Agilent
Trusted Answers

PFAS Analysis Without Compromise

Agilent sample prep solutions for environmental PFAS analysis

Meet the Challenges of a Regulated PFAS Landscape

Per- and polyfluoroalkyl substances (PFAS) have been used for decades, both in industry and for products, such as food packaging, nonstick cookware, firefighting foams, and cleaners. Some of the more than 4,000 PFAS include compounds like perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), and Gen X.

PFAS compounds contain strong carbon-fluorine bonds, which enhance their stability and cause environmental persistence and bioaccumulation. This persistence has resulted in regulatory guidance for water and soil, along with accelerated PFAS monitoring and identification.

Table 1. Current Standards and Consensus methods for PFAS analysis in the environment.

Method	Matrix Tested	No. of Analytes	Sample Preparation Procedure	Quantification Technique
EPA 533	Drinking water	25	Solid phase extraction	Isotope dilution
EPA 537	Drinking water	14	Solid phase extraction	Internal standard correction
EPA 537.1	Drinking water	18	Solid phase extraction	Internal standard correction
EPA 1633	Non-potable water, solids, tissues	40	Solid phase extraction	Isotope dilution
EPA 8327	Surface water, groundwater, wastewater influent, and effluent	24	Filtration	External calibration (isotope dilution also allowed)
ASTM D7979	Surface water, groundwater, wastewater influent, and effluent	21	Filtration	External calibration (isotope dilution also allowed)
ASTM D7968	Soil and solids	21	Filtration	External calibration
ASTM D8535-23	Soil and biosolids	44	Filtration	Isotope dilution
ASTM D8421-22	Landfill leachate, industrial wastewaters, ground water, and surface water	44	Filtration	Isotope dilution
ISO/DIS 21675:2019	Drinking water, sea water, fresh water, and wastewater (<0.2% solids)	30	Solid phase extraction	Internal standard correction

Successful PFAS analysis begins with uncompromised sample preparation

The Agilent portfolio of sample preparation solutions is comprehensive and designed to equip your lab for success across most environmental PFAS testing workflows, including drinking water, wastewater, soil, solid waste and beyond. We are committed to environmental safety excellence and our solutions provide you with confidence for each analysis.

Meet your needs for regulatory compliance and method flexibility

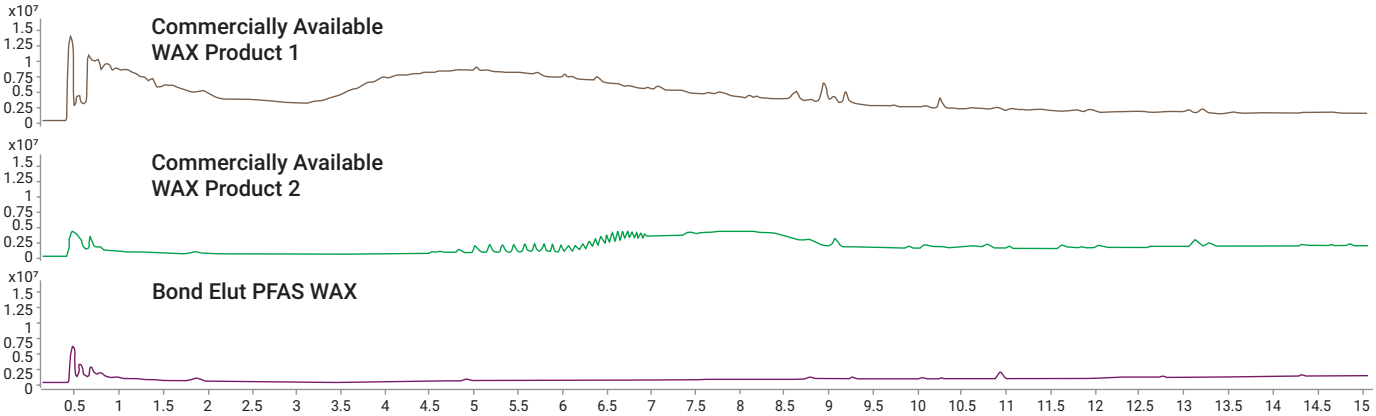
Worrying about whether your sample preparation product meets regulatory guidelines has become a thing of the past. Agilent offers cost-effective solutions that meet various regulation requirements, including EPA Method 533, EPA Method 1633, as well as directives like 2020/2184/EU. That means you can spend more time on the things that matter—like generating reliable results and increasing your lab's revenue.

