

Extraction of PFAS from Solid Matrices Using Multi-Channel Pressurized Liquid Extraction and Solid Phase Extraction

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Introduction

- PLE® Overview
 - Pressurized Liquid Extraction as alternative to manual extraction
- Extraction and Cleanup for PFAS Testing application: food
- Questions



- Current techniques
 - Manual Solvent Extraction, Centrifuging
 - Labor intensive
 - Inconsistent results
 - Sonication in Solvent, Centrifuging
 - Labor and Solvent Intensive
 - Inconsistent results



Pressurized Liquid Extraction

- An Extraction technique used in the AG/Environmental/Food Markets
- The Technique Incorporates:
 - Solvent
 - Pressure
 - Heat
 - Time



Why is PLE so effective?

- Performed near the solvent's supercritical region
- Under Programmable Pressure
- Creates a high degree of analyte solubility releasing them from the solid matrix



Extraction

- A solid or semi-solid sample is placed in the Pressurized Extraction Cell 5mL to 200mL
- The Extraction cell is capped and placed into the extraction device which can be pressurized to up 2500psi



Extraction

- The Extraction cell is filled with the extraction solvent put under pressure and depressurized
 - PFAS
- The Extract is flushed with Nitrogen into a collection vessel



The PLE®

Pressurized Liquid Extraction

PLE - Pressurized Liquid Extraction

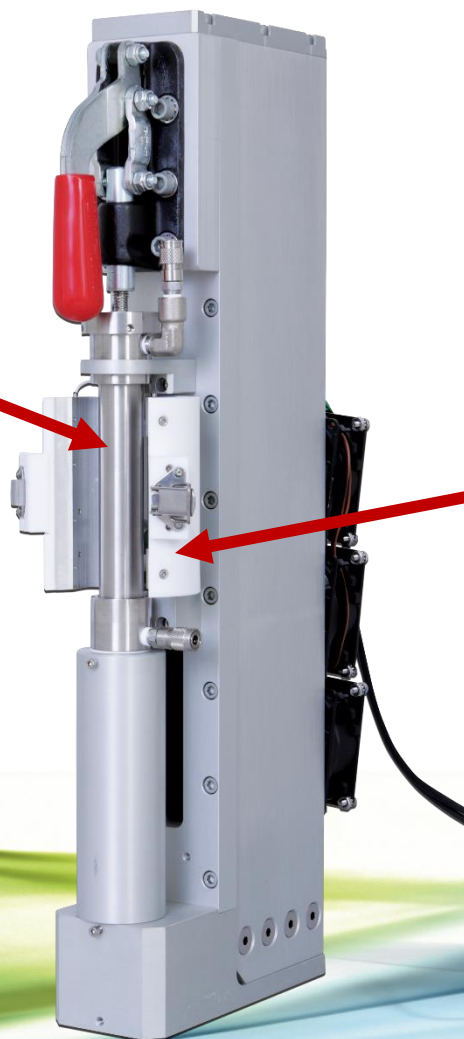
- High Speed
- Modular and expandable from 1 to 8
- Process 1 to 8 samples in 10 to 15 min
- Extraction cell size 5 mL to 200 mL
- Real time plot of temperature and pressure
- Reduced Solvent Consumption
- Lower Energy Consumption
- In Cell Sample Cleanup





