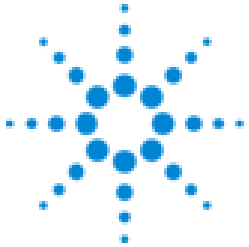
FMS
Fluid Management Systems

Optimize your Sample Preparation Workflow for PFAS Analysis

FMS
Fluid Management Systems
Total Sample Prep Solutions



Agilent

Optimize your Sample Preparation Workflow for PFAS Analysis

- **Automate the Sample Prep Workflow**
  - **Automate the Solid Phase Extraction Step**
  - **Automate the Concentration/Evaporation Step**

- **Automated, Semi-Automated SPE Extractions and Concentration**
  - **Reduces Human Error**
  - **Reduces Outside contamination**
  - **Increase Throughput**
  - **Reduces Labor**

- **No Teflon**
- **Use Hyphenated techniques to deliver consistent, reproducible results**
- **Different configurations to handle Matrix type and Budget**
- **Use any size cartridge**

Automated Solid Phase Extraction front end for LC/MS

EconoTrace® PFC

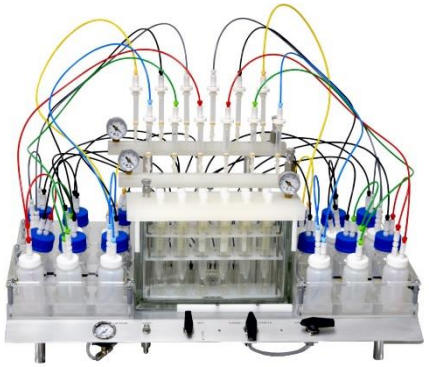
TurboTrace® PFC

TurboTrace®
Parallel
Sequential

LC/MS

Modular and Expandable
Designed for Different Matrices and
Number of Samples to be run per week

Semi-Automated Solid Phase Extraction PFAS/PFOS front end for LC/MS



EZPFC / SuperVap PFC 24

LC/MS

Low Cost, High Throughput
Sample Prep

Automated Extraction and Concentration for PFAS/PFOS in Drinking Water

EconoTrace® PFC

Drinking Water, Serum and samples with minimal particulate
Positive Pressure Pumping

