Agilent

Trusted Answers

Simplifying Sample Preparation for PFAS in Food and Feed Analysis

Agilent Captiva EMR PFAS Food I and II cartridges

CPS analitica | Calibre SCIENTIFIC

Untangling the Complexity of Food Analysis

Per- and polyfluoroalkyl substances (PFAS) comprise a group of over 5,000 synthetic organofluorine chemicals, first developed in the 1940s. The molecules of PFAS are characterized by robust carbon-fluorine bonds, rendering them resistant to environmental degradation. Consequently, these chemicals are pervasive, persistent, and bioaccumulative in both terrestrial and aquatic food sources. PFAS can infiltrate the food supply via contaminated water, food packaging, and food processing equipment. Contaminated food is deemed one of the primary routes of exposure. Recently, certain regulatory agencies have set limits, and standard method organizations are formulating methods to determine the level of PFAS in food.

Regulation, Method, or Recommendation	PFAS analytes	Food matrix
EU 2023/915*	4	egg, seafood, fish meat, meat, edible offal
AOAC SMPR 2023.003	30	egg, seafood, fish meat, meat, edible offal, produce, food for infants and young children, fish oil, milk, feed, dairy and plant-based protein powders, coffee
FDA Method C-010.03	30	egg, lettuce, chocolate milk, salmon, bread, clam, blueberry, feed
EU 2022/1431	4 + 24	egg, seafood, fish meat, meat, edible offal, produce, food for infants and young children, fish oil, milk
EURL POPS	4	egg, seafood, fish meat, meat, edible offal, produce, food for infants and young children, fish oil, milk, feed
USDA CLG-PFAS 2.04	16	bovine, porcine, poultry, Siluriformes muscle, bovine plasma
China GB5009.253	2	animal-derived food
US Maine	1	milk, beef, fish tissue

* Enforced regulation

Uncompromising accuracy for challenging food analysis methods can be achieved with Agilent PFAS solutions

Discover the cornerstone to successful PFAS analysis: Optimized sample preparation

Introducing Agilent Captiva EMR PFAS Food I and II cartridges for PFAS analysis in food and animal feed. This full portfolio of cartridges offers:

- Agilent's legacy of award-winning Enhanced Matrix Removal (EMR) innovation
- Sorbents specifically designed for optimized PFAS extraction from food and animal feed matrices
- Factory testing for PFAS recovery, matrix removal, and product cleanliness included on every Certificate of Analysis (CoA)
- Elimination of manual, cumbersome, and time-consuming cleanup steps like QuEChERS dispersive solid phase extraction (dSPE) and solid phase extraction (SPE)
- Automation-friendly cartridge format for enhanced efficiency
- Validated protocols enabling ultra low-level (part per trillion) PFAS quantitation to meet limit of quantitation (LOQ) requirements
- Seamless integration into Agilent PFAS solutions

Enhanced efficiency for confident, reliable results

As interest in PFAS food testing grows, it becomes crucial to have sample preparation products specifically designed to tackle the challenges of PFAS analysis in food. Captiva EMR PFAS Food I and II cartridges are designed to facilitate easy and efficient matrix removal, while ensuring robust PFAS recoveries to meet the requirements of low-level reporting for different food matrices. This allows you to focus less on sample preparation and more on what truly matters — achieving uncompromised results and improving lab productivity.

Break free from difficult to manage inventory requirements

With Captiva EMR PFAS Food cartridges, product selection and inventory management challenges are a thing of the past. They eliminate the need to stock various products for different PFAS food methods. Our two cartridge types offer versatility across a spectrum of food matrices, simplifying purchasing decisions and freeing you from cumbersome inventory requirements.

Easy selection guide

Captiva EMR PFAS Food I	Captiva EMR PFAS Food II
340 mg, 6 mL (PN: **5610-2230**) 680 mg, 6 mL (PN: **5610-2231**)*	750 mg, 6 mL (PN: **5610-2232**)
Perfect choice for: • Fruits • Vegetables • Baby food • Beverages • Juices	**Perfect choice for:** • Milk • Egg • Infant formula • Meat • Fish and seafood • Animal feed • Edible offal • Edible oils

* Recommended for methods that require a large sample volume to achieve higher post-concentration (>10x)

Unlock superior accuracy with our simplified methodology

Discover our latest innovation in sample preparation with Captiva EMR PFAS Food cartridges.

