

A Rapid, Simple, and Efficient Automated Method for PFAS from Produce

Alicia D. Stell, Candice S. Cashman – CEM Corporation
Kari Organtini – Waters Corporation
molecular.support@cem.com

Abstract

Due to their persistent nature, there is increasing concern of Per- and Polyfluoroalkyl Substances (PFAS) in our water, soil, food, and in our environment as a whole. More and more regulations are being implemented with respect to PFAS so labs need to be prepared to meet these needs. In order to analyze PFAS in solid matrices, you must first extract the compounds. With an ever-growing amount of PFAS work being done on solid matrices such as soil and foodstuff, there is a need for a rapid and efficient extraction. The extraction of PFAS can be challenging given the susceptibility to contamination and the low levels in which these compounds are present. Existing techniques do not offer a method that is rapid, simple, and efficient. In this study, a novel extraction system, the EDGE, combines the processes of pressurized fluid extraction and dispersive solid phase extraction is explored. Recovery and RSD values for the extraction of lettuce, cranberries, potatoes, strawberries, and carrots will be presented. The extractions were performed on the EDGE and analysis was done via a Waters Xevo TQ-XS with an Acquity I Class PLUS equipped with a PFAS kit. The EDGE offers an efficient extraction of PFAS from produce in less than 15 minutes in one simple automated process. With the EDGE, a rapid, simple, and efficient solution for PFAS testing is achieved.

EDGE Extraction Method

Q-Disc: S1 Q-Disc stack (C9 + G1+ C9 sandwich)

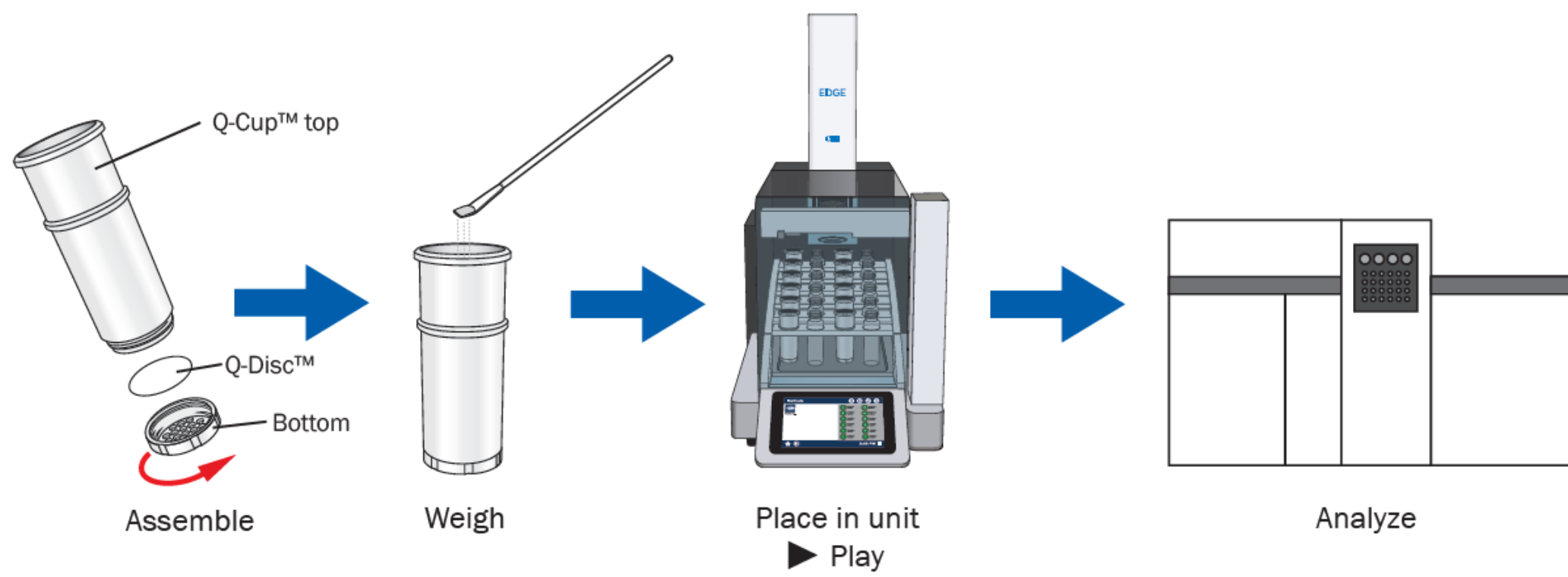
Cycle 1 Extraction Solvent: Methanol / Water (80:20) Agitation: 02:00 (mm:ss) Top Add: 20 mL Bottom Add: 0 mL Rinse: 0 mL Temperature: 65 °C Hold Time: 05:00 (mm:ss)