LC/MS

EconoTrace SPE

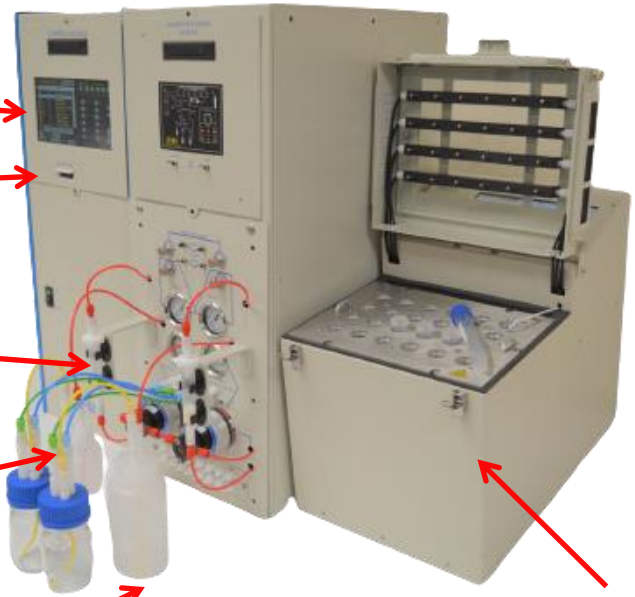
Touch Screen Control

SD Card for Storing and Transferring Methods

Nitrogen Drying

Six Elution and Wash Solvents

Automatic Bottle Rinse



Sample Size 2 ml to unlimited

Direct to 15 ml Centrifuge tube Concentration

EconoTrace for Extraction and Concentration of PFAS/PFOS in Drinking Water

Fluid Management Systems

Fully Automated

Modular and expandable from 1 to 4 Modules, 2 to 8 samples

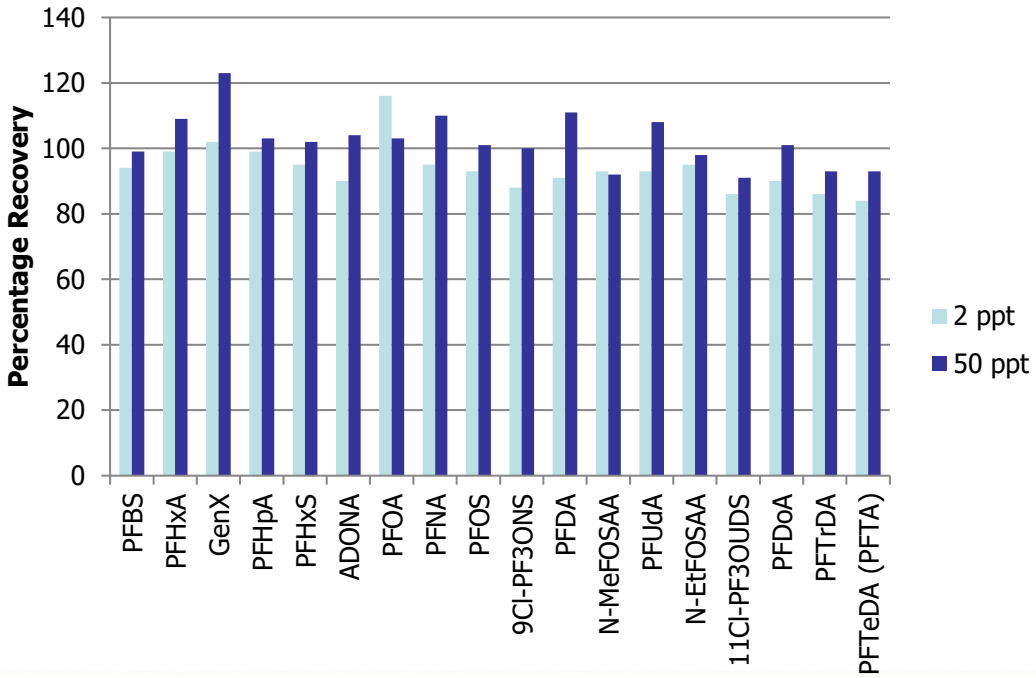
High Throughput Runs
8 Sample Extractions in Parallel

Uses Positive Pressure Pumping only for Precise delivery of Conditioning Solvent, Sample, Bottle Rinse and Elution Solvent

Automatic Bottle Rinse

Delivers extract directly to SuperVap Concentrator for final blowdown

EPA 537.1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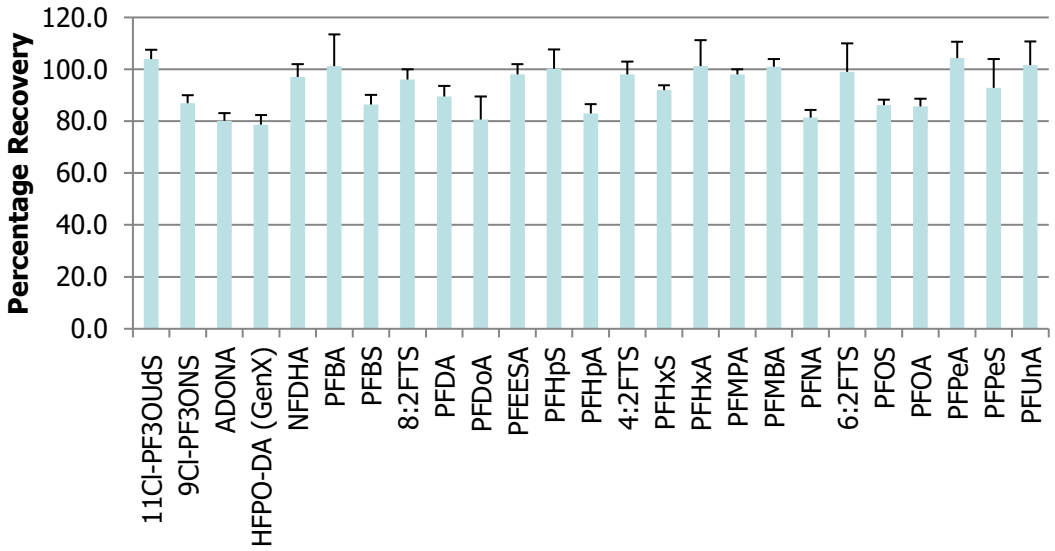
120
100
80
60
40
20
0
PFBS
PFHxA
GenX
PFHpA
PFHxS
ADONA
PFOA
PFNA
PFOS
9Cl-PF3ONS
PFDA
N-MeFOSAA
PFUdA
N-EtFOSAA
11Cl-PF3OUDS
PFDoA
PFTrDA
PFTeDA (PFTA)
2 ppt
50 ppt