Method using Captiva EMR PFAS Food

QuEChERS extraction

↓

Captiva EMR PFAS Food cartridge cleanup

↓

Collect clean extract

Method using QuEChERS dSPE and SPE

QuEChERS extraction

↓

QuEChERS dSPE cleanup

↓

Large volume dilution or solvent exchange

↓

Solid-phase extraction (SPE)

↓

Collect clean extract

Fewer Steps. Lower Risk. Superior Results.

PFAS compounds are everywhere! Every step of your analysis increases the risk for PFAS contamination. Fewer steps means less risk of contamination and more confidence in your results.

More effective than traditional dSPE

QuEChERS dSPE alone often struggles with optimal matrix removal which affects recoveries, data accuracy, and instrument performance. Captiva EMR PFAS Food cartridges address these concerns, setting a new standard in sample preparation.

Unlike traditional QuEChERS dSPE, Captiva EMR PFAS Food cartridges offer exceptional selectivity and efficiency in matrix removal for a variety of plant and animal-origin matrices. This improved matrix removal enhances PFAS recoveries, easily meeting low-level part per trillion (ppt) LOQ requirements and eliminating the need for solid phase extraction in PFAS food protocols — resulting in improved data quality and significant time and cost savings.

Captiva EMR PFAS Food vs traditional dSPE cleanup

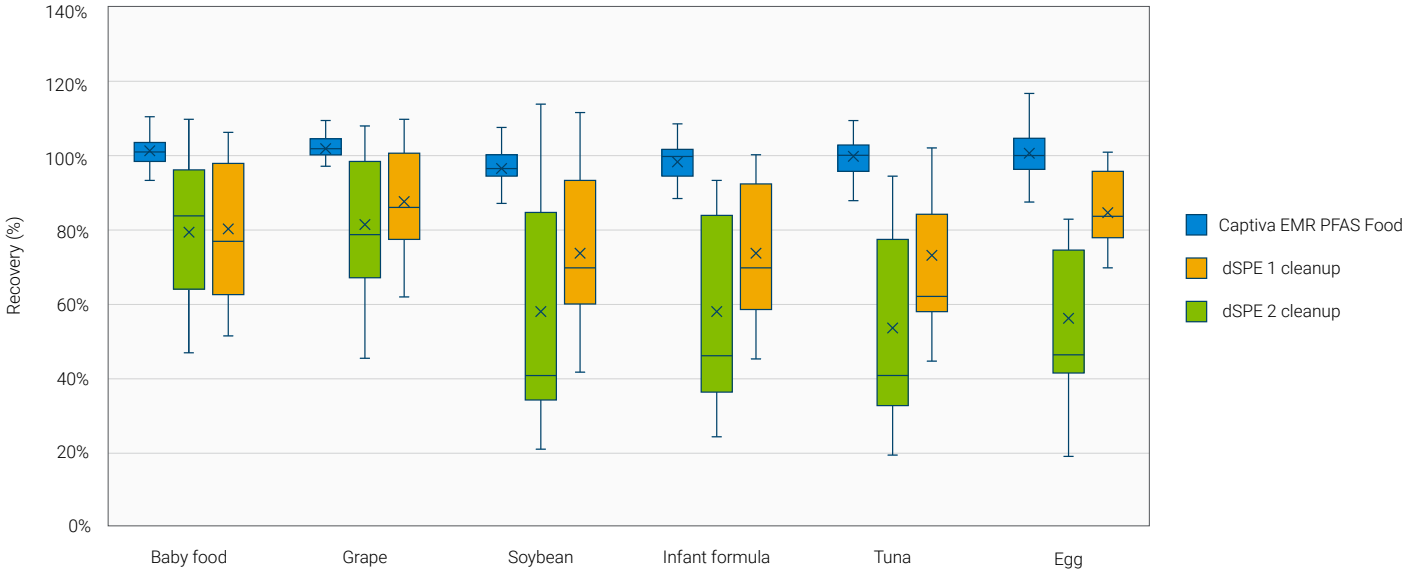

Figure 1. Recovery comparison of 30 AOAC PFAS targets (20 ppt in matrix, n=3) using Captiva EMR PFAS Food passthrough cleanup compared to two different dSPE cleanup methods for plant and animal-origin food matrices.