Consistent quality enables consistent performance for PFAS analysis

As instruments have become more selective and sensitive, Agilent manufacturing standards have evolved as well. Our rigorous, multistep quality assurance (QA) and quality control (QC) processes minimize variability and deliver the consistency, reliability, and robustness you expect.

Agilent Bond Elut solid phase extraction (SPE) products are manufactured using state-of-the-art processes – and are subject to more than 25 tests to ensure consistent recovery, cleanliness, and flow.

Total Ion Chromatogram Cartridge Blank Comparison



Counts vs. acquisition time (min)

For more information on the data on this page, see the full application note.

Boost lab productivity with certified SPE cartridges

Why waste time verifying each product lot? Every Agilent SPE product labeled for PFAS analysis comes with a Certificate of Analysis (CoA), detailing important PFAS quality control testing results like PFAS recovery and PFAS cleanliness. We've completed the groundwork on our end, allowing you to focus on generating results and revenue for your laboratory.

Agilent Product Name: Bond Elut PFAS WAX, 150 mg, 6 mL, 30/pk
Agilent Part Number: 5610-2150
FG Lot Number: 6678914-01
Media Lot Number: 0006678914

Raw Materials

Component Properties			
Properties	Specifications	Results	Methods
Tube Purity	Proprietary	Pass	GC FID Test
Frit Purity	Proprietary	Pass	HPLC QQQ Test

Product Specifications/Analysis

Polymeric Sorbent Properties			
Properties	Specifications	Results	Methods
Average Particle Size D50(µm)	38.1-52.4	46.2	Laser Diffraction
Average Pore Diameter (Å)	50.0-250.0	157.5	Nitrogen Adsorption Isotherm
Turbidity (NTU)	≤7.0	0.5	Turbidity meter
Washable Residue (mg/g)	≤1.0	0.1	Methanol and Hexane gravimetric
Ion Exchange Capacity (meq/g)	0.40-0.82	0.63	Counter Ion Titration
Cleanliness Test	Proprietary	Pass	GC FID Test
Bed Mass Consistency	Proprietary	Pass	Weight Measurement
Flow Characteristics	Proprietary	Pass	Air Flow Test
PFAS Recovery	Proprietary	Pass	HPLC QQQ Test
PFAS Cleanliness	Proprietary	Pass	HPLC QQQ Test

Visual and Microscopic Properties

Properties	Description
Color	White to Buff
Form and Appearance	Spherical, Free Flowing Beads

SDS are available at: www.agilent.com

All of the manufacturing and testing processes used in the preparation and evaluation of this product are in accordance with an ISO 9001 regulated Quality Management System.

Agilent Technologies, Inc. Folsom, CA 95630, Tel. 800-227-9770 Ext.3, Fax 916-985-1101, www.agilent.com

Release Date: 26-Apr-2022 Manufacture Date: 26-Apr-2022 Quality Control Technician: Jared D Caldwell
Jarred Caldwell

Clean

You need to analyze PFAS in your target samples—not introduce them. Every lot of SPE cartridges for PFAS analysis is tested to meet our stringent PFAS cleanliness specifications.

Comprehensive

Our PFAS testing is in addition to the rigorous testing you expect from an Agilent SPE product, ensuring high performance and reliability across multiple applications.