EPA 533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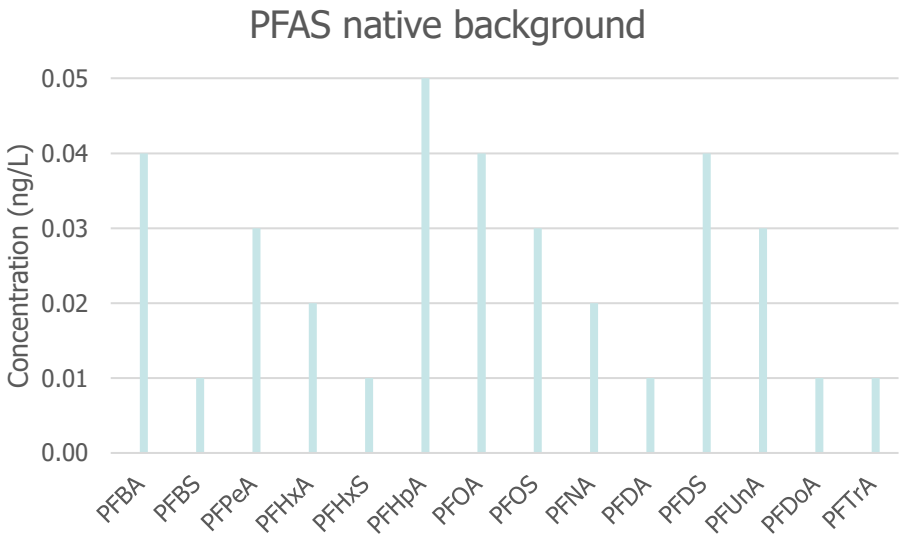
100.0
80.0
60.0
40.0
20.0
0.0
11Cl-PF3OUdS
9Cl-PF3ONS
ADONA
HFPO-DA (GenX)
NFDHA
PFBA
PFBS
8:2FTS
PFDA
PFDoA
PFEESA
PFHpS
PFHpA
4:2FTS
PFHxS
PFHxA
PFMPA
PFMBA
PFNA
6:2FTS
PFOS
PFOA
PFPeA
PFPeS
PFUnA

PFAS Background



TurboTrace Parallel Sequential PFC Automated Extraction and Concentration for PFAS/PFOS in Drinking Water and WasteWater

TurboTrace® PFC Parallel Sequential

LC/MS

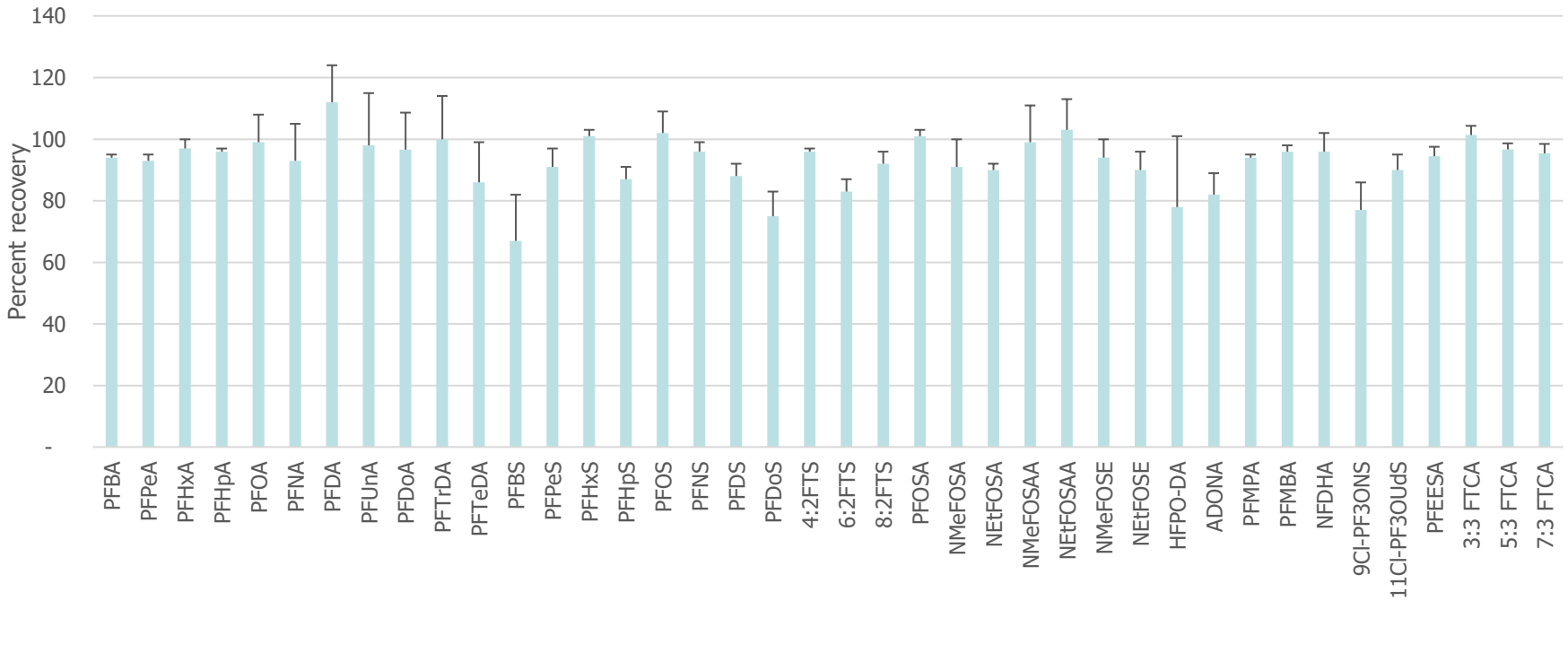
Wastewater, Particulate Laden Samples
Drinking Water Samples
Vacuum Pump or Positive Pressure for loading samples
Positive Pressure Pumping for conditioning, rinsing, and elution
Direct to SuperVap Concentrator