Sample extract cleanliness comparison for infant formula

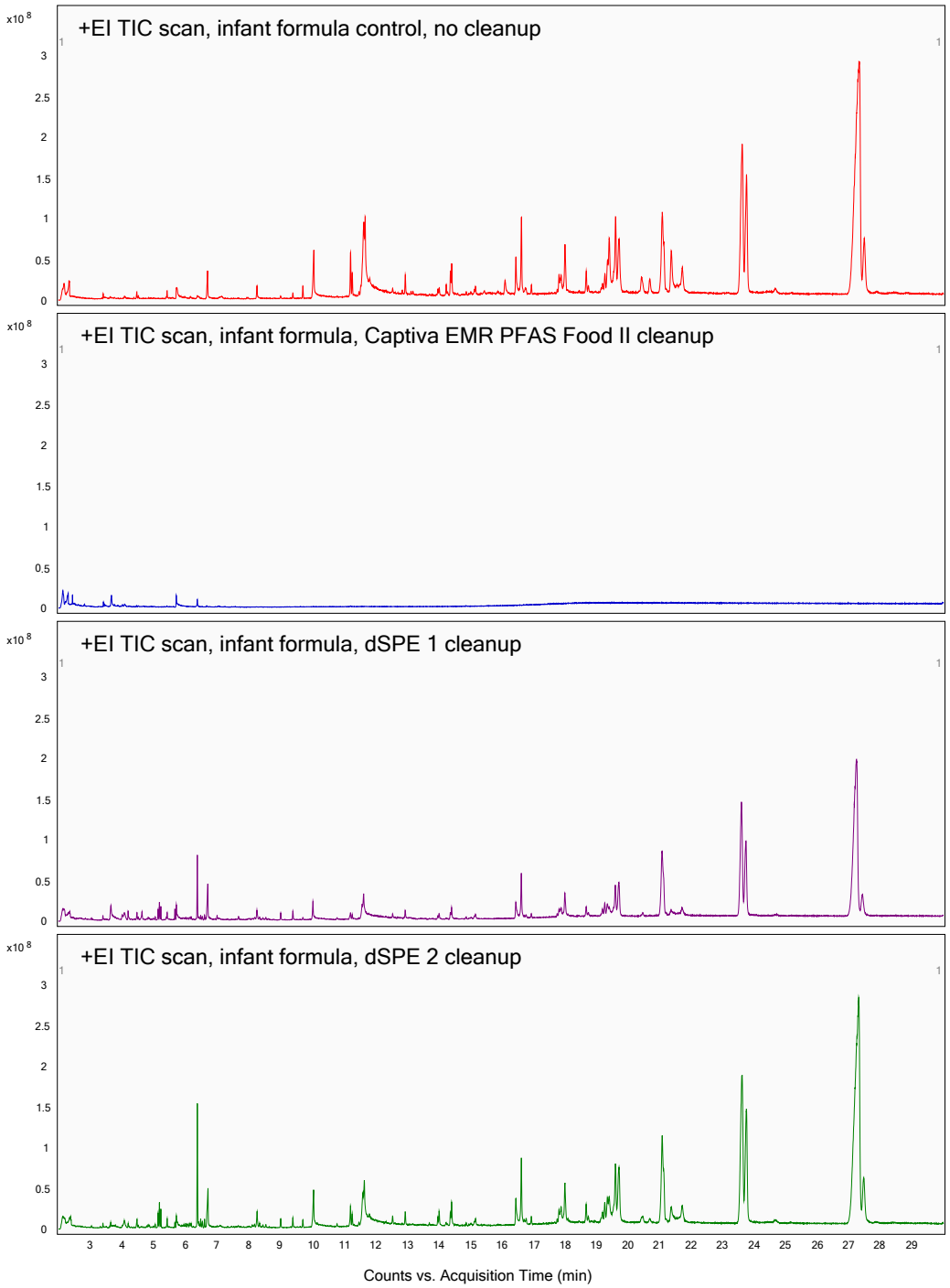

Figure 2. Final sample extract cleanliness comparison between Captiva EMR PFAS Food passthrough cleanup vs. traditional dSPE cleanup using GC/MS. GC/MS, rather than LC/MS/MS, is used to demonstrate extract cleanliness comparisons due to its low system background.