Consistent

Are you performing consumable lot verifications every time you receive a new lot of product? Confidently meet your PFAS testing requirements with dedicated PFAS recovery specifications included on the Certificate of Analysis.

Bond Elut PFAS WAX/Carbon S cartridges: Compliance and cleanliness you need with the flexibility you want

The Agilent Bond Elut dual-phase PFAS WAX/Carbon S cartridges are designed specifically to meet the stringent requirements of EPA Method 1633. This portfolio of dual-phase SPE products undergoes extensive quality control testing for PFAS recovery and cleanliness to ensure minimal interferences and low detection levels for your PFAS analysis. Combining the high recovery rates of Bond Elut PFAS WAX with the superior cleanup capabilities of Bond Elut Carbon S, the dual-phase products ensure precise and reliable results in various environmental matrices including wastewater, soils/solids, and tissues.

Available in multiple layered and blended, or mixed bed, formats, our fit-for-purpose Bond Elut dual-phase portfolio allows you to choose the right product for your application, sample type, and budget.

Layered

200 mg PFAS WAX/50 mg Carbon S

- Follows EPA 1633 sorbent order for aqueous samples.
- Perfect for wastewater, surface water, groundwater, and landfill leachate.

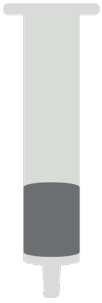
500 mg PFAS WAX/50 mg Carbon S

- Follows EPA 1633 sorbent order for aqueous samples.
- Larger PFAS WAX bed mass is great for more complex aqueous samples.
- Can be used for modified EPA 537 methods.

50 mg Carbon S/200 mg PFAS WAX

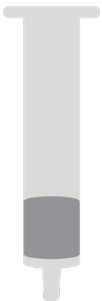
- Follows EPA 1633 sorbent order for solid samples.
- Designed for use with soil, sediment, biosolid, and fish/shellfish tissue samples.

Blended



200 mg PFAS WAX + 50 mg Carbon S

- EPA 1633 compliant.
- Cost-effective and versatile option for all 1633 matrices – aqueous, solid, and tissue.

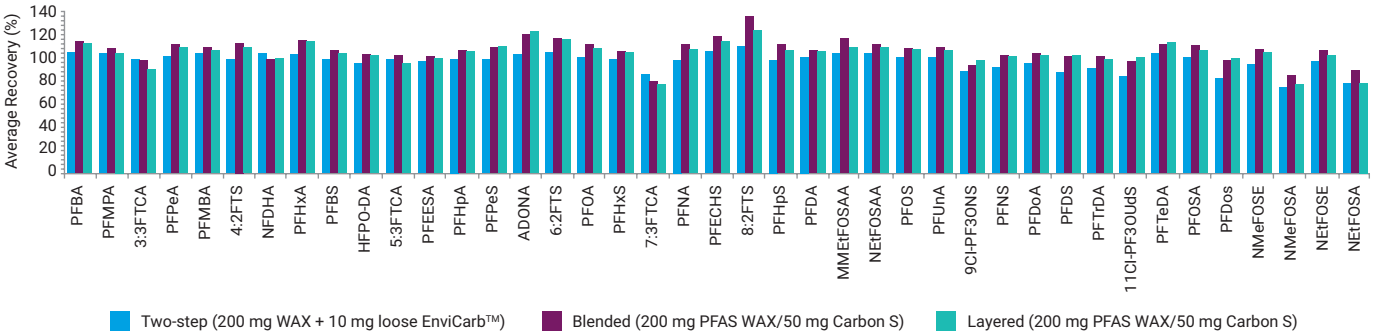


200 mg PFAS WAX + 10 mg Carbon S

- EPA 1633 compliant.
- Minimal Carbon S content is our most cost-effective option for less complex matrices.