TurboTrace for Extraction and Concentration of PFAS/PFOS in WasteWater

Fluid Management Systems

- Fully Automated
- Modular and Scalable expandable from 1 to 6 Modules
- Run 1 to 6 samples simultaneously, up to 30 sequentially
- Each Module can Run 5 Samples in a Sequence
- Uses Positive Pressure Pumping for Precise delivery of Elution and Wash Solvent
- Uses Vacuum with liquid sensor to Load Dirty Samples
- Direct Extract delivery to Concentrator for Evaporation

1633 Parallel-Sequential Recoveries (n=5)



Automated Concentration for PFAs

- SuperVap PFC
  - 24 positions
  - 15ml Conical vials
  - No Teflon

Concentration Functionality

- **Designed for PFAS/PFOS Concentration**
- **Accepts Extracts Directly from FMS Automated SPE systems**
- **Self Installable**
  - **Video unpacking, installation and training video**
- **Preprogrammed with most common temperature settings**
- **Direct to 15ml Centrifuge Tubes**
- **Dry bath heating element**
- **Time based endpoint**

Can this Handle Dirty Samples?

Typical Cartridge can have problems!

- **6ml 500mg DVB**
  - **Doesn't do well**
  - **Frit Surface Area is to small**

Yes, A Cartridge will work

- **25ml 500mg DVB cartridge**
  - **Does well**
  - **3X the Frit Surface Area**

FMS, Inc. Plastic Filtration Wool

Delrin Plastic Wool

- Irregular random stranding
- Slows Particles to the Uniform Frit
- Prevents Clogging

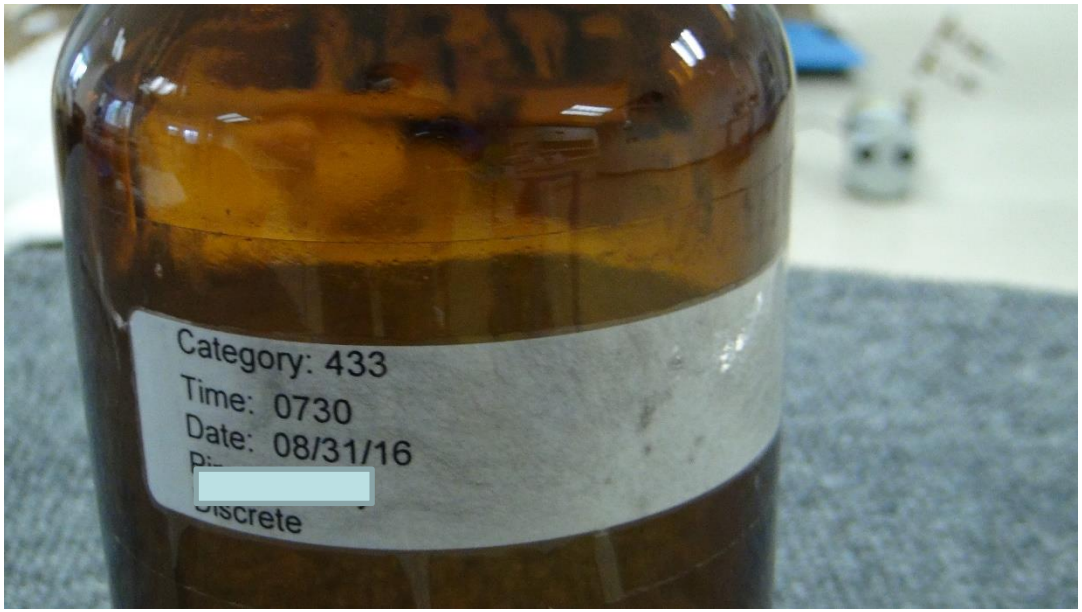
Prepping the 6ml Cartridge with Plastic Filtration Wool