Validated methods for quantitative determination of 30 PFAS in 13 common foods

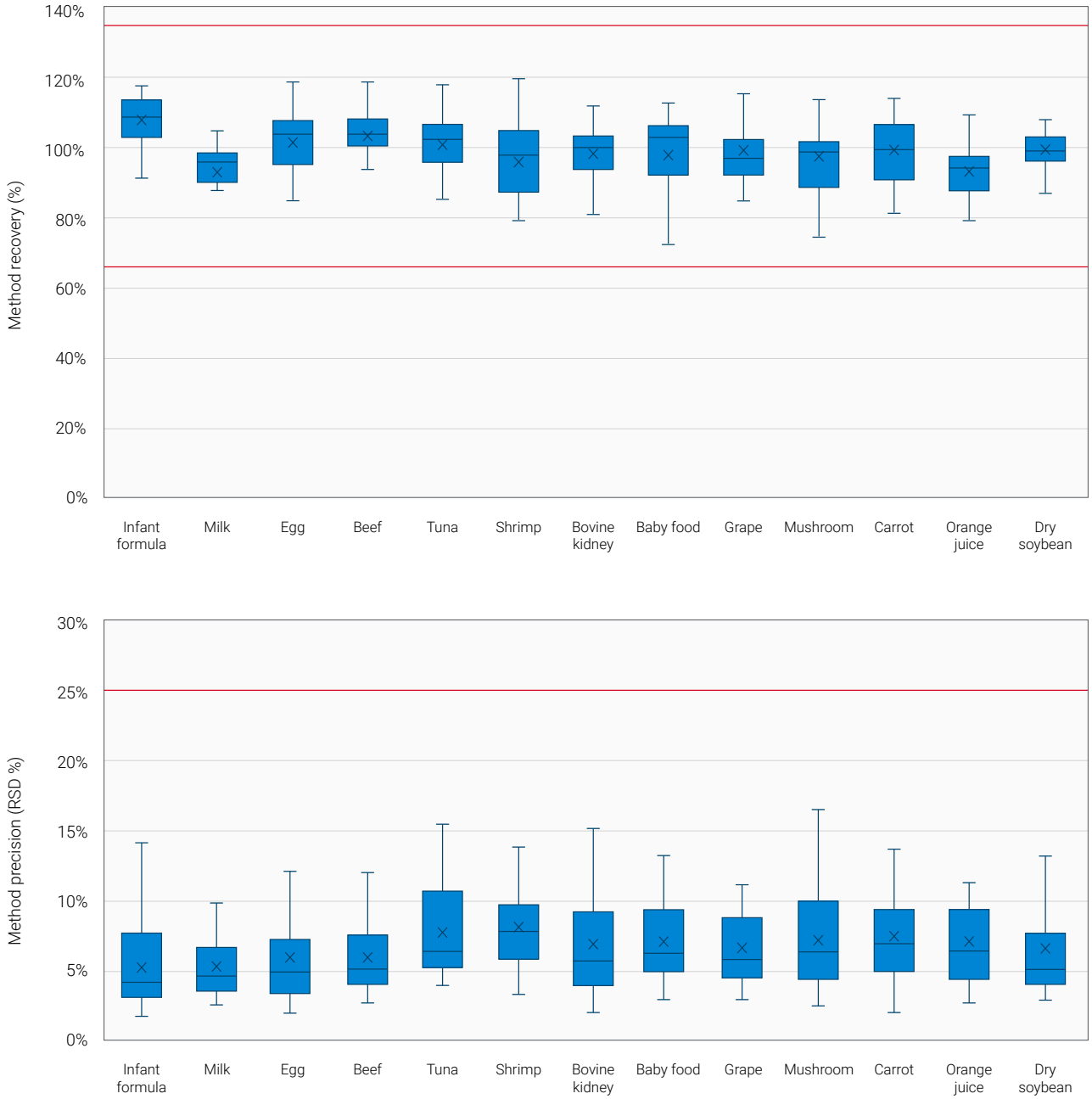

Figure 3. Validated method recoveries (top) and validated method precision (bottom) for 30 PFAS targets at three spiking levels in plant and animal-origin food matrices according to AOAC Standard Method Performance Requirements (SMPR) 2023.003 using QuEChERS extraction followed by Captiva EMR PFAS Food passthrough cleanup.