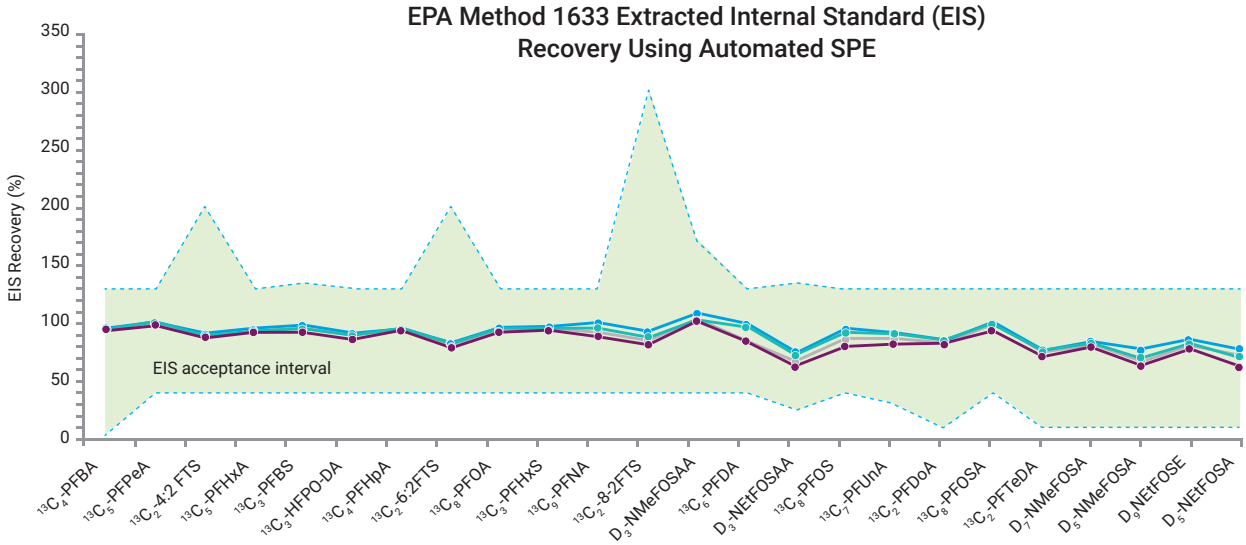
Whether you choose layered or blended PFAS WAX/Carbon S cartridges, rest assured that there are no compromises with performance.

Comparison of EPA 1633 Two-Step Sample Extraction and Clean-up with Layered and Blended Dual-Phase SPE Cartridges



With a standard 6 mL cartridge format, Bond Elut dual-phase cartridges are compatible with most sample prep automation systems.

EPA Method 1633 Extracted Internal Standard (EIS) Recovery Using Automated SPE



For more information on the data on this page, see the full application note.

Bond Elut PFAS WAX cartridges: Optimized PFAS extraction solutions are the key to your PFAS analysis success

The Agilent Bond Elut PFAS WAX SPE cartridges help minimize contamination, reduce cost per sample, and eliminate guesswork with its WAX sorbent designed specifically for PFAS extraction and cleanliness. The cartridges, compliant with EPA Method 533 and ISO 21675:2019, are perfect for extracting a broad range of PFAS compounds from various environmental matrices, including drinking water, wastewater, soil, sediment, and tissues. The portfolio offers flexibility with various bed masses available to meet your laboratory's application needs.

Ensure compliance with EPA methods for PFAS analysis

EPA Method 533 and EPA draft Method 1633 (August 2021) call for extraction of PFAS from environmental samples with a WAX product. Here's how Bond Elut PFAS WAX SPE cartridges measure up.

Agilent Bond Elut PFAS WAX Offers
✓ Polymeric polystyrene divinylbenzene (PSDVB) sorbent
✓ WAX chemistry—diamino functionality
✓ pKa > 8
✓ Multiple bed mass options: 500 mg, 200 mg, 150 mg

Many of these features are called out explicitly in regulated methods. You can have confidence knowing this product was specifically designed for regulatory compliance.

500 mg, 6 mL

- EPA 533 compliant.
- Perfect for larger sample volumes that need increased concentration to meet sensitivity needs.