Extraction Cell

Heater



Economical Extraction Cells



Production Cell



200ml

Easy to Use End Caps



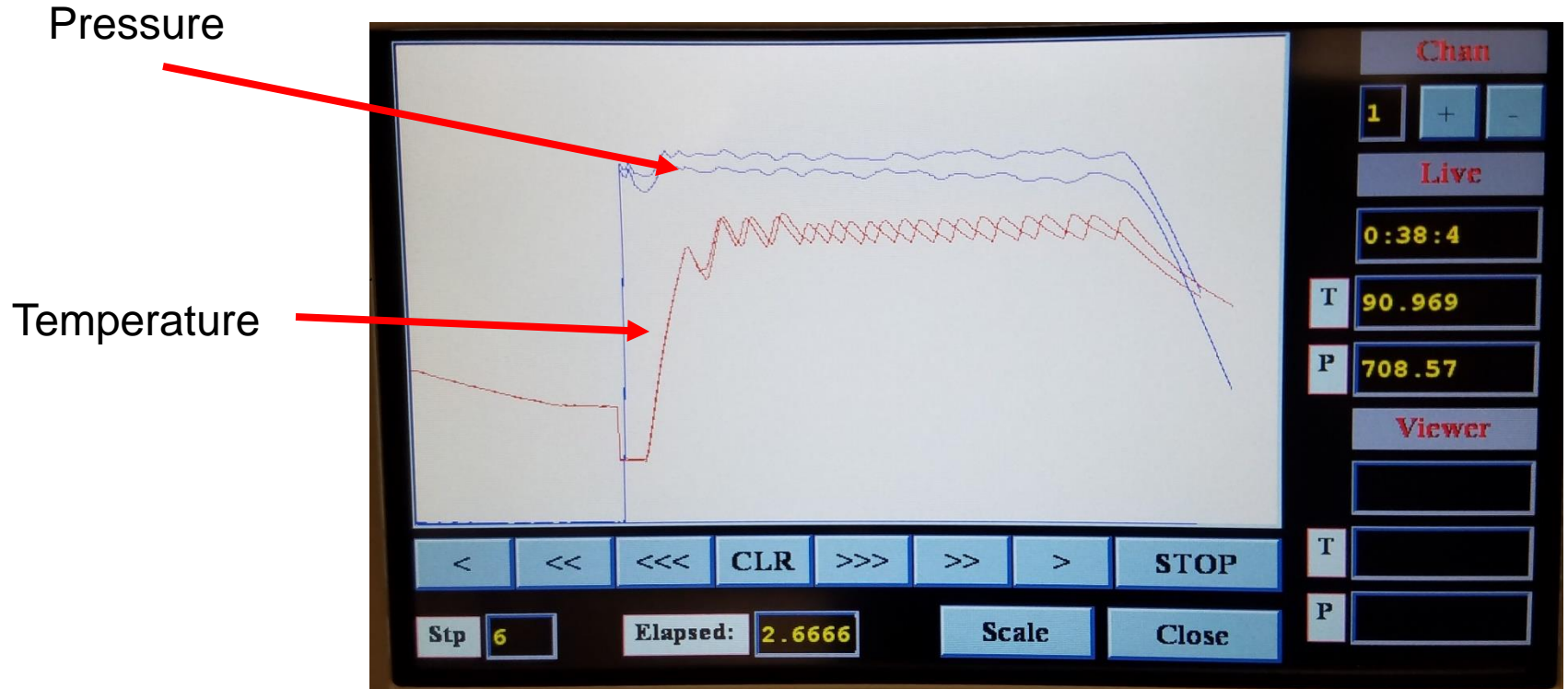
Modular and Expandable

Expandable from 1 to 8 Modules

