Fast and Optimal Extraction of PFAS Compounds Using Strata™-XL-AW

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Overview

EPA 533 recommends SPE cartridges containing weak anion exchange, mixed-mode polymeric sorbent (polymeric backbone and a diamino ligand), with a particle size of approximately 33 µm. The Solid Phase Extraction (SPE) sorbent must have a pKa above 8 for optimal extraction. In this application note we compared the recovery of PFAS compounds using a Strata-XL-AW SPE cartridge, a similar functionality but with 100 µm particle size, pore size of 300 Å, and a 500 mg/6 mL format. The EPA 533 method flexibility allows alternative SPE phases to be used. Six sets of extractions were performed on drinking water using a Strata X-AW and a Strata XL-AW SPE cartridge. The extractions performed using the Strata-XL-AW met EPA recovery requirements, while providing the advantage of faster sample loading. This reduces the sample loading time by half for clean samples (like drinking water) compared to traditional extraction methods using smaller pore and particle sizes, while maintaining % recovery, as presented in **Table 1**.

LC Conditions

Column: Gemini™ 3 µm C18
Dimensions: 50 x 2.0 mm
Part No.: 00B-4439-B0
Mobile Phase: A: 20 mM Ammonium Acetate
B: Methanol

Gradient:

Time (min)	%B
0	5
0.5	5
3	40
16	80
18	80
20	95
22	95
25	5
35	5

Flow Rate: 0.25 mL/min
Injection Volume: 2 µL
Detection: ESI-MS/MS

Sample Preparation

Step	Description
Sample Pre-treatment:	250 mL sample is fortified with isotopically labeled analogues of the method analytes.
Load:	250 mL pre-treated sample through a Strata-XL-AW 500 mg/6 mL (8B-S051-HCH) cartridge or through a Strata-X-AW 500 mg/6 mL (8B-S038-HCH) cartridge.
Wash:	Cartridges with aqueous Ammonium Acetate, followed by Methanol.
Elute:	Sample with Ammonium Hydroxide in Methanol.
Dry Down:	Under a gentle stream of Nitrogen in a heated water bath.
Reconstitute:	Sample to a final volume to 1 mL with 20 % Water in Methanol (v/v) before analyzing by LC-MS/MS.

"The Strata-XL-AW tubes result in a significant time savings during the sample loading step. The Strata-XL-AW tubes take about half the time to load clean samples, and about 20 % of the time required for dirty samples. This reduces the impact of the SPE bottleneck, allowing us to process more samples per shift."

- Agustin Pierri, PhD, Technical Director, Weck Laboratories

Table 1. Comparison of % Recovery of PFAS Compounds Using Strata™-XL-AW versus Strata-X-AW SPE Cartridges.

	Strata XL-AW		
Target Analyte	Avg % Recovery (n=6)	STD	%RSD
$^{13}C_4$-PFBA	89.23	2.47	3%
PFBA	97.45	3.12	3%
PFMPA	101.54	3.07	3%
$^{13}C_5$-PFPeA	90.55	2.88	3%
PFPeA	104.59	3.97	4%
$^{13}C_3$-PFBS	88.56	2.48	3%
PFBS	103.54	2.87	3%
PFMBA	104.9	4.68	4%
PFEESA	104.71	4.06	4%
NFDHA	108.74	7.44	7%
$^{13}C_2$-4:2 FTS	83.73	3.79	5%
4:2 FTS	92.23	3.41	4%
$^{13}C_5$-PFHxA	90.99	3.43	4%
PFHxA	96.42	4.63	5%
PFPeS	101.69	4.70	5%
$^{13}C_3$-HFPO-DA	89.75	4.07	5%
HFPO-DA	106.86	4.11	4%
$^{13}C_4$-PFHpA	90.66	4.29	5%
PFHpA	99.51	3.76	4%
$^{13}C_3$-PFHxS	91.27	3.82	4%
PFHxS	103.11	4.96	5%
ADONA	102	3.31	3%
$^{13}C_2$-6:2 FTS	86.01	5.28	6%
6:2 FTS	93.71	4.85	5%
$^{13}C_8$-PFOA	91.4	4.12	5%
PFOA	102.97	3.67	4%
PFHpS	105.16	4.49	4%
$^{13}C_9$-PFNA	89.91	4.04	4%
PFNA	102.76	1.98	2%
$^{13}C_8$-PFOS	88.85	4.72	5%
PFOS	105.93	4.61	4%
9Cl-PF3OUdS	99.65	2.93	3%
$^{13}C_2$-8:2 FTS	85.24	4.22	5%
8:2 FTS	100.36	3.75	4%
$^{13}C_6$-PFDA	89.83	5.43	6%
PFDA	100.45	4.10	4%
$^{13}C_7$-PFUnA	87.57	4.32	5%
PFUnA	100.51	2.95	3%
11Cl-PF3OUdS	103.01	2.32	2%
$^{13}C_2$-PFDoA	83.61	4.49	5%
PFDoA	103.67	4.07	4%

	Strata-X-AW		
Target Analyte	Avg % Recovery (n=6)	STD	%RSD
$^{13}C_4$-PFBA	91.28	3.37	4%
PFBA	97.2	4.13	4%
PFMPA	100.62	3.40	3%
$^{13}C_5$-PFPeA	92.54	3.15	3%
PFPeA	101.93	4.51	4%
$^{13}C_3$-PFBS	87.13	2.03	2%
PFBS	104.89	3.93	4%
PFMBA	104.09	4.66	4%
PFEESA	104.92	3.91	4%
NFDHA	112.38	7.87	7%
$^{13}C_2$-4:2 FTS	82.47	2.88	3%
4:2 FTS	91.46	3.04	3%
$^{13}C_5$-PFHxA	91.35	3.67	4%
PFHxA	95.57	4.76	5%
PFPeS	101.71	2.16	2%
$^{13}C_3$-HFPO-DA	93.37	2.23	2%
HFPO-DA	103.16	3.27	3%
$^{13}C_4$-PFHpA	90.34	3.42	4%
PFHpA	99.45	4.33	4%
$^{13}C_3$-PFHxS	91.22	4.46	5%
PFHxS	102.05	2.73	3%
ADONA	102.8	3.80	4%
$^{13}C_2$-6:2 FTS	84.55	2.58	3%
6:2 FTS	94.44	3.89	4%
$^{13}C_8$-PFOA	91.08	3.54	4%
PFOA	102.9	4.60	4%
PFHpS	103.84	5.91	6%
$^{13}C_9$-PFNA	89.96	3.05	3%
PFNA	101.27	5.45	5%
$^{13}C_8$-PFOS	88.02	3.13	4%
PFOS	102.97	5.48	5%
9Cl-PF3OUdS	95.64	3.81	4%
$^{13}C_2$-8:2 FTS	83.6	2.37	3%
8:2 FTS	99.39	4.86	5%
$^{13}C_6$-PFDA	89.62	2.55	3%
PFDA	97.12	4.22	4%
$^{13}C_7$-PFUnA	84.69	3.25	4%
PFUnA	99.46	4.25	4%
11Cl-PF3OUdS	100.1	6.08	6%
$^{13}C_2$-PFDoA	82.21	2.36	3%
PFDoA	101.45	4.30	4%

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