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Time and freedom
to tackle other challenges

Dionex AutoTrace 280 PFAS SPE Instrument

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What else can you accomplish while your PFAS samples are prepared automatically?

In today's busy labs, everyone needs to do more with less. As daily tasks grow, so does your need to prioritize. All too often, urgent demands—like PFAS sample preparation—take priority over important strategic work, which is forced to take a backseat. Even worse, some tasks may get rushed, leading to errors and the need to rerun batches or even resample. Truth is: Preparing per- and poly-fluoroalkyl substance (PFAS) samples manually is very time-consuming.

Imagine what you could do if you recaptured the time spent doing manual solid-phase extraction (SPE) for your PFAS water samples. Combine that with better recoveries, reproducibility, and productivity—and it's easy to see how your lab can surmount the challenges of PFAS analysis. With heightened efficiency, your lab can conquer anything else it encounters. It's time to discover the Thermo Scientific™ Dionex™ AutoTrace™ 280 PFAS solid-phase extraction instrument.

Dionex AutoTrace 280 PFAS instrument overview

- Designed to automate SPE for U.S. EPA Method 533 and U.S. EPA Method 537.1
- Greatly reduces background contamination with non-fluoropolymer-based tubing, valves, and filters
- Saves time and labor ensuring high reproducibility and productivity for PFAS sample preparation
- Extracts analytes of interest from large volume aqueous samples easily and efficiently
- Processes ground, surface, and wastewater samples
- Processes up to six samples with minimal user interaction
- Automates eliminates errors in the manual process
- Positive pressure loading and elution ensures accurate flow rate control improving analytical precision
- Accomplishes SPE without the need to learn new software





Supporting better sample prep—and safer drinking water

PFAS are considered “Forever Chemicals” due to their prevalence and persistence in the environment. Found almost everywhere, these chemicals do not breakdown and accumulate in biological systems. PFAS, even at trace levels, are associated with several health and public safety concerns, and enter the drinking water supply through run-off into source water. Monitoring these compounds is critical to ensuring safe drinking water.

Important considerations in PFAS analysis

Background contribution

- Analytical and sample prep instruments
- Laboratory supplies (e.g., gloves or foil)
- Personal care products
- Sample collection equipment

Analysis

- Trace-level requirements
- Identification and confirmation
- Large number of compounds
- Limited standard and reference materials

Sample prep

- Labor-intensive manual SPE
- Recovery and reproducibility requirements
- PFAS can adhere to lab supplies and instrument materials

SPE for PFAS

Extraction diagrams for U.S. EPA Method 537.1 and U.S. EPA Method 533

To detect trace levels of PFAS, SPE is used to isolate and concentrate the PFAS molecules from water samples. SPE also separates other compounds that may interfere with the LC-MS analysis.

U.S. EPA Method 537.1 extraction

SPE cartridge conditioning

1. 15 mL methanol
2. 18 mL water

A 1-minute soak helps with recovery

Sample loading

1. Load 250 mL of sample at 10–15 mL/min
2. Rinse sample bottles with water and methanol
3. Dry cartridges before elution