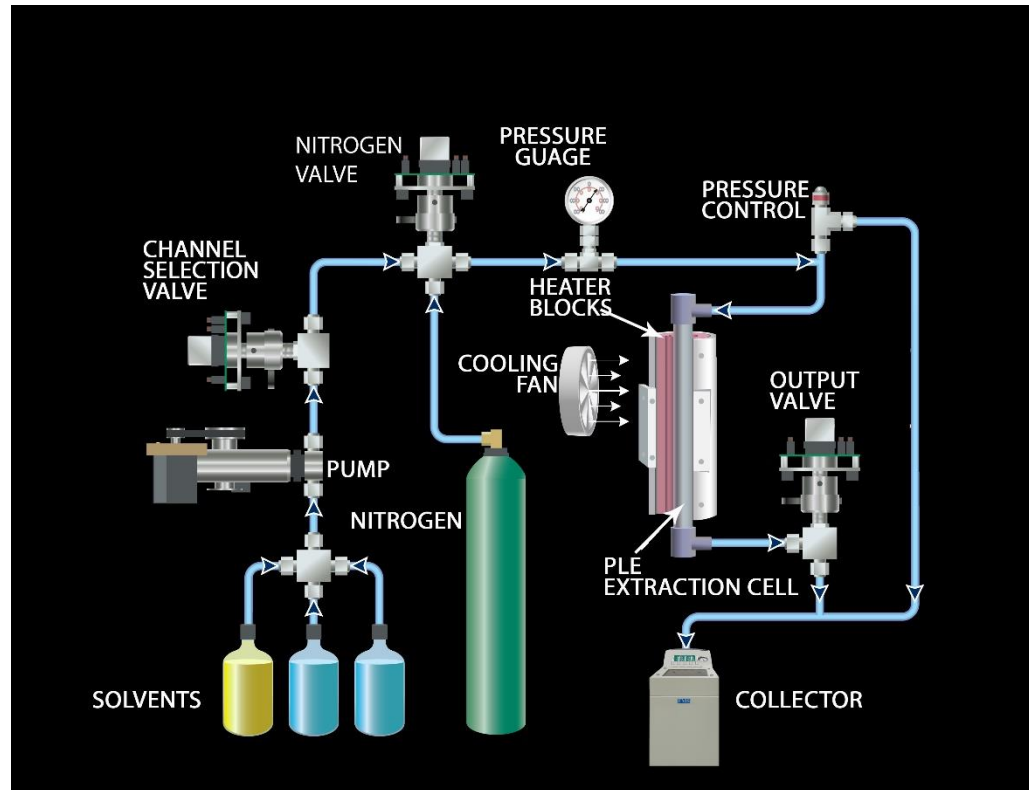
Parallel Extraction



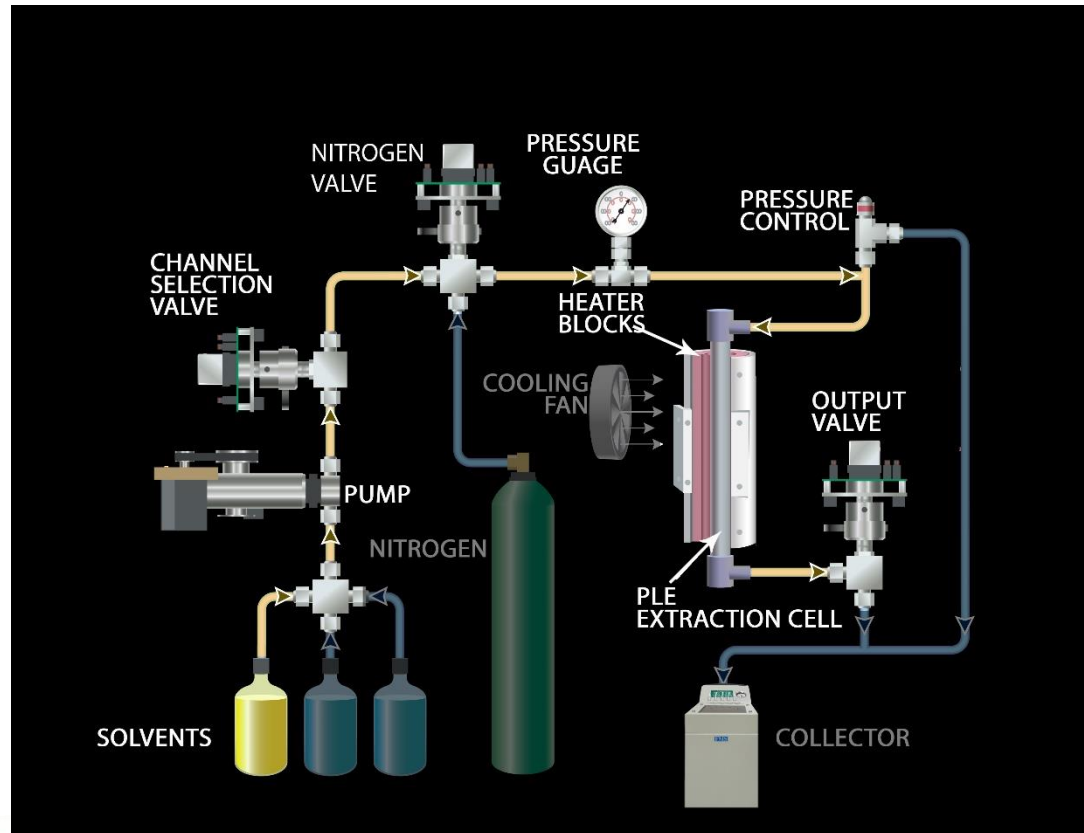
Method Documentation



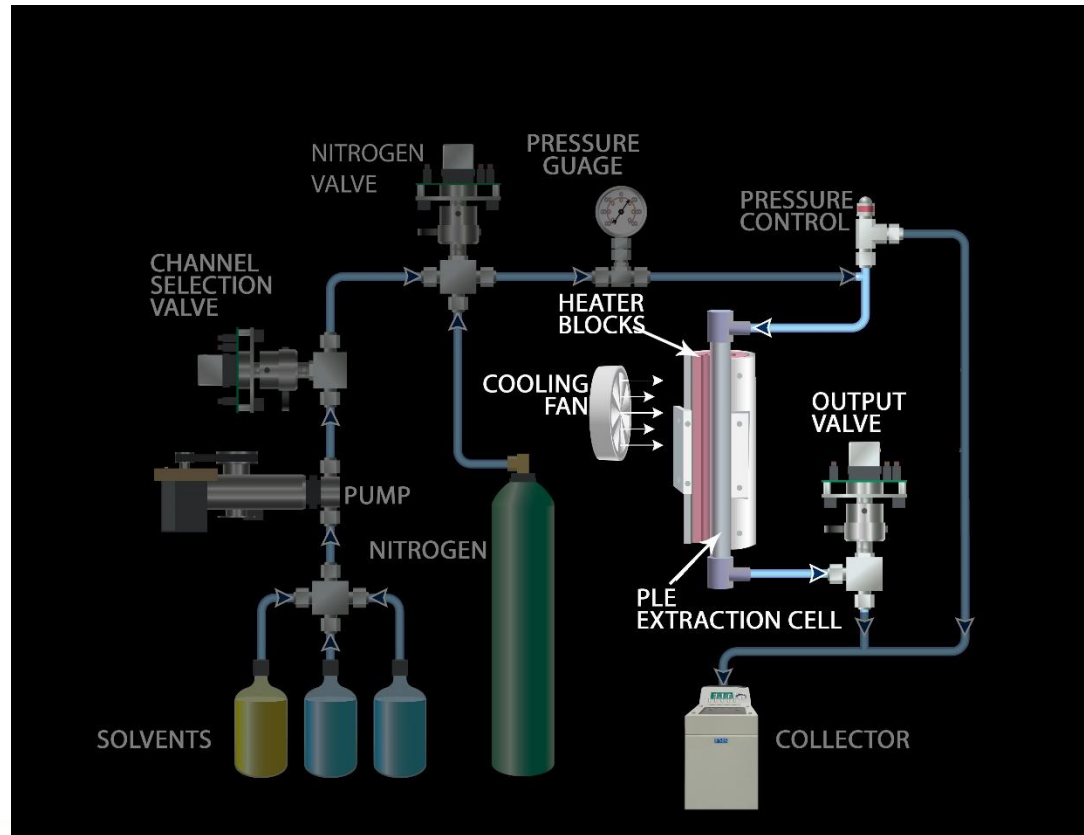
