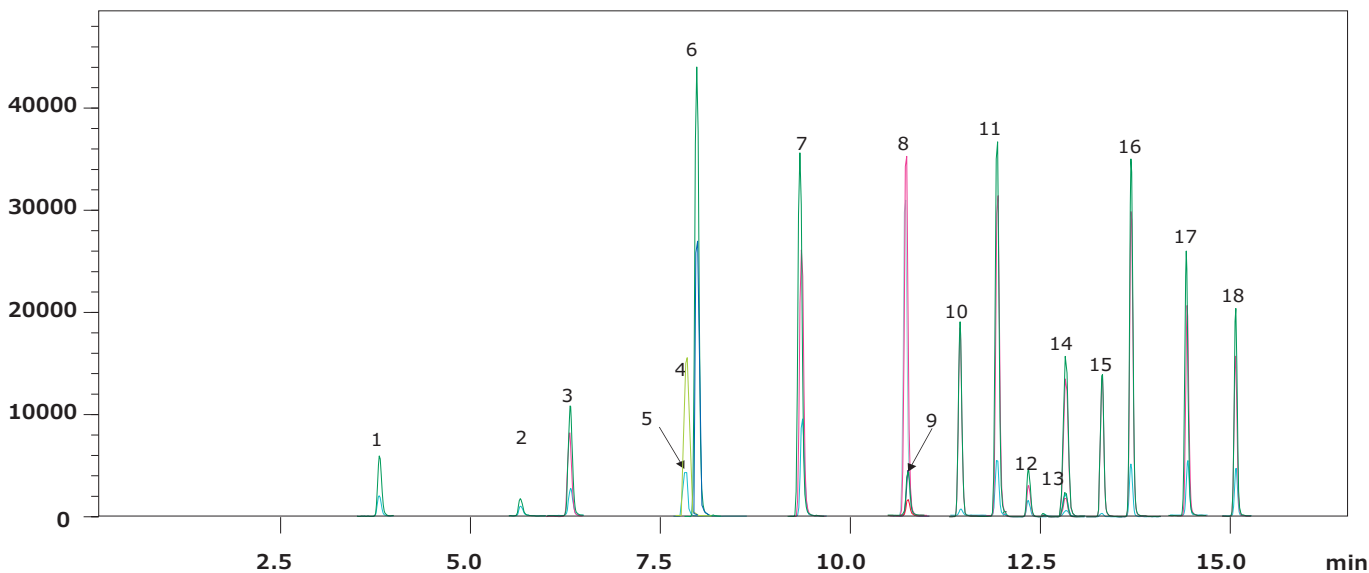
MS Conditions:	
Detection:	ESI(-) MS/MS
LC System:	Shimadzu Nexera X2
ESI LCMS system:	Shimadzu LCMS-8040
Spray Voltage:	-2.0 kV
Nebulizing gas:	2 L/min
Drying gas:	15 L/min
DL temp:	250 °C
Heat Block:	400 °C