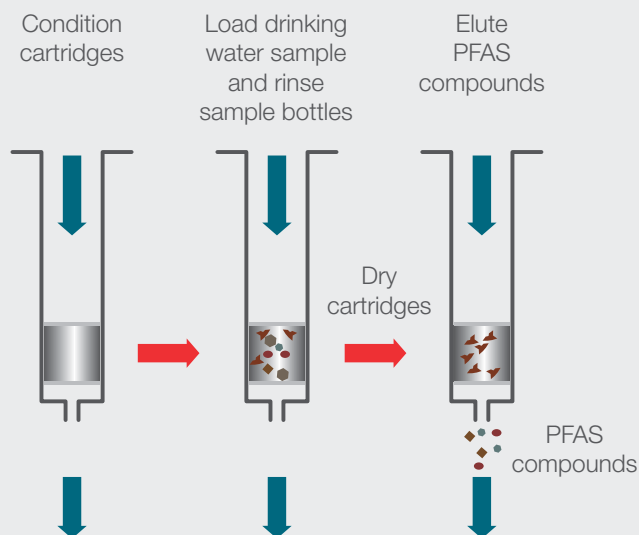
Cartridge elution

1. Elute SPE cartridges with two 4 mL aliquots of methanol

Elution must be done in dropwise fashion

General SPE protocol for PFAS samples

The Dionex AutoTrace 280 PFAS instrument automates the SPE process. First, the SPE cartridges are conditioned with the solutions. Cartridges can not go dry during conditioning or before loading samples. Next, the drinking water samples are pumped from the sample container through the SPE cartridges. As the sample passes through the SPE sorbent, PFAS analytes are adsorbed and concentrated as the liquid goes to aqueous waste. The cartridge is then dried before eluting the PFAS components. Samples are then dried and reconstituted with 1 mL of the solution specified in the method.



Sample concentration: dry sample and reconstitute with 1 mL of appropriate solution.

U.S. EPA Method 533 extraction

SPE cartridge conditioning

1. 10 mL methanol
2. 10 mL 0.1M phosphate buffer
3. Add another 2–3 mL phosphate buffer then about 5 mL water

Sample loading

1. Load 100–250 mL of sample at 5 mL/min
2. Rinse sample bottles with 10 mL ammonium acetate and 1 mL methanol
3. Dry cartridges before elution

Cartridge elution

1. Elute SPE cartridges using methanol with 2% ammonium hydroxide.
2. Repeat bottle rinse with 5 mL methanol with 2%

Elution must be done in dropwise fashion

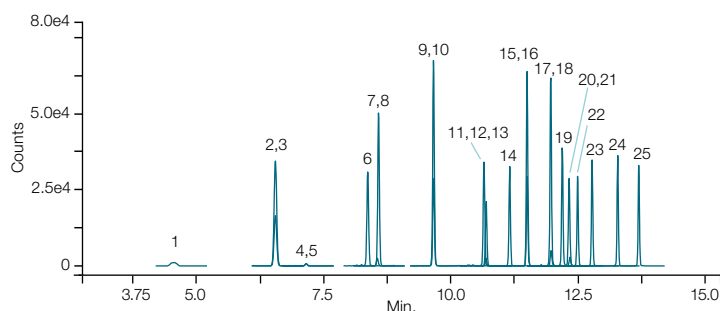
PFAS application data

Extracted samples were analyzed by LC-MS/MS using SRM according to U.S. Method 537.1

LC conditions			
Analytical column	Thermo Scientific™ Accucore™ RP-MS, 2.1 × 100 mm, 2.6 μm		
Isolator column	Thermo Scientific™ Hypersil™ BDS C18, 2.1 × 50 mm, 5 μm; This column was installed prior to the autosampler to remove any contaminants from the mobile phase		
Column temperature	45 °C		
Flow rate	0.5 mL/min		
Injection volume	5 μL		
Autosampler temperature	6 °C		
Mobile phase A	0.1% acetic acid		
Mobile phase B	Methanol containing 0.1% acetic acid		
Mobile phase C	20 mM ammonium acetate		
Gradient	Time	%B	%C
	0	30	5
	1	30	5
	14	95	5
	17	95	5
	18	30	5
	21	30	5

MS global parameters	
Ion source type	H-ESI
Polarity	Negative
Negative ion	2500 V
Sheath gas	50 arbitrary units
Aux gas	10 arbitrary units
Sweep gas	1 arbitrary units
Ion transfer tube temp	325 °C
Vaporizer	300
Q1 resolution	0.7 FWHM
Q3 resolution	1.2 FWHM
CID gas	2 milli-Torr

LC-MS/MS SRM chromatogram shows excellent separation with a 15-min run time



LC-MS/MS chromatograms of PFAS at 4 μg/L standard solution.