Filling the Cell with Methanol



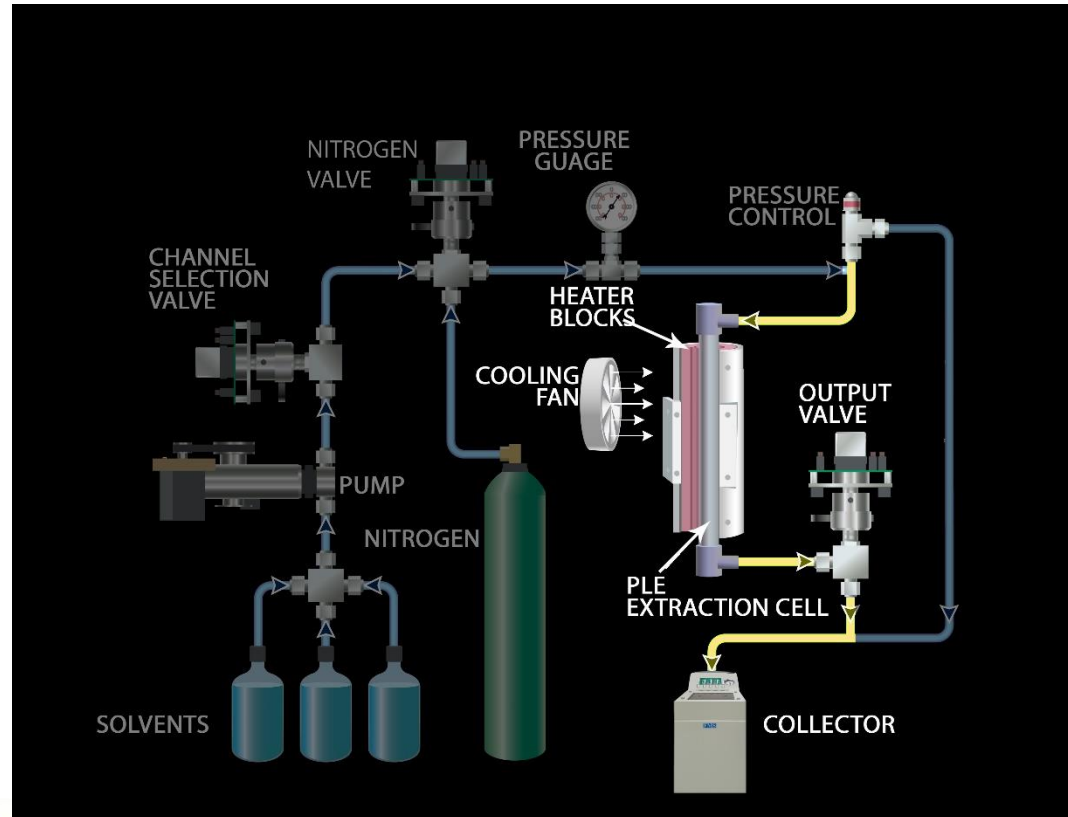
Pressurize the Cell



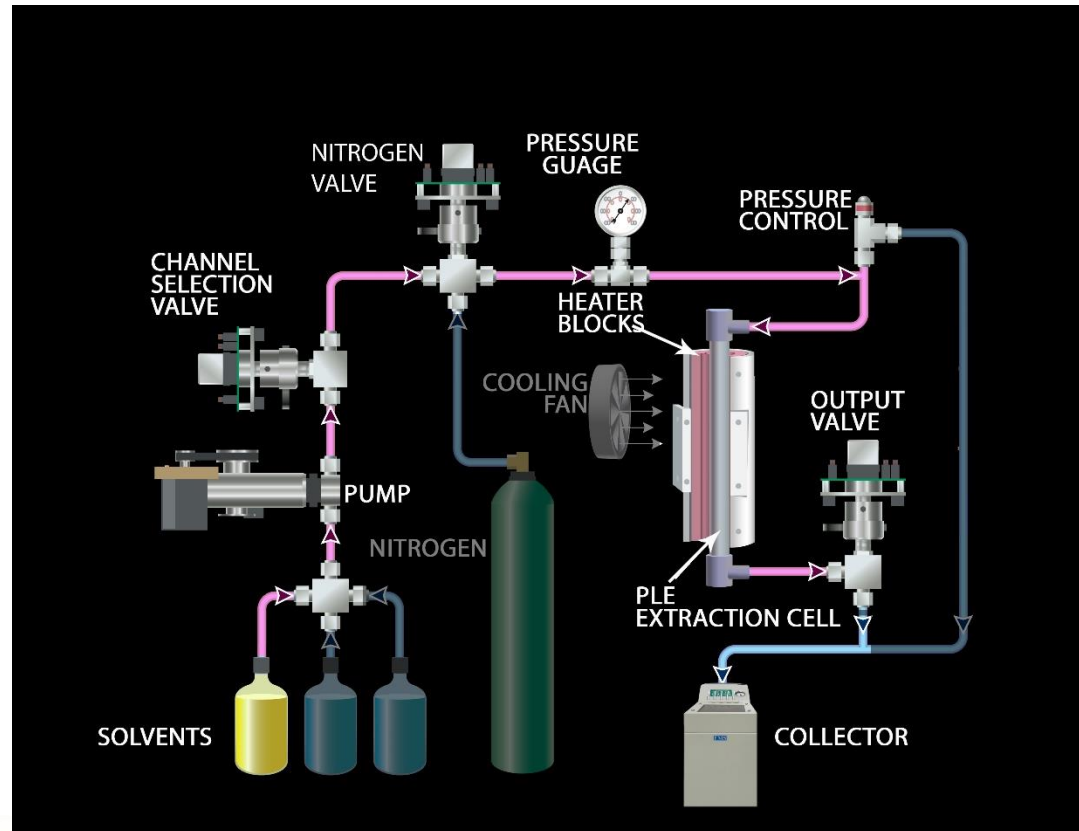
Maintain Pressure



Depressurize the Cell



Deliver the Extract to the Collection Vessel



Pressurized Liquid Extraction for PFAS

- Works efficiently on all Sample Matrices
- Can be done efficiently at ambient temperature
 - Includes food