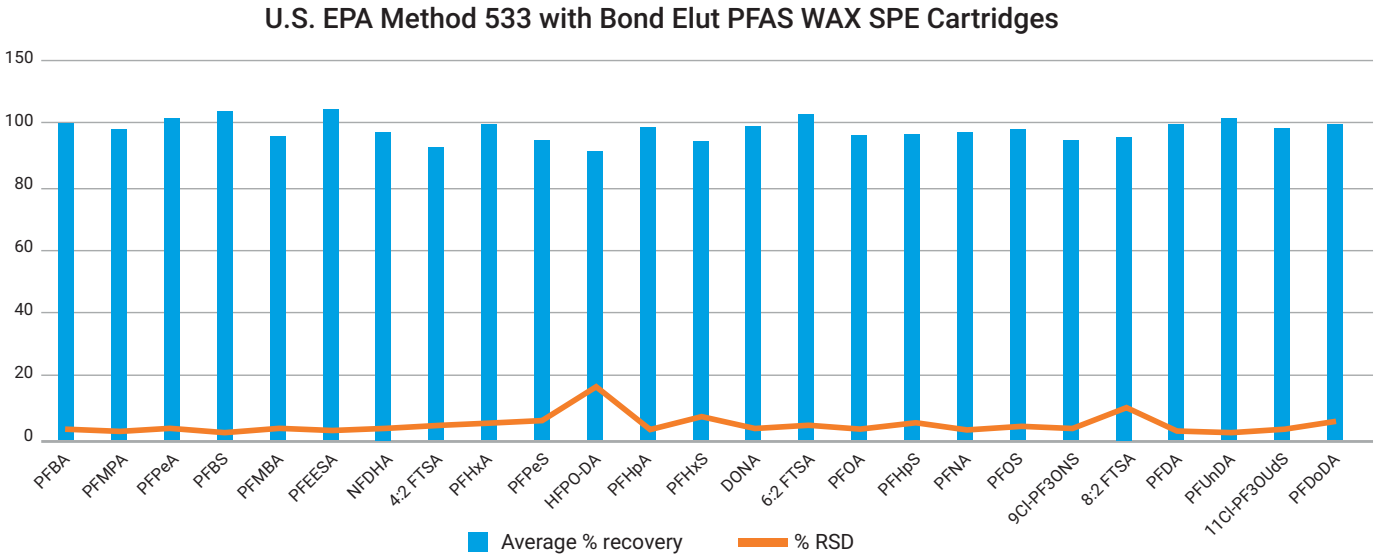
200 mg, 6 mL

- EPA 533 compliant.
- Great for EPA 533 labs that are looking for method compliance with the smallest possible sample volume.