Meeting AOAC SMPR 2023.003 Standards for food testing

Our fully validated methods meet or exceed the AOAC SMPR 2023.003 LOQ requirements for the majority of food matrix categories.

AOAC SMPR 2023.003 LOQ requirements

Matrix category	Representative food for method validation	Required LOQ (µg/kg) by AOAC SMPR 2023.003		
		PFHxS, PFOA, PFNA, and PFOS	PFBA and PFPeA	Other PFAS
Produce	Grape, carrot, mushroom	≤ 0.01	≤ 1	≤ 0.1
Food for infants and young children	Baby food	≤ 0.01	≤ 1	≤ 0.1
Beverage	Orange juice	≤ 0.01	≤ 1	≤ 0.1
Feed	Dry soybean	≤ 0.5	≤ 5	≤ 5
Dairy powders and plant-based protein powders	Infant formula**	≤ 0.01	≤ 1	≤ 0.1
Eggs*	Egg	≤ 0.3	≤ 3	≤ 3
Milk	Whole milk	≤ 0.01	≤ 1	≤ 0.1
Seafood* (crustaceans and mollusks)	Shrimp	≤ 0.3	≤ 3	≤ 3
Fish and meat of terrestrial animals*	Tuna, beef	≤ 0.1	≤ 1	≤ 1
Edible offal of terrestrial animals*	Bovine kidney	≤ 0.4	≤ 4	≤ 4

* Matrix categories from EU-regulated matrixes, which are required food matrixes by AOAC SMPR 2023.003.

** Infant formula is also considered "Food for infants and young children," therefore, the LOQ requirement was regulated under the category of "Food for infants and young children."

See our method in action

Experience Captiva EMR PFAS Food in practice by exploring application notes **5994-7366EN** and **5994-7367EN**, demonstrating how our simplified method successfully meets the LOQs established by AOAC SMPR 2023.003.

Consistent quality enables consistent performance for PFAS in food 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.

Why waste time verifying each product lot? Every box of Captiva EMR PFAS Food cartridges comes with a Certificate of Analysis (CoA), detailing matrix removal, PFAS recovery, and PFAS cleanliness testing results. We've completed the groundwork on our end, allowing you to focus more on generating results and revenue for your laboratory.

Agilent Product Name: Captiva EMR PFAS Food II, 6mL, 750mg, 30/pk
Agilent Part No.: 5610-2232
FG Lot No.: 6794012-01
Media Lot No.: 0006794012

Raw Materials Component Properties

Test	Method	Result
Tube Purity	GC-FID	Pass
Frit PFAS Cleanliness	LC-QQQ	Pass

Product Specifications/ Analysis

Test	Test description	Method	Result
PFAS Recovery	Recovery of a representative panel of PFAS compounds in food matrix using passthrough cleanup.	LC-QQQ	Pass
Matrix Removal	Matrix removal in representative food sample.	GC-FID	Pass
PFAS Cleanliness	Cartridge cleanliness for targeted PFAS background.	LC-QQQ	Pass
Flow Characteristics	Proprietary	Air Flow	Pass

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

Manufacturing Statement:
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.

Date of Manufacture: 01 Jun 2024

Date of Release: 01 Jun 2024

Sample Lot Approver
Christopher Ferlin
Quality Test

Clean

You need to analyze PFAS in your target samples—*not introduce them*. Every lot of Captiva EMR PFAS Food cartridges is tested to meet our rigorous PFAS cleanliness specifications.

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.