U.S. EPA Method 537.1 requirements

- Recoveries must be 70–130%
- RSD ≤ 20%

Dionex AutoTrace 280 PFAS instrument shows excellent recovery and reproducibility

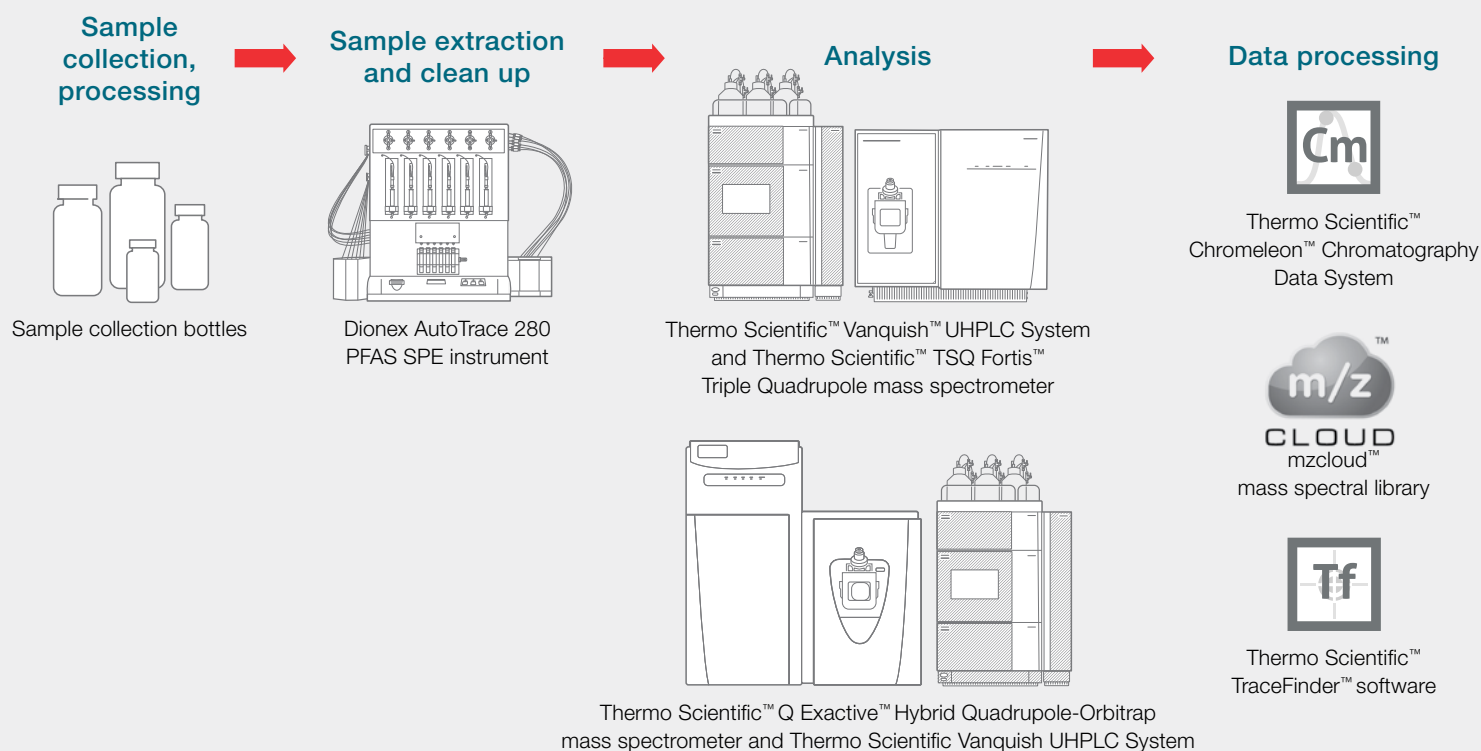
- All 18 PFAS compounds and deuterated standards between 84–123%
- RSD between 1.1–9.9%