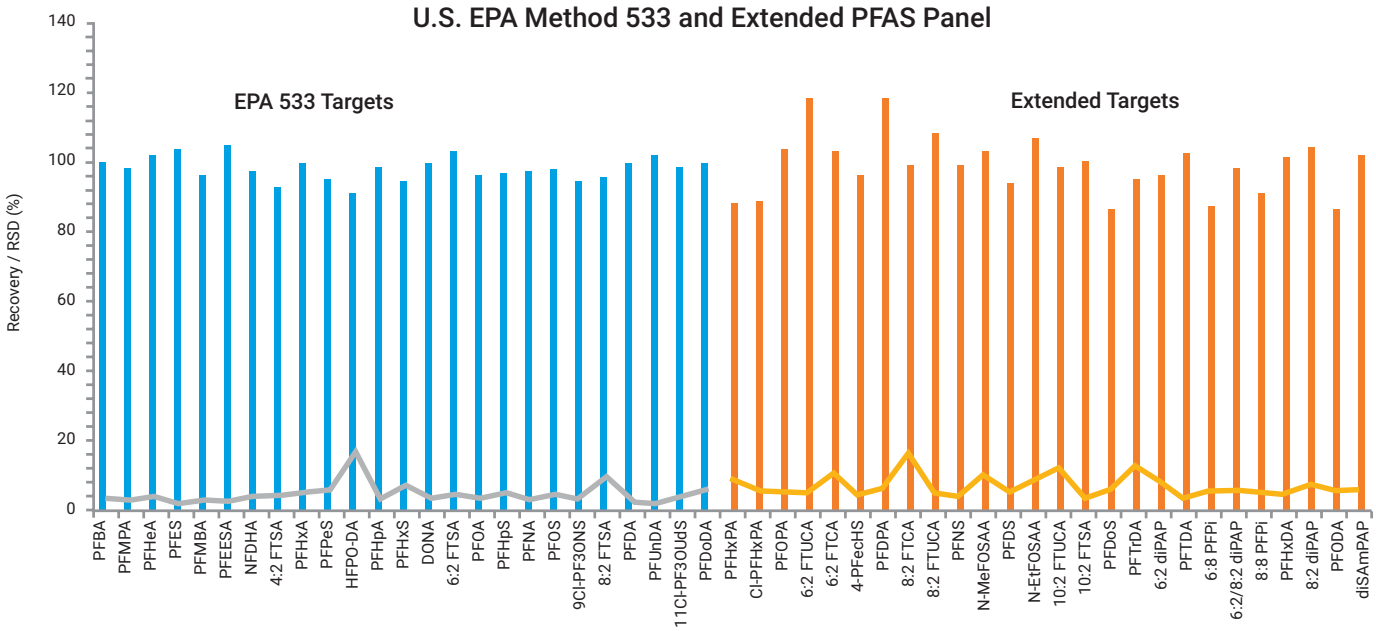
150 mg, 6 mL

- EPA Method 1633 compliant.
- Suitable for ISO 21675:2019 methods.
- Cost-effective option for non-regulated or modified PFAS methods that have flexibility in bed mass choice.

A cost-effective solution doesn't mean you have to settle on performance. Bond Elut PFAS WAX SPE cartridges produce reliable results, analyst to analyst and batch to batch. Generate data you can count on, whether you're analyzing a few samples per week or hundreds per day.



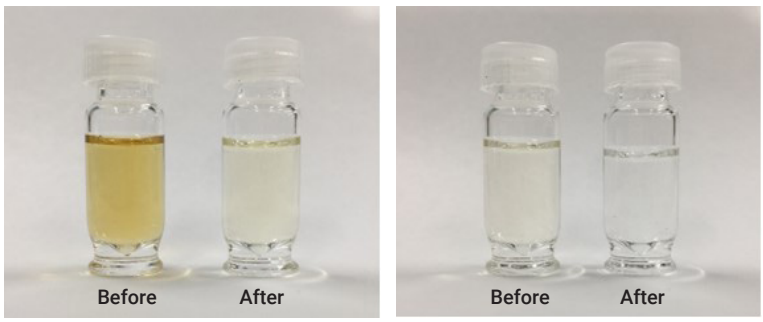
Bond Elut PFAS WAX SPE cartridges can be used for the extraction of a wide range of compound classes exceeding many regulated compounds lists. The SPE cartridge can be used to extract both short and long chain PFAS including carboxylic and sulfonic acids, sulfonamindes, fluorotelomer sulfonates and carboxylic acid (saturated and unsaturated), polyfluoroalkyl ether carboxylic acids, chorinated polyfluoroalkyl ether sulfonic acids, fluorotelomer phosphate diesters, perfluoroalkyl phosphinates, and sulfonamido ethanols (not shown).



Bond Elut Carbon S for PFAS cartridges: Superior cleanup for reliable results

Bond Elut Carbon S for PFAS cartridges are designed for efficient passthrough matrix cleanup, ensuring high recovery rates and reproducibility for PFAS analysis in various environmental samples. The advanced Agilent Carbon S sorbent offers superior cleanup compared to graphitized carbon black (GCB), making these cartridges ideal for PFAS testing laboratories.