PFOA



PFOS



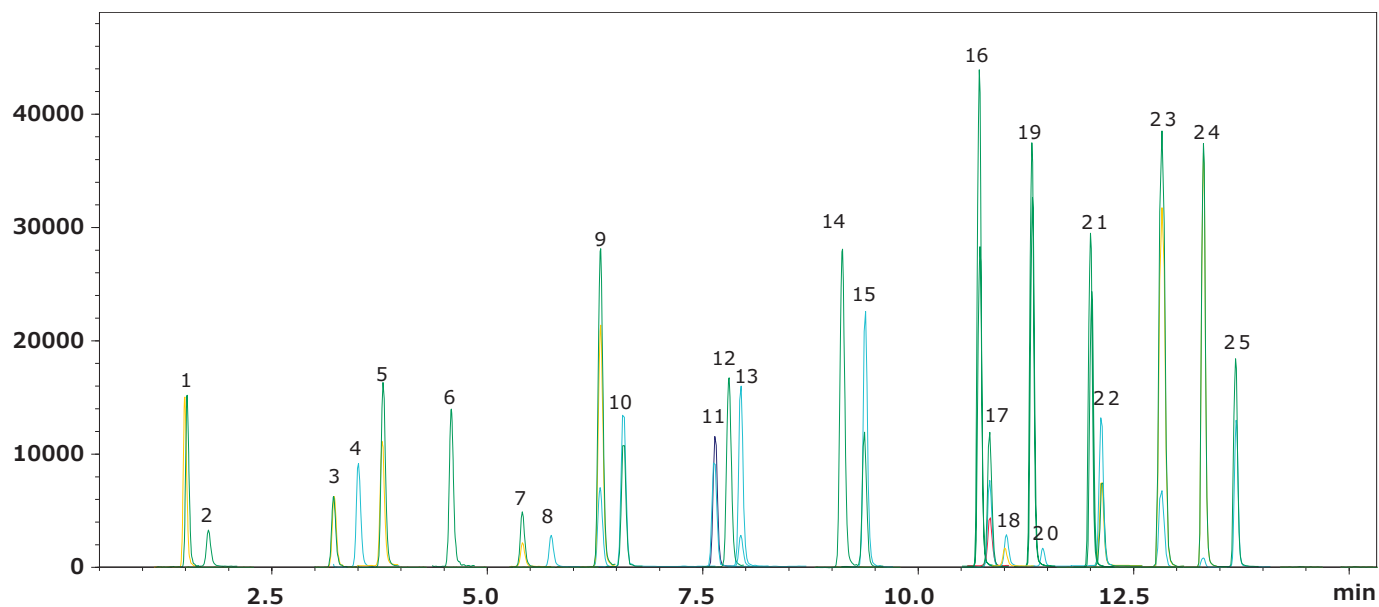
Peak #	Compound	Transition	t _R (min)
1	PFBS	299.0000>80.0000	3.789
2	PFHxA	313.0000>269.0000	5.639
3	HFPO-DA	285.0000>169.0000	6.307
4	PFHpA	363.0000>319.0000	7.723
5	PFHxS	399.0000>80.0000	7.936
6	ADONA	377.0000>250.9000	7.978
7	PFOA	413.0000>369.0000	9.368
8	PFNA	463.0000>419.0000	10.715
9	PFOS	499.0000>80.0000	10.762

Peak #	Compound	Transition	t _R (min)
10	9Cl-PF3ONS	530.9000>351.0000	11.439
11	PFDA	513.0000>469.0000	11.857
12	N-MeFOSAA	570.0000>419.0000	12.336
13	PFUnA	563.0000>519.0000	12.822
14	N-EtFOSAA	584.0000>419.0000	12.827
15	11Cl-PF3OUdS	630.7000>451.0000	13.311
16	PFDoA	613.0000>569.0000	13.690
17	PFTTrDA	663.0000>619.0000	14.435
18	PFTeDA	713.0000>669.0000	15.083

EPA Method 533

LC Conditions:															
Analytical Column:	Ascentis® Express PFAS 90 Å, 10 cm x 2.1 mm I.D., 2.7 µm (53559-U)														
Delay Column:	Ascentis® Express PFAS Delay, 5 cm x 3 mm I.D., 2.7 µm (53572-U)														
Mobile Phase:	[A] 10 mM Ammonium acetate; [B] methanol														
Gradient:	<table border="1"> <thead> <tr> <th>Time</th> <th>%B</th> </tr> </thead> <tbody> <tr> <td>0.0</td> <td>33.0</td> </tr> <tr> <td>18.0</td> <td>98.0</td> </tr> <tr> <td>18.1</td> <td>100.0</td> </tr> <tr> <td>21.0</td> <td>100.0</td> </tr> <tr> <td>21.1</td> <td>33.0</td> </tr> <tr> <td>26.0</td> <td>End</td> </tr> </tbody> </table>	Time	%B	0.0	33.0	18.0	98.0	18.1	100.0	21.0	100.0	21.1	33.0	26.0	End
Time	%B														
0.0	33.0														
18.0	98.0														
18.1	100.0														
21.0	100.0														
21.1	33.0														
26.0	End														
Flow Rate:	0.4 mL/min														
Pressure:	485 bar														
Temperature:	35 °C														
Injection Volume:	2.0 µL														
Sample Solvent:	Methanol:water (96:4)														