Reliable

Selective and efficient matrix removal improves data quality and reduces data processing time. Plus, it safeguards your system from contaminants and column clogging, leading to increased instrument uptime.

Explore our range of PFAS analysis consumables and supplies

Agilent Bond Elut QuEChERS Extraction Kits

A perfect compliment to Captiva EMR PFAS Food cartridges, Agilent Bond Elut QuEChERS Extraction Kits offer pre-weighed salts that can be purchased as salt packets only, salt packets with 50 mL extraction tubes and caps, or salt packets with 50 mL extraction tubes, caps, and ceramic homogenizers. Ceramic homogenizers break up matrix and salt agglomerates for higher extraction recoveries or target analytes and are an essential part of effective sample preparation. Kit options are available for AOAC 2007.01, EN 15662, and unbuffered salt methods.

Take a closer look

Agilent PFC-free vials and caps for LC/MS

It's easy to think of vials as simple, inexpensive components that don't affect your results. However, substandard vials, caps, and septa can lead to sample loss, contamination, and damaged autosampler needles. Agilent PFC-free vials and caps limit extractables that can leach during PFAS analyses. Choose from resealable polypropylene caps with polypropylene/silicone bi-layer septa and vials manufactured from high purity polypropylene resin.

Take a closer look

Agilent ZORBAX RRHD Eclipse Plus C18 columns

The ZORBAX column family is one of the most popular high-performance liquid chromatography (HPLC) column families for reversed-phase HPLC. ZORBAX columns are based on traditional fully porous particles and offer increased retention, loadability, and resistance to sample solvents. ZORBAX Rapid Resolution High Definition (RRHD) columns are packed with 1.8 µm particles and stable up to 1200 bar for fast, high-resolution separations of your most complex PFAS samples.

Take a closer look

Advanced sample preparation tailored for expanded PFAS applications

Agilent Bond Elut PFAS WAX SPE

The award-winning Bond Elut PFAS WAX SPE cartridges provide excellent extraction performance and flow rates for PFAS compounds. Confidently isolate PFAS from environmental matrices such as drinking water, wastewater, soils, sludges, and tissues. Bond Elut PFAS WAX cartridges were specifically designed for PFAS analysis and are compliant for EPA Method 533, EPA Method 1633, and ISO 21675.

Take a closer look

Agilent Bond Elut LMS SPE

Bond Elut LMS (large molecule size) polymeric sorbent has an optimized 75 um particle enabling reproducible flow and fast extraction speeds. Together with the Agilent Ultivo LC/TQ, it offers a robust, start-to-finish workflow for achieving EPA Method 537.1 detection limits.

Take a closer look

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

Optimize your PFAS workflow for analytical success

InfinityLab PFC-free HPLC conversion kit

The **InfinityLab PFC-free HPLC conversion kit*** includes everything you need to ensure that your 1290 Infinity II LC systems, including the 1290 Infinity II high-speed pumps, are free of PFAS contaminants:

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

** Although the kit is customer installable, Agilent offers supplemental installation by a service professional. To add this service to your order, ask for part number H5949A.*

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, PFC-free sample containment, and other HPLC supplies.

Find easy selection and ordering information

Agilent eMethods

Set up your method faster and future-proof your lab. Agilent eMethods accelerate your startup time by condensing vast amounts of technical information and optimized analytical methods into a ready-to-run, downloadable, digital information package.

Our **eMethod for PFAS analysis** lets you separate and detect 108 native and isotopically labeled PFAS compounds in drinking and surface water. It includes information on instrument configuration, consumables, and sample preparation protocols, plus analytical methods for sample introduction, chromatographic separation, detection, and data analysis.

Ordering information

Description	Part Number
Captiva EMR PFAS Food I, 6 mL, 340 mg, 30/pk	5610-2230
Captiva EMR PFAS Food I, 6 mL, 680 mg, 30/pk	5610-2231
Captiva EMR PFAS Food II, 6 mL, 750 mg, 30/pk	5610-2232

Learn more about Captiva EMR PFAS Food cartridges:
www.agilent.com/chem/captiva-emr-pfas-food

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

PFAS Testing in Food, Beverages, and Food Packaging
www.agilent.com/chem/pfas-testing-in-food

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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