6ml 500mg DVB cartridge with Plastic wool

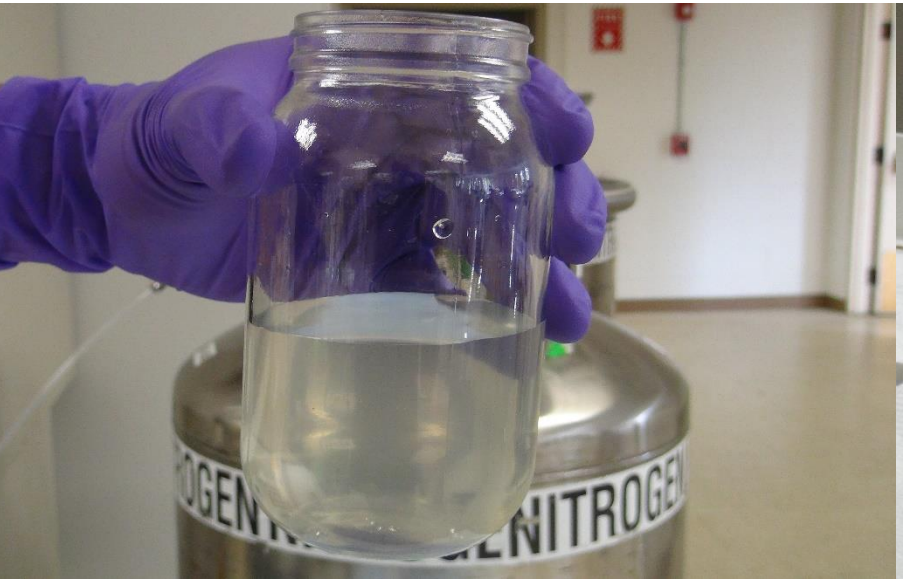
- Take a little and push it into the barrel of the syringe until it touches the cartridge Frit