Peak number	Analyte	Fortified Conc. (ng/L)	Mean Recovery (%)	RSD	Fortified Conc. (ng/L)	Mean Recovery (%)	RSD
1	PFBS	16.0	107	3.3	80.0	98.3	3.6
2,3*	PFHxA	16.0	108	2.3	80.0	106	2.6
4,5*	HFPO-DA	16.0	84.1	7.5	80.0	88.6	6.3
6	PFHpA	16.0	113	2.7	80.0	117	1.3
7	PFHxS	16.0	120	3.4	80.0	123	2.1
8	ADONA	16.0	117	2.5	80.0	121	1.1
9,10*	PFOA	16.0	113	2.5	80.0	119	1.6
11	PFNA	16.0	114	2.9	80.0	118	2.1
12,13*	PFOS	16.0	113	4.5	80.0	117	2.9
14	9CI-PF3ONS	16.0	96.1	4.1	80.0	103	2.6
15*,16	PFDA	16.0	105	3.2	80.0	111	2.1
17*,18	NMeFOSAA	16.0	103	5.2	80.0	110	5.2
19	PFUnA	16.0	96.8	5.0	80.0	103	3.1
20*,21	NEtFOSAA	16.0	100	9.9	80.0	104	2.3
22	11CI-PF3OUdS	16.0	88.5	5.5	80.0	97.1	4.8
23	PFDoA	16.0	89.8	4.4	80.0	97.3	3.4
24	PFTTrA	16.0	89.6	3.8	80.0	95.8	3.7
25	PFTA	16.0	89.0	4.8	80.0	98.1	3.3

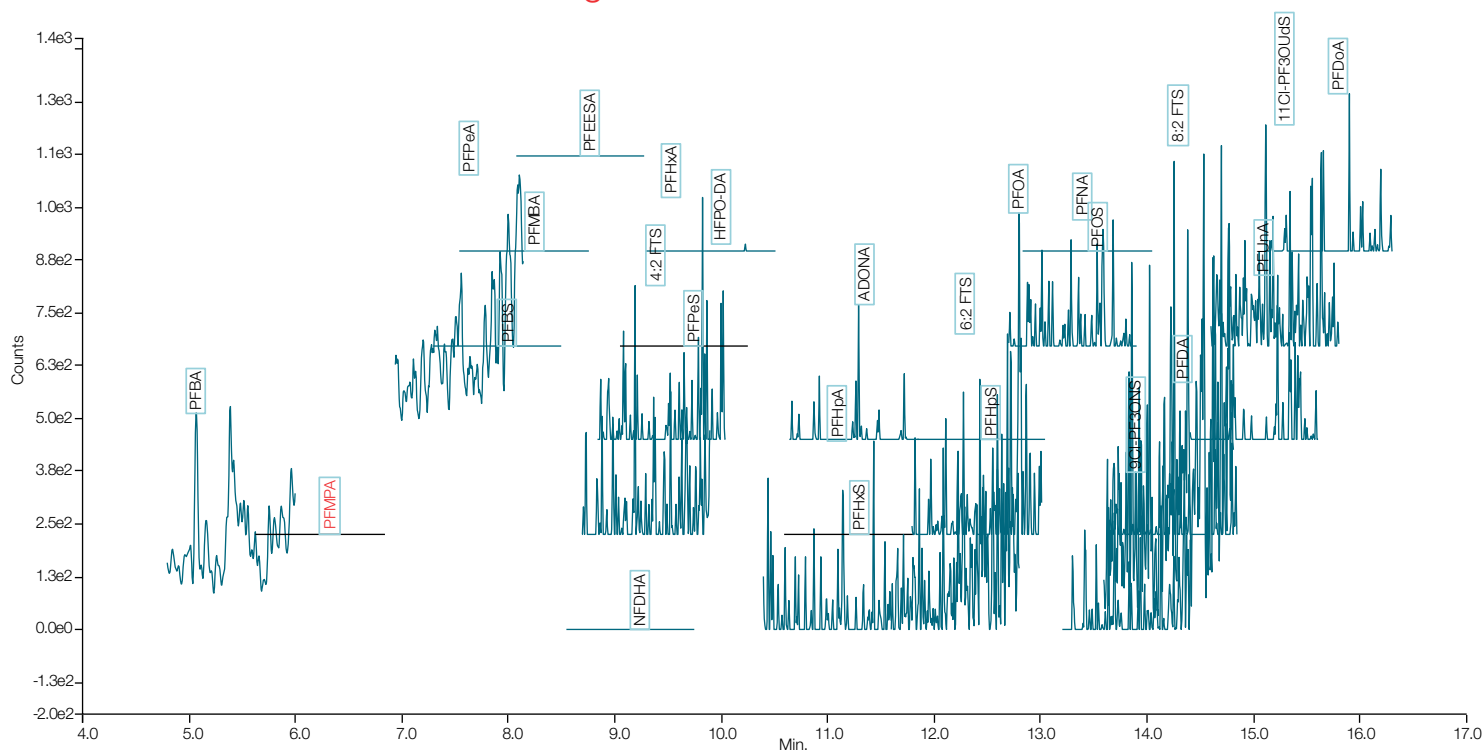
* Designates the isotope labeled internal standard or surrogate.

