

## Objective

- Analysis of fourteen perfluorinated alkyl acids including PFOA and PFOS in drinking water by EPA method 537

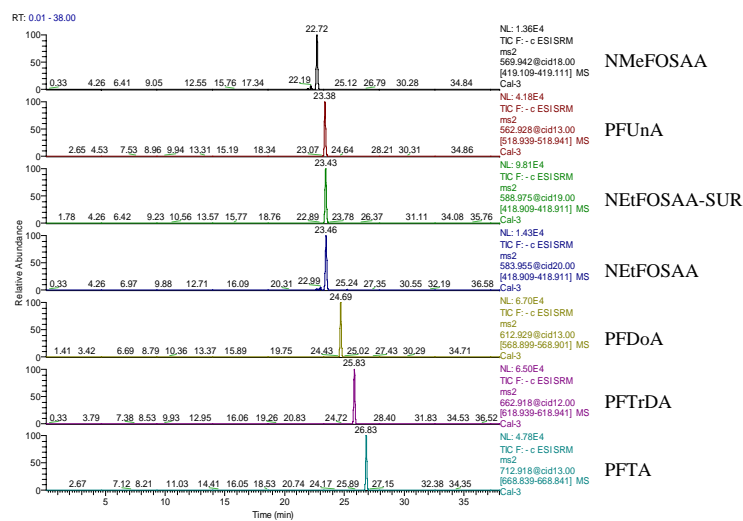
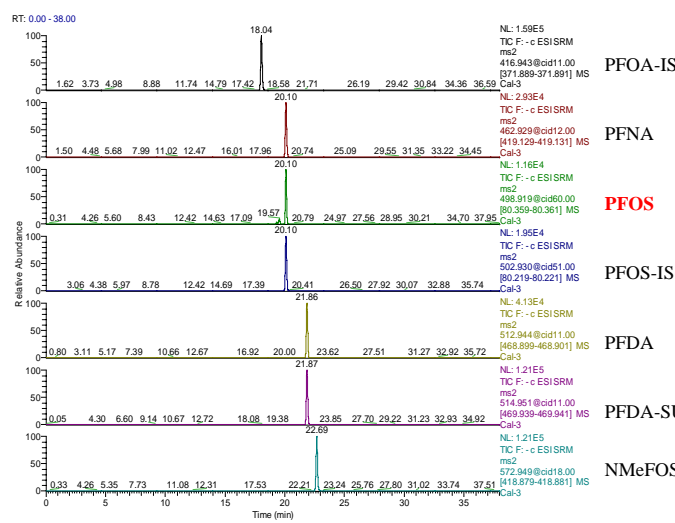
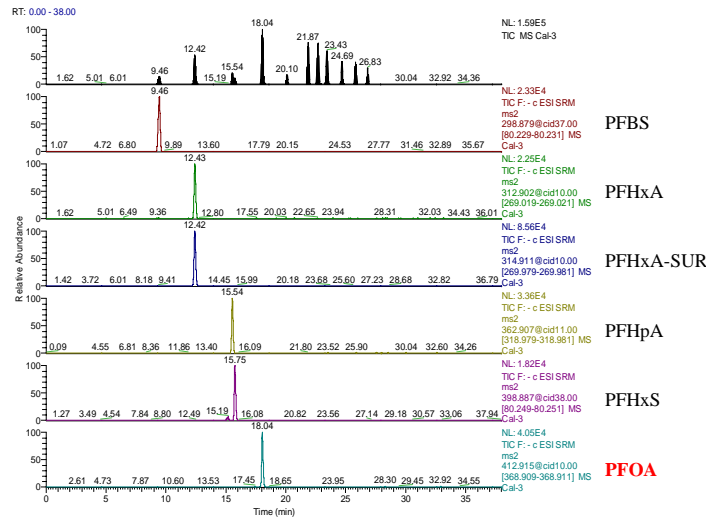
## Method

- 250 mL water sample fortified with method surrogates is extracted by solid phase extraction (SPE) cartridge
- The extract is concentrated to dryness and then adjusted to a 1mL volume
- The resulting solution is analyzed by LC/MS/MS operated in negative electrospray ionization (ESI) mode
- Separation and detection is performed using a Thermo Scientific Accela Autosampler and quaternary U-HPLC pump equipped with TSQ Quantum Access Triple Quadrupole mass spectrometer
- Precautions such as replacing PTFE components of LC system with PEEK material where applicable, bypassing degasser, etc. are taken to minimize method interference