- The Sample will not clog, it will take longer to process

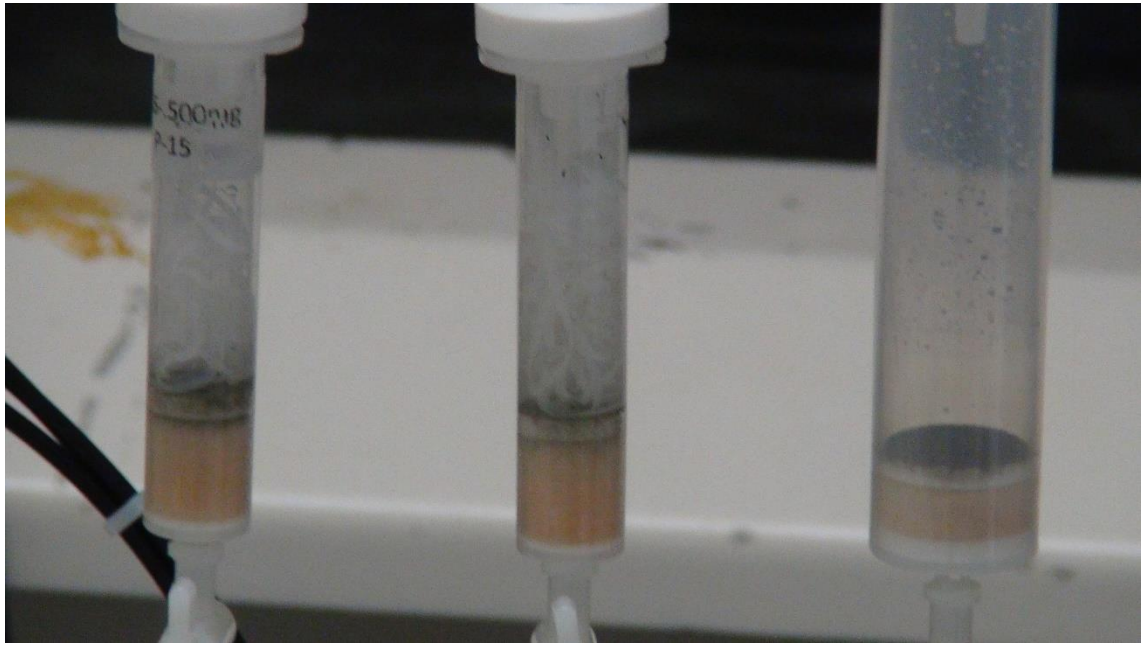
Dirty Sample from a Customer



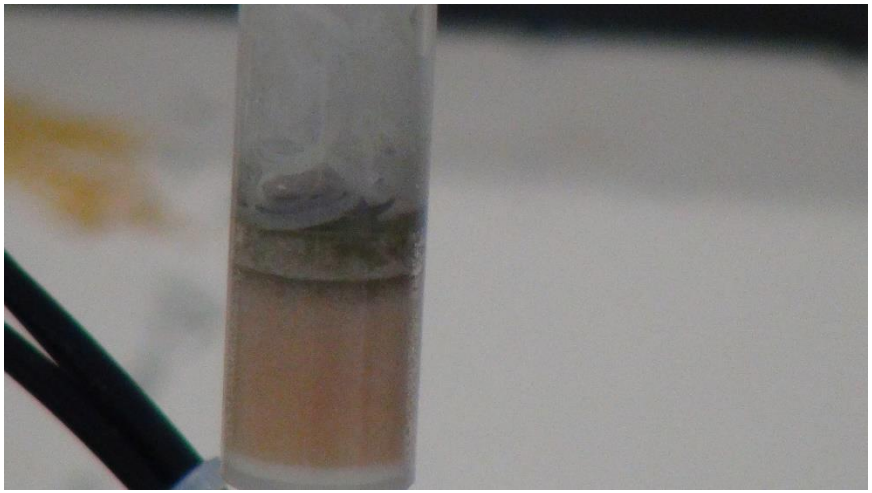
Industrial 433 Matrix 250ml

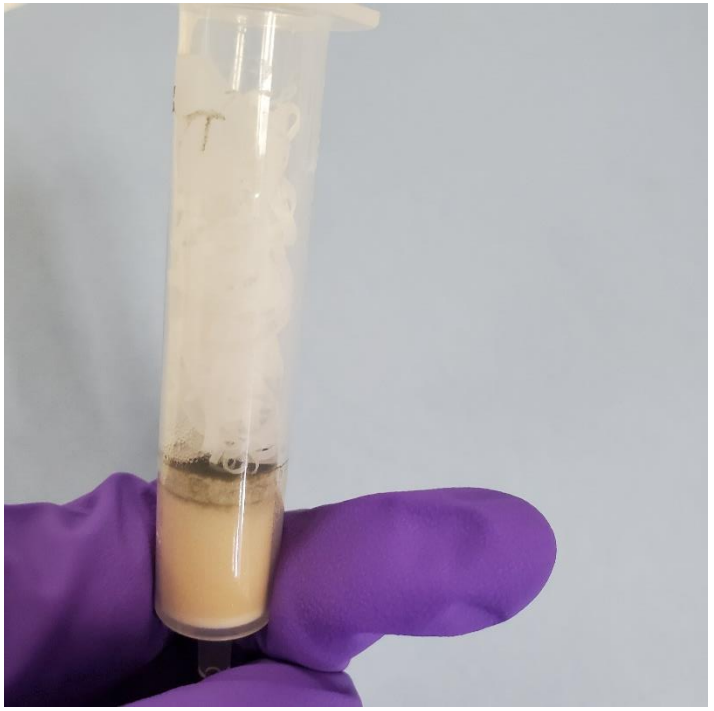


6ml and 25ml Cartridges