Complete service and support from Thermo Fisher Scientific

Only Thermo Scientific can support and service every step of your PFAS analysis



PFAS Blank LC-MS/MS chromatograms

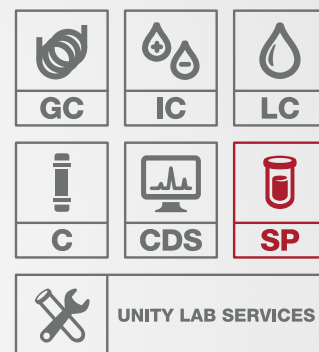


A blank sample was extracted using the Dionex AutoTrace 280 PFAS instrument. This chromatogram shows there is no significant background contribution from the instrument.

The collective power of chromatography

Expect reproducible results with sample prep, columns and vials

Maximizing your chromatography productivity and achieving reproducible results requires optimizing the whole workflow from sample to knowledge. By choosing the right tools, from your sample preparation (manual or automated) to the highest selectivity column chemistry and cleanest vials, you maintain sample integrity and achieve the highest instrument efficiency and reduce the need for costly reanalysis. With the largest portfolio of sample handling; vials, plates and closures, column chemistries in a broad range of dimensions and sample preparation, we remain a steadfast and committed partner in your endeavor to improve the world around us.



Ordering information

Description	P/N
Dionex AutoTrace 280 Automated Large Volume SPE for U.S. EPA Method 533	22136-60101
Dionex AutoTrace 280 Sample Rack	071333
Elution Rack; 16 x 100 mm	071070
1 L Solvent Bottle	04590
IC/SP Three-Year Warranty	701-086201
SolEx WAX SPE Cartridges, 6 mL, 500 mg (For U.S. EPA Method 533 only)	088115

Do you want to run other methods with your new Dionex AutoTrace 280 PFAS instrument?

Contact us for guidance.

For more information or to place an order, contact the Thermo Fisher Scientific office nearest you or your local distributor.

The value of support and service

When you purchase any Thermo Scientific instrument, module or system, you get a partner, not just a piece of equipment. We provide access to a wide range of quality post-installation programs and assistance including expert customer training, comprehensive service agreements, validation and qualification services, application support, and timely, professional service by skilled, locally based representatives. Our service representatives are distributed around the world, but close to you, ready to provide professional assistance, whether you're a new customer or a longtime partner. Your success equals our success.

Find out more at thermofisher.com/autotrace

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