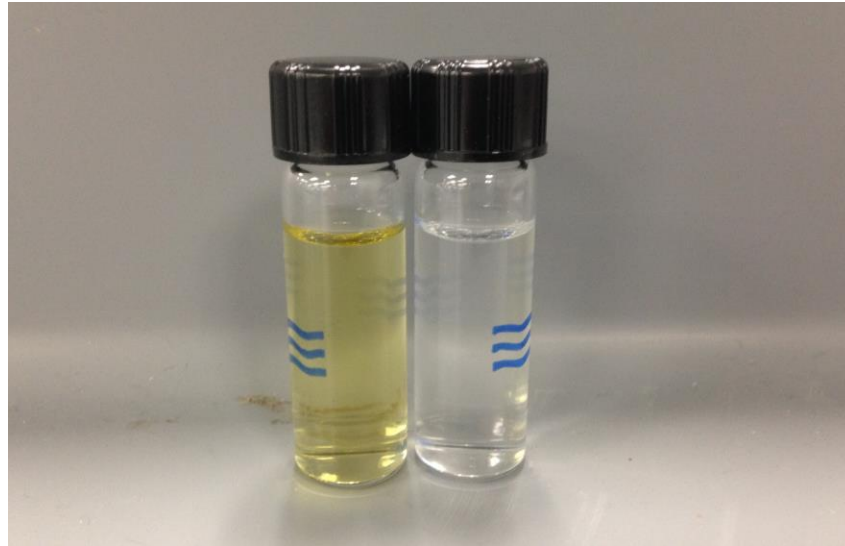


Pressurized Liquid Extraction for PFAS

- High Speed extraction for PFAS
 - Up to 8 extracts per 40 min
 - Up to 96 extracts per 8hr shift
- Consistent, Reproducible Results
 - Automated System
 - Processor based controller with unlimited methods storage
 - Documentation of run conditions
- Save money
 - Solvent
 - Labor



Extract after Cleanup



Methanol Extraction

- Low Solvent Consumption
- Low Power Consumption
 - 110V 20 A circuit
- Ambient temperature extraction
- Touch Screen Control
- Preload methods



Expandable

- 1 to 8 modules
- Run in Parallel
- Extract up to 8 samples
in 40 min
- 96 samples per 8 h
shift



Easy to Use Cells



Salmon extraction-SPE cleanup

- 5 or 10 g salmon or scallops in PLE cell
- Cell 40 mL
- Mixed with Ottawa Sand
- Extraction near ambient temperature ~ 30 °C
- 20 min
- 1000 psi (~ 65 atm)
- Minimal cool down then nitrogen flush
- Final extract volume ~ 40 mL
- Cleanup over in-line Florisil/WAX cartridge