- Ideal for use in non-regulated PFAS testing of soil samples.
- Efficient matrix clean-up and pigment removal while maintaining high PFAS recovery.
- Engineered to provide high recovery rates and reproducibility for a wide range of PFAS compounds.
- Rigorously tested for PFAS cleanliness to ensure minimal background interference, ensuring accurate and reliable results.
- Improved chromatographic peak shape and retention time consistency by reducing matrix interference.



Qualitative pigment removal comparison before and after Carbon S passthrough cleanup for peat (left) and topsoil (right)

For more information on the data on this page, see the full application note.

Bond Elut LMS cartridges: Precision and speed for PFAS analysis using EPA Method 537.1

Bond Elut LMS cartridges are directly called out in EPA Method 537.1, ensuring regulatory compliance for PFAS analysis. Featuring ultraclean styrene-divinylbenzene polymer an optimized 75 µm particle size, these cartridges enable reproducible flow and fast extraction speeds, making them ideal for high-throughput laboratories.

- Styrene-divinylbenzene polymer minimizes contamination, providing ultraclean extracts.
- 75 µm particle size ensures reproducible flow rates and fast extraction speeds, enhancing laboratory efficiency.
- Engineered for high recovery and reproducibility of PFAS compounds across various matrices.
- Consistent and reliable results, reducing the need for reanalysis and improving overall productivity.

Environmental PFAS Start-Up Kits

Agilent PFAS Start-Up Kits are essential for laboratories seeking to comply with stringent PFAS testing methods. These comprehensive kits provide all necessary components for sample preparation and analysis, including Bond Elut SPE cartridges that are specifically designed to meet regulatory requirements. The kits include PFAS-specific sample prep products and advanced columns, simplifying the workflow process and ensuring your laboratory can achieve compliance with confidence. Additionally, the kits help minimize the risk of contamination with vials and caps optimized for PFAS analysis, a critical factor given the persistent nature of PFAS in the environment. These kits include everything you need to get started.

Below are examples of kits designed for specific testing methods offered by Agilent. To see the complete offering, visit our website.

EPA 533

EPA 537

EPA 1633 Aqueous

EPA 1633 Soil, Biosolids

Performing PFAS testing in food?

In addition to environmental PFAS Start-up kits, Agilent also offers kits for PFAS testing in food analysis workflows. To learn more, visit our website.

Optimize your PFAS workflow for analytical success

InfinityLab PFAS Analysis HPLC conversion kit

This convenient kit includes everything you need to ensure that your 1290 Infinity III LC systems, including the 1290 Infinity III high-speed pumps, are free of PFAS contaminants:

- Tubing
- Inline filter
- Bottle head assembly
- Delay column with InfinityLab Quick Connect LC fitting

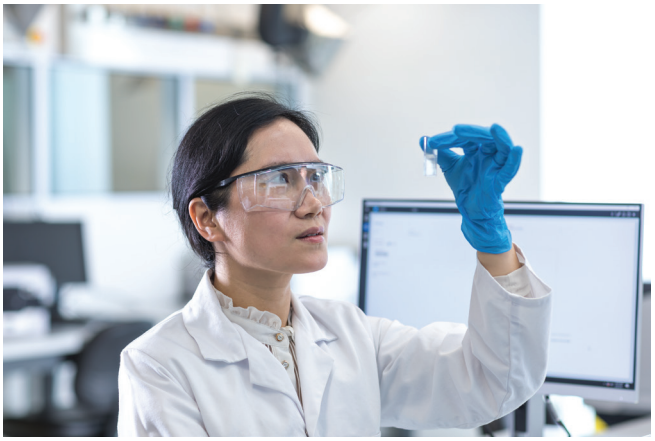
Learn more.