MS Conditions:	
Detection:	ESI(-) MS/MS
LC System:	Shimadzu Nexera X2
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



Peak #	Compound	Transition	t _R (min)
1	PFBA	213.0000>169.0000	1.358
2	4:2FTS	229.0000>85.0000	1.890
3	PFPeA	263.0000>219.0000	3.219
4	PFBS	299.0000>80.0000	3.810
5	PFHpS	279.0000>85.0000	3.967
6	PFPeS	315.0000>135.0000	4.791
7	PFMPA	327.0000>307.0000	5.431
8	PFHxA	313.0000>269.0000	5.684
9	PFEESA	349.0000>80.0000	6.099
10	HFPO-DA	285.0000>169.0000	6.335
11	PFHpA	363.0000>319.0000	7.763
12	PFHxS	399.0000>80.0000	7.985
13	ADONA	377.0000>250.9000	8.012

Peak #	Compound	Transition	t _R (min)
14	PFOA	413.0000>369.0000	9.398
15	PFMBA	449.0000>80.0000	9.512
16	PFNA	463.0000>419.0000	10.751
17	PFOS	499.0000>80.0000	10.793
18	9Cl-PF3ONS	530.9000>351.0000	11.459
19	PFDA	513.0000>469.0000	11.885
20	8:2FTS	549.0000>80.0000	11.897
21	6:2FTS	498.0000>78.0000	12.680
22	NFDHA	599.0000>80.0000	12.847
23	PFUnA	563.0000>519.0000	12.862
24	11Cl-PF3OUdS	630.7000>451.0000	13.329
25	PFDoA	613.0000>569.0000	13.708

EPA Method 8327

LC Conditions:

Analytical Column: Ascentis® Express PFAS 90 Å, 10 cm x 2.1 mm I.D., 2.7 µm (53559-U)

Delay Column: Ascentis® Express PFAS Delay, 5 cm x 3 mm I.D., 2.7 µm (53572-U)

Mobile Phase: [A] 10 mM Ammonium acetate; [B] methanol

Gradient:

Time	%B
0.0	33.0
18.0	98.0
18.1	100.0
21.0	100.0
21.1	33.0
26.0	End

Mobile Phase B: Methanol

Flow Rate: 0.4 mL/min

Pressure: 485 bar

Temperature: 35 °C

Injection Volume: 2.0 µL

Sample Solvent: Methanol:water (96:4)

MS Conditions:

Detection: ESI(-) MS/MS

LC System: Shimadzu Nexera X2

ESI LCMS system: Shimadzu LCMS-8040

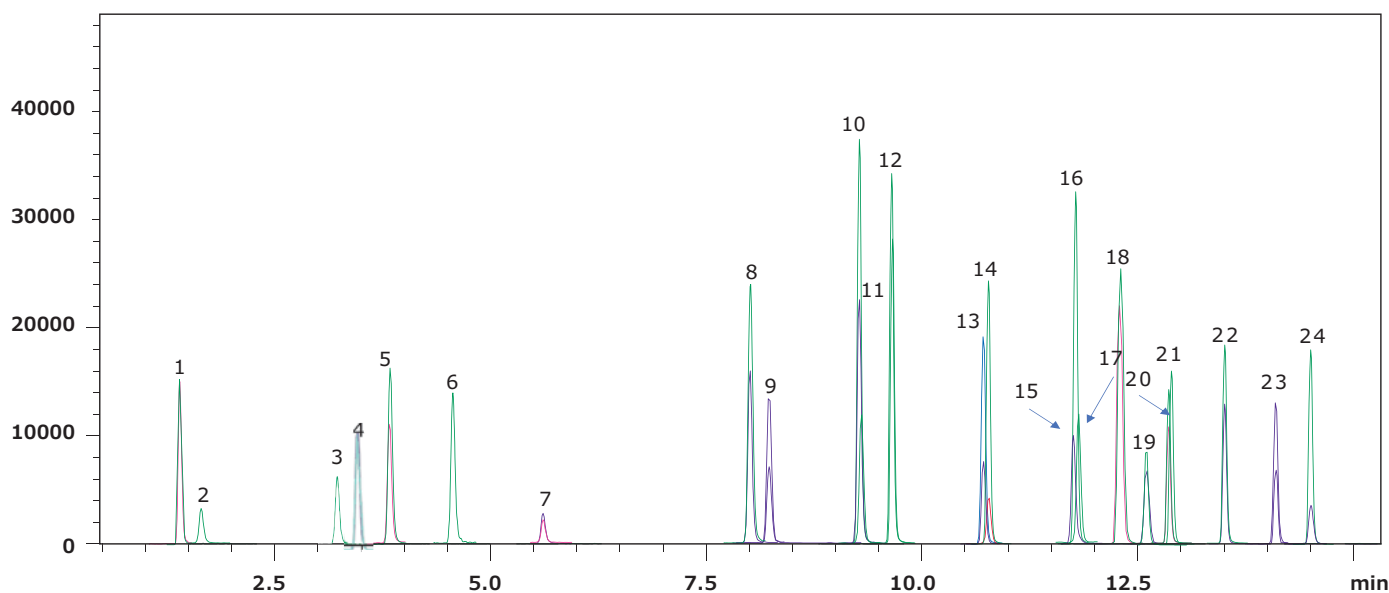
Spray Voltage: -2.0 kV

Nebulizing gas: 2 L/min

Drying gas: 15 L/min

DL temp: 250 °C

Heat Block: 400 °C



Peak #	Compound	Transition	t _r (min)
1	PFBA	213.0000>169.0000	1.358
2	4:2FTS	229.0000>85.0000	1.890
3	PFPeA	263.0000>219.0000	3.219
4	PFBS	299.0000>80.0000	3.810
5	PFHpS	279.0000>85.0000	3.967
6	PFPeS	315.0000>135.0000	4.791
7	PFHxA	313.0000>269.0000	5.684
8	PFHpA	363.0000>319.0000	7.763
9	PFHxS	399.0000>80.0000	7.985
10	FOSA	427.0000>407.0000	9.304
11	PFOA	413.0000>369.0000	9.398
12	PFDS	295.0000>201.0000	9.695

Peak #	Compound	Transition	t _r (min)
13	PFNA	463.0000>419.0000	10.751
14	PFOS	499.0000>80.0000	10.793
15	PFNS	527.0000>507.0000	11.843
16	PFDA	513.0000>469.0000	11.885
17	8:2FTS	549.0000>80.0000	11.897
18	N-MeFOSAA	570.0000>419.0000	12.366
19	6:2FTS	498.0000>78.0000	12.680
20	PFUnA	563.0000>519.0000	12.862
21	N-EtFOSAA	584.0000>419.0000	12.865
22	PFDoA	613.0000>569.0000	13.708
23	PFTTrDA	663.0000>619.0000	14.446
24	PFTeDA	713.0000>669.0000	15.103

Product list

	Cat. No.
Ascentis® Express PFAS 90 Å, 10 cm x 2.1 mm I.D., 2.7 µm	53559-U
Ascentis® Express PFAS Delay, 5 cm x 3 mm I.D., 2.7 µm	53572-U
Methanol hypergrade for LC-MS LiChrosolv®	1.06035
Water for chromatography (LC-MS grade) LiChrosolv® or ultrapure water from a Milli-Q® IQ 7 series water purification system	1.15333
Ammonium acetate LiChropur™, eluent additive for LC-MS	73594

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