Cycle 2 Same as Cycle 1

Wash 1 Wash Solvent: Methanol Wash Volume: 30mL Temperature: 65 °C Hold: 0:30 (mm:ss)

Wash 2 Wash Solvent: Methanol Wash Volume: 30mL Temperature: 65 °C Hold: 0:30 (mm:ss)

Wash 3 Wash Solvent: Methanol/Water (80:20) Wash Volume: 10 mL Temperature: 65 °C Hold: 0:03 (mm:ss)



1. Assemble Q-Cup sample holder with S1 Q-Disc (allows for 0.3µm filtration)
2. Weigh 1.75 g sodium chloride and 6 g of sodium sulfate directly into Q-Cup
3. Weigh 5 g of homogenized produce directly into Q-Cup
4. Spike samples with 5 ng/g or 1ng/g of PFAC30PAR Wellington standard
5. Place prepared Q-Cup into the EDGE rack alongside 50 mL centrifuge tube for extract collection
6. Run EDGE extraction
7. Transfer to vial for concurrent analysis

Triple Quad LC-MS Method

- Waters Acquity I Class PLUS with PFAS kit with Xevo TQ-XS
- ACQUITY BEH C18 2.1mm x 100 mm, 1.7 µm column
- 10 µl injection
- A: Water + 2 mM ammonium acetate
- B: Methanol + 2 mM ammonium acetate