Complete PFAS workflow solutions

Let Agilent be your partner for extracting, quantifying, and reporting PFAS in the environment. Our workflow solutions include ultrahigh performance liquid chromatography (UHPLC) systems coupled to triple quadrupole mass spectrometry. You can also choose from our portfolio of sample preparation products, HPLC columns, sample containment, and other HPLC supplies.

Find easy selection and ordering information.

Specialized sample preparation for additional PFAS applications



Agilent Captiva EMR—Lipid

With Captiva EMR—Lipid, you can easily remove interferences, particularly phospholipids, in minutes without PFAS loss. Its pass-through format is fast, repeatable, and delivers a clean extract with minimal ion suppression, extending column life, and reducing the frequency of MS cleaning.

Take a closer look

Captiva EMR PFAS Food

Experience the efficiency of Captiva EMR PFAS Food cartridges, designed to efficiently remove matrix interferences from food samples, ensuring accurate PFAS analysis. Enhance your laboratory's productivity and reliability with these advanced cartridges, tailored for superior sample preparation of complex food matrices.

Learn more

Interference-minimizing supplies for EPA and ASTM methods

Reliable consumables are critical to the success of sample preparation workflows for analyzing PFAS as outlined in EPA 8327, ASTM D7968-17a, and ASTM D7979-19. Agilent centrifuge tubes, Captiva disposable syringes, and Captiva regenerated cellulose syringe filters are free from interferences and losses that can be problematic for PFAS analysis.

Take a closer look

Bond Elut dual-phase PFAS WAX/Carbon S

Description	Part Number
Bond Elut layered PFAS WAX (top)/Carbon S, 200/50 mg, 6 mL, 30 pk	5610-2237
Bond Elut layered PFAS WAX (top)/Carbon S, 200/50 mg, 6 mL, 250 pk	5610-2238
Bond Elut layered PFAS WAX (top)/Carbon S, 500/50 mg, 6 mL, 30 pk	5610-2239
Bond Elut layered PFAS WAX (top)/Carbon S, 500/50 mg, 6 mL, 250 pk	5610-2240
Bond Elut layered Carbon S (top)/PFAS WAX, 50/200 mg, 6 mL, 30 pk	5610-2241
Bond Elut layered Carbon S (top)/PFAS WAX, 50/200 mg, 6 mL, 250 pk	5610-2242
Bond Elut blended PFAS WAX/Carbon S, 200/10 mg, 6 mL, 30 pk	5610-2243
Bond Elut blended PFAS WAX/Carbon S, 200/10 mg, 6 mL, 250 pk	5610-2244
Bond Elut blended PFAS WAX/Carbon S, 200/50 mg, 6 mL, 30 pk	5610-2245
Bond Elut blended PFAS WAX/Carbon S, 200/50 mg, 6 mL, 250 pk	5610-2246

Bond Elut PFAS WAX

Description	Part Number
Bond Elut PFAS WAX, 150 mg, 6 mL, 30/pk	5610-2150
Bond Elut PFAS WAX, 200 mg, 6 mL, 30/pk	5610-2151
Bond Elut PFAS WAX, 500 mg, 6 mL, 30/pk	5610-2152

Bond Elut Carbon S for PFAS

Description	Part Number
Bond Elut Carbon S for PFAS 250 mg, 6 mL, 30/pk	5610-2247
Bond Elut Carbon S for PFAS 250 mg, 6 mL, 250/pk	5610-2248

Bond Elut LMS (Large Molecule Size)

Description	Part Number
Bond Elut LMS Cartridge, 500 mg, 6 mL, 30/pk	12255021

To learn more about Agilent's sample prep solutions for PFAS analysis visit

www.agilent.com/sample-prep/environmental-pfas-analysis

Learn more about Start-to-Finish Workflows for PFAS Analysis.

PFAS Testing in Water:
www.agilent.com/chem/pfas-testing-in-water

PFAS Testing in Soil:
www.agilent.com/chem/pfas-testing-in-soil

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