## Compounds Analyzed

NEtFOSAA	N-ethyl perfluorooctanesulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBS	Perfluorobutanesulfonic acid
PFDA	Perfluorodecanoic acid
PFDoA	Perfluorododecanoic acid
PFHpA	Perfluoroheptanoic acid
PFHxS	Perfluorohexanesulfonic acid
PFHxA	Perfluorohexanoic acid
PFNA	Perfluorononanoic acid
<b>PFOS</b>	<b>Perfluorooctanesulfonic acid</b>
<b>PFOA</b>	<b>Perfluorooctanoic acid</b>
PFTA	Perfluorotetradecanoic acid
PFTTrDA	Perfluorotridecanoic acid
PFUnA	Perfluoroundecanoic acid
PFOA-IS	Perfluoro-n-[1,2,3,4-13C4]octanoic acid*
MPFOS-IS	Sodium perfluoro-1-[1,2,3,4-13C4]octanesulfonate
NMeFOSAA-IS	N-deuteriomethylperfluoro-1-octanesulfonamidoacetic acid
PFHxA-SUR	Perfluoro-n-[1,2-13C2]hexanoic acid
PFDA-SUR	Perfluoro-n-[1,2-13C2]decanoic acid
NEtFOSAA-SUR	N-deuterioethylperfluoro-1-octanesulfonamidoacetic acid

Figure 1. Example Chromatogram (TIC and SRM) of Calibration Standard (Level 3)\*



## Results

Figure 2. Example of Calibration Curve

Figure 2a. Calibration Curve of PFOA (0.5, 1.25, 2.5, 5, 10 ng/mL)

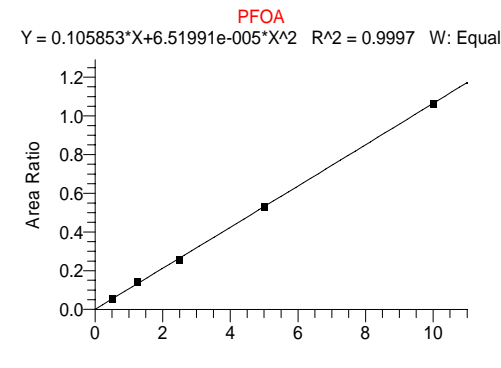


Figure 2b. Calibration Curve of PFOS (8, 20, 40, 80, and 160 ng/mL)

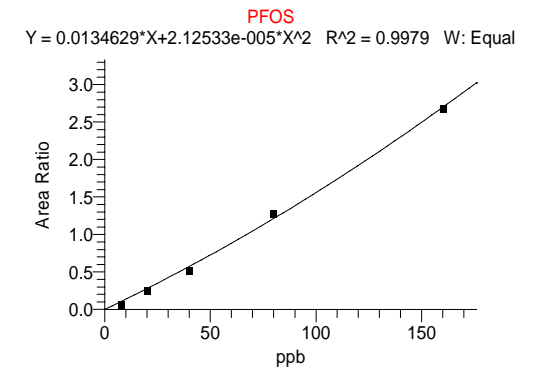


Table 1. The Concentration Range of Calibration Curve (ng/mL)

Analyte	Cal. 1	Cal. 2	Cal. 3	Cal. 4	Cal. 5
PFHxA	0.5	1.25	2.5	5	10
PFHpA	0.5	1.25	2.5	5	10
PFOA	0.5	1.25	2.5	5	10
PFNA	0.5	1.25	2.5	5	10
PFDA	0.5	1.25	2.5	5	10
PFUnA	0.5	1.25	2.5	5	10
PFDoA	0.5	1.25	2.5	5	10
PFTTrDA	0.5	1.25	2.5	5	10
PFTA	0.5	1.25	2.5	5	10
NMeFOSAA	1	2.5	5	10	20
NEtFOSAA	1	2.5	5	10	20
PFHxA-SUR	1.25	3.125	6.25	12.5	25
PFDA-SUR	1.25	3.125	6.25	12.5	25
PFBS	4.42	11.05	22.1	44.2	88.4
PFHxS	5	12.5	25	50	100
NEtFOSAA-SUR	5	12.5	25	50	100
PFOS	8	20	40	80	160

Table 2. Example of Precision and Accuracy in Fortified Milli Q Water and Tap Water

	n	PFOA				PFOS			
		Fortified Conc. (ng/L)	Mean Analyzed Conc. (ng/L)	Mean Recovery (%)	RSD (%)	Fortified Conc. (ng/L)	Mean Analyzed Conc. (ng/L)	Mean Recovery (%)	RSD (%)
Milli Q Water Blank	10	0	0.094	N/A	N/A	0	0.002	N/A	N/A
Milli Q Water Fortified-1	4	2	2.0	100	5.4	32	22.4	70	20.1
Milli Q Water Fortified-2	7	20	18.7	93	1.8	320	312.9	98	2.7
Milli Q Water Fortified-3	4	34	33.7	99	0.8	544	518.1	95	5
Tap Water Blank	1	0	3.772	N/A	N/A	0	2.859	N/A	N/A
Tap Water Fortified-1	7	20	19.628	98	3.3	320	323.741	101	5.8

## Conclusion

- Good separation for fourteen perfluorinated alkyl acids in drinking water under conditions of EPA method 537
- Very good recoveries of some perfluorinated compounds from drinking water
- Sensitivity in ppt range for all analytes listed in EPA Method 537.