Automated Concentration for PFAS

SuperVap 24 PFC

24 positions

15ml Conical vials

Timed Endpoint

SuperVap 12 PFC

12 positions

50ml Conical vials

Timed Endpoint

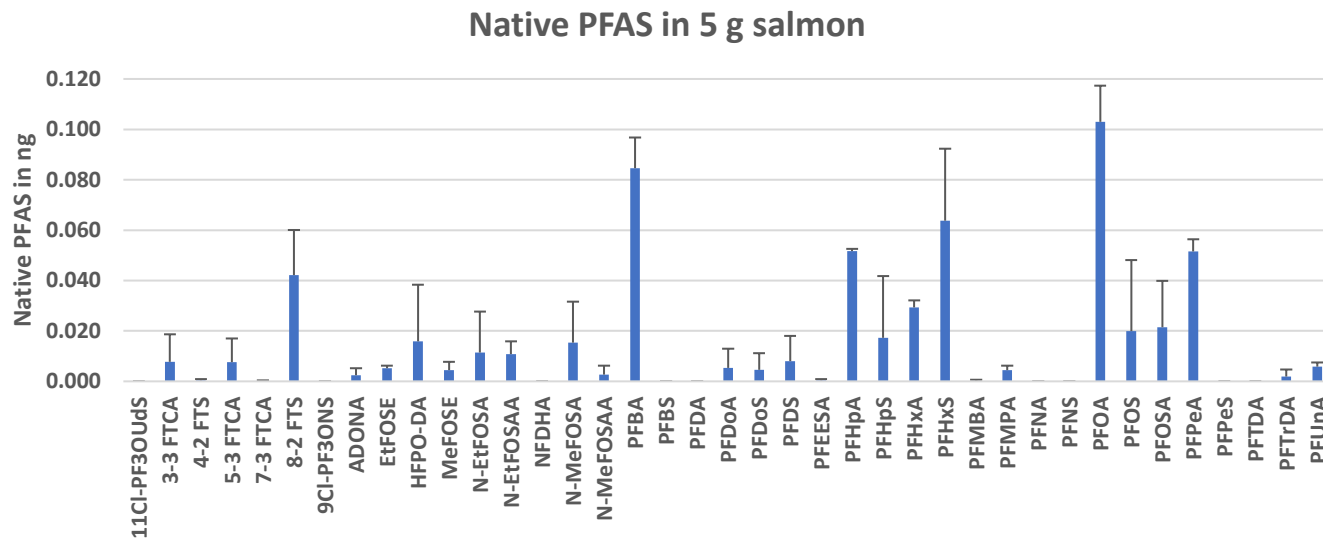


LC/MS

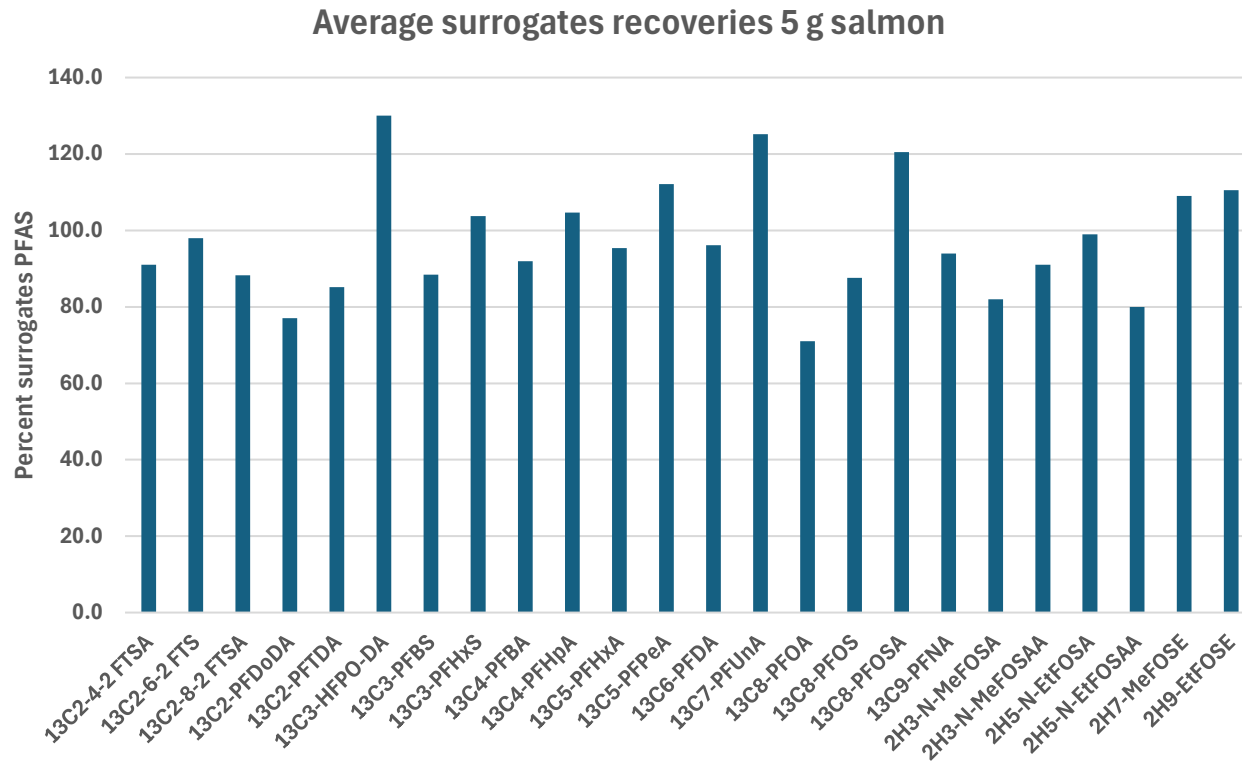
Agilent 6475



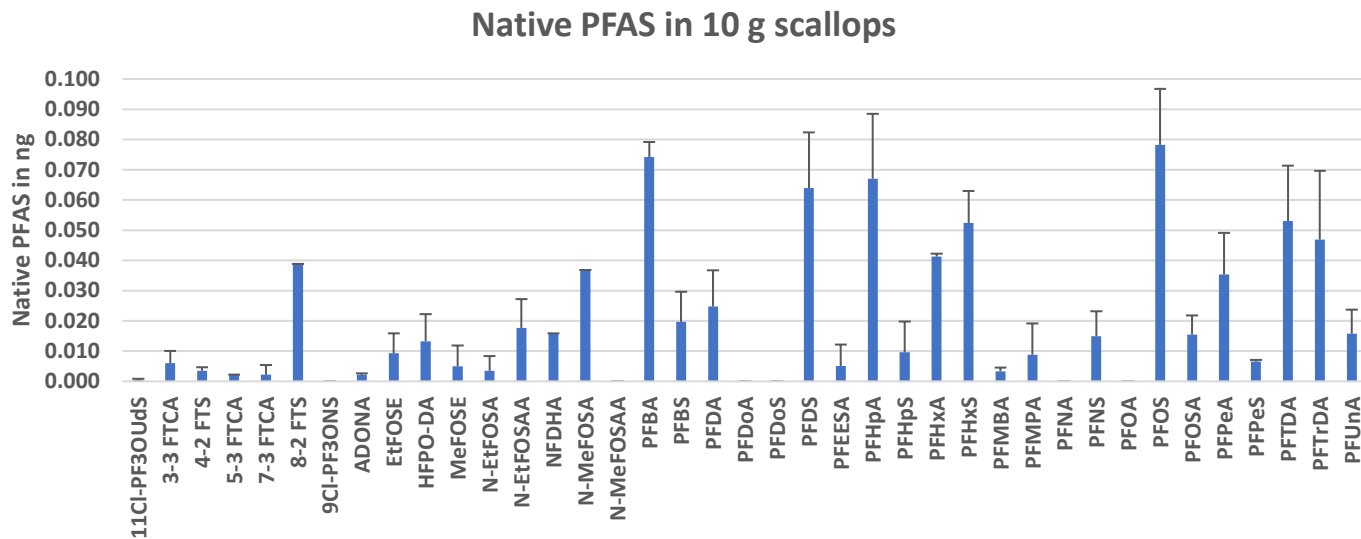
Native PFAS in salmon



Surrogates in salmon (%)

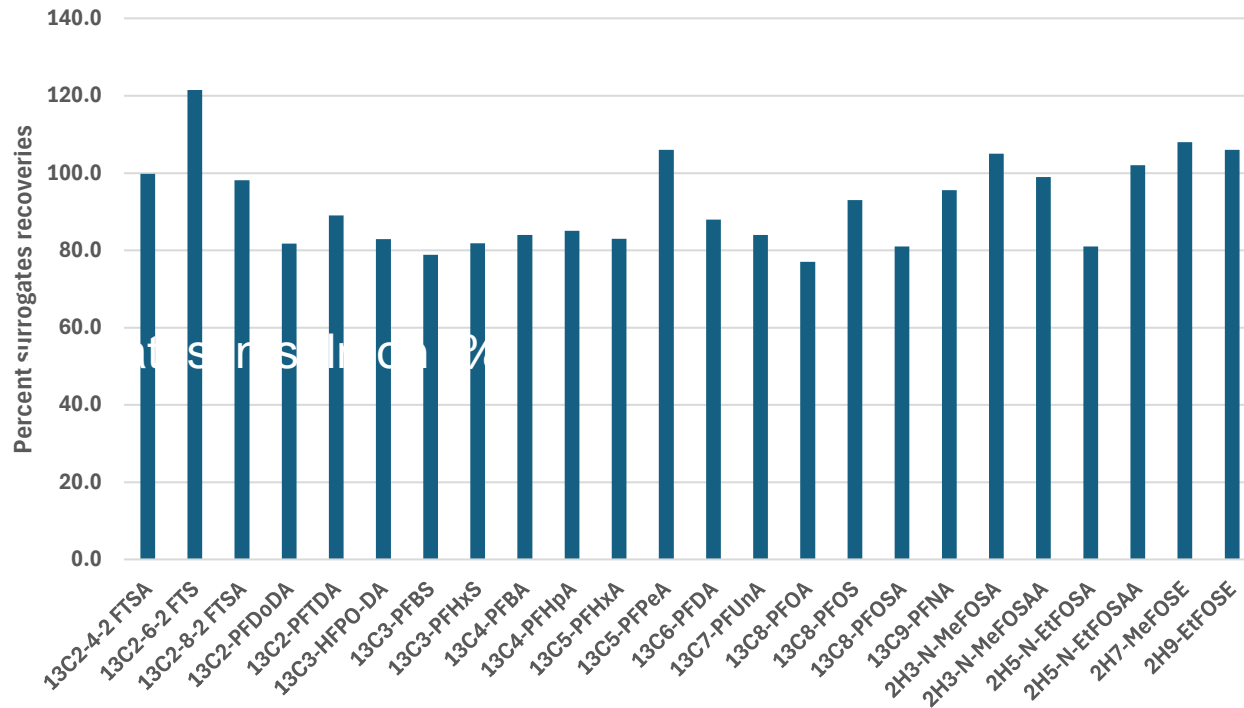


Native PFAS in scallops



Surrogates in scallops (%)

Average surrogates recoveries 10 g scallops (%)



- Using the PLE®
 - Sample Prep processes are combined into one step
 - Extraction
 - Cleanup with, e.g., Florisil/WAX
- One Extraction Method for all Solid Matrices
- Reduces error
- Produces consistent, reproducible results
- Increased productivity

Fast, Reproducible Extractions

- Faster and easier operator training
- Automatic documentation of extraction and cleanup and concentration conditions
- Reduced errors due to mistakes eliminating manual steps and conditions.
- Reduced solvent usage and disposal costs.



Come see us at booth # A01

Questions?

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