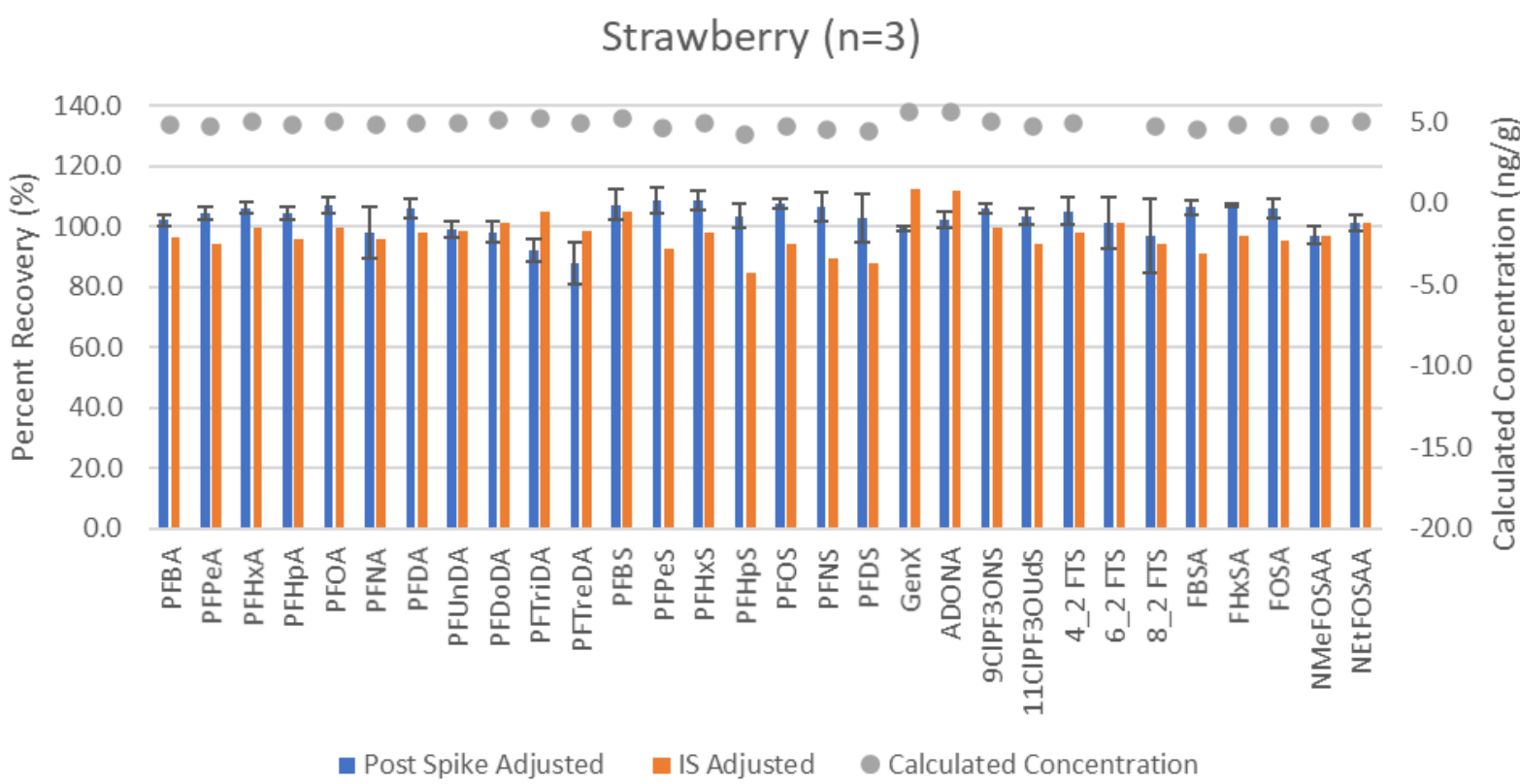


- Gradient

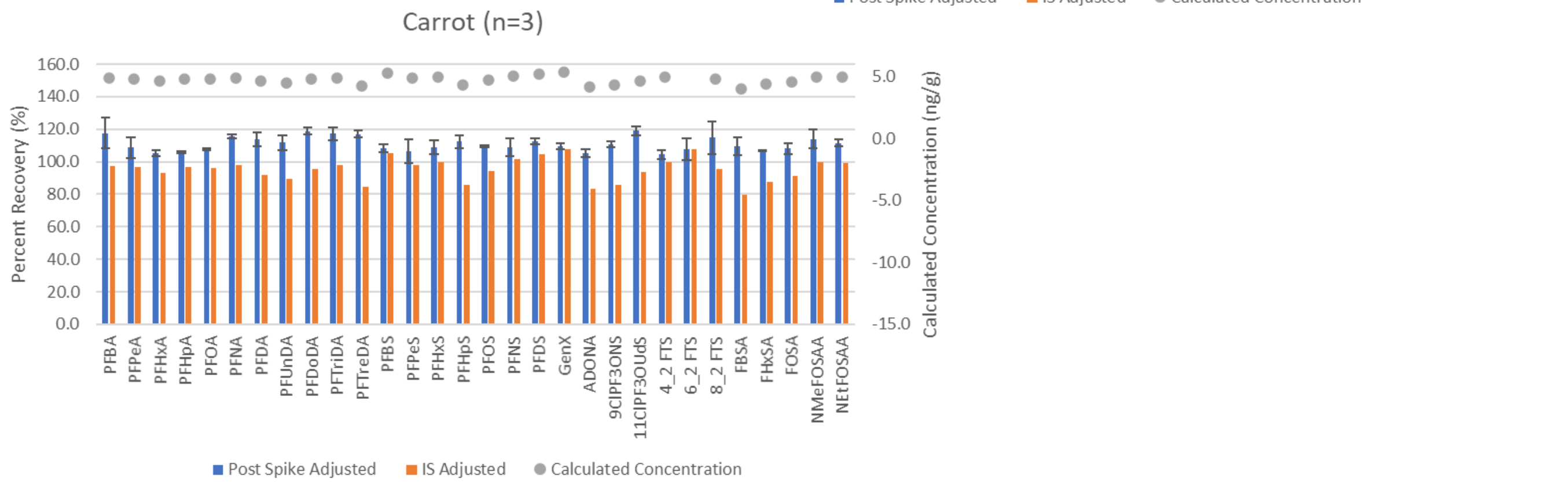
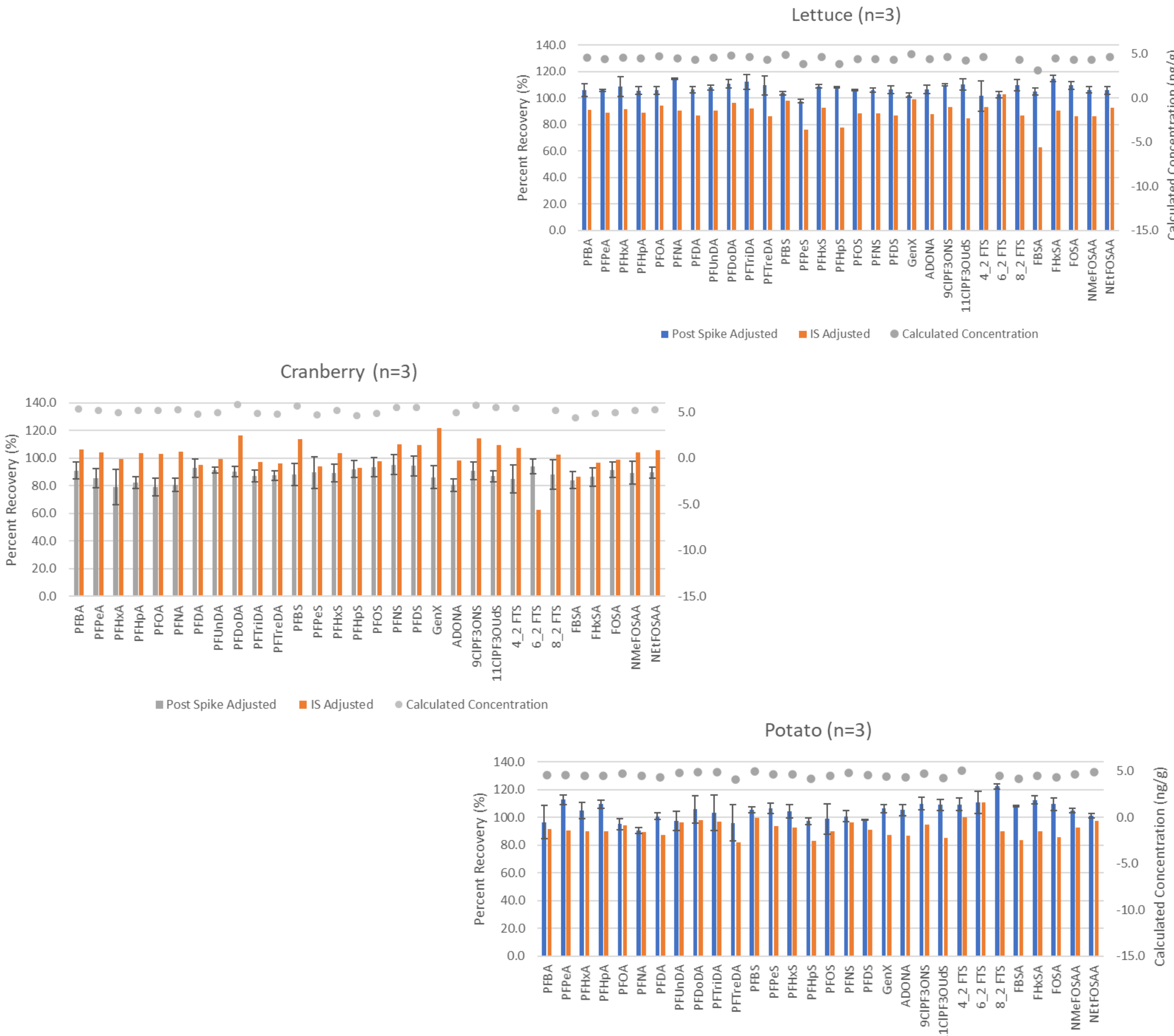
Time (min)	Flow (mL/min)	%A	%B
Initial	0.3	95	5
1	0.3	75	25
6	0.3	50	50
13	0.3	15	85
14	0.3	5	95
17	0.3	5	95
18	0.3	95	5
22	0.3	95	5

- Source Parameters
 - Instrument: Xevo TQ-XS
 - Ion Mode: ESI-
 - Capillary Voltage: 0.5 kV
 - Desolvation Temperature: 350°C
 - Desolvation Flow: 900 L/hr
 - Cone Flow: 150 L/hr

Results



Results cont'd



Conclusion

The extraction of PFAS from various produce, strawberry, lettuce, cranberry, carrot, and potato, using the EDGE has proven to be a reliable, efficient and robust technique. With one simple, rapid, and efficient automated PFAS extraction method, it can be applied to any food commodity when properly prepared.