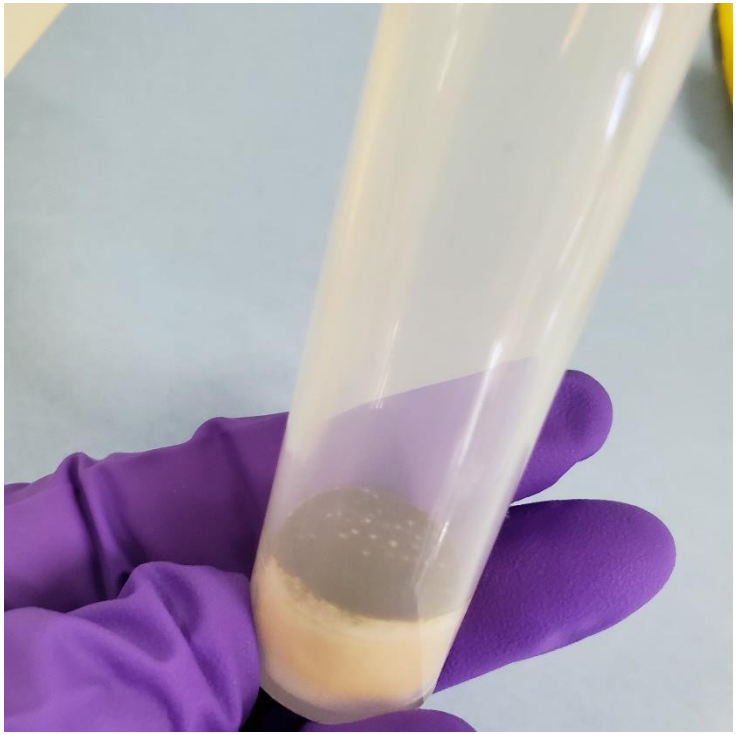


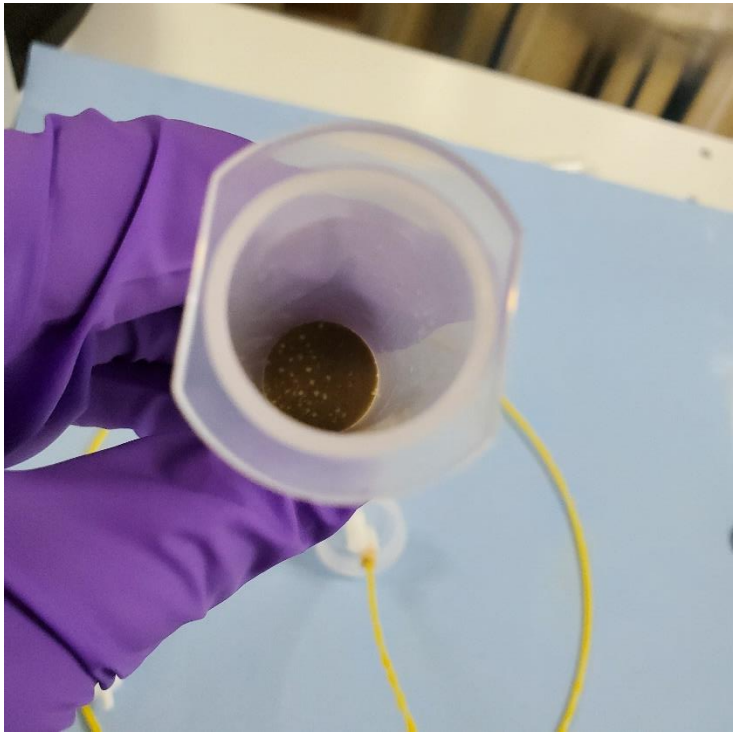
250 ml run to completion on 6 ml cartridge with Plastic Wool



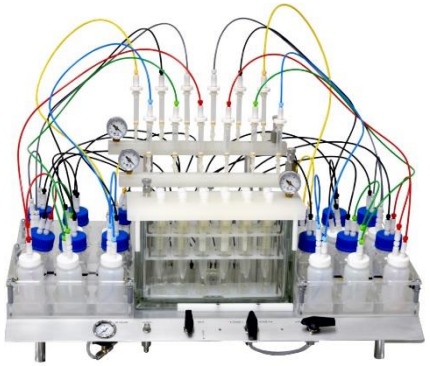


250ml run to completion
25ml cartridge





Semi-Automated Solid Phase Extraction front end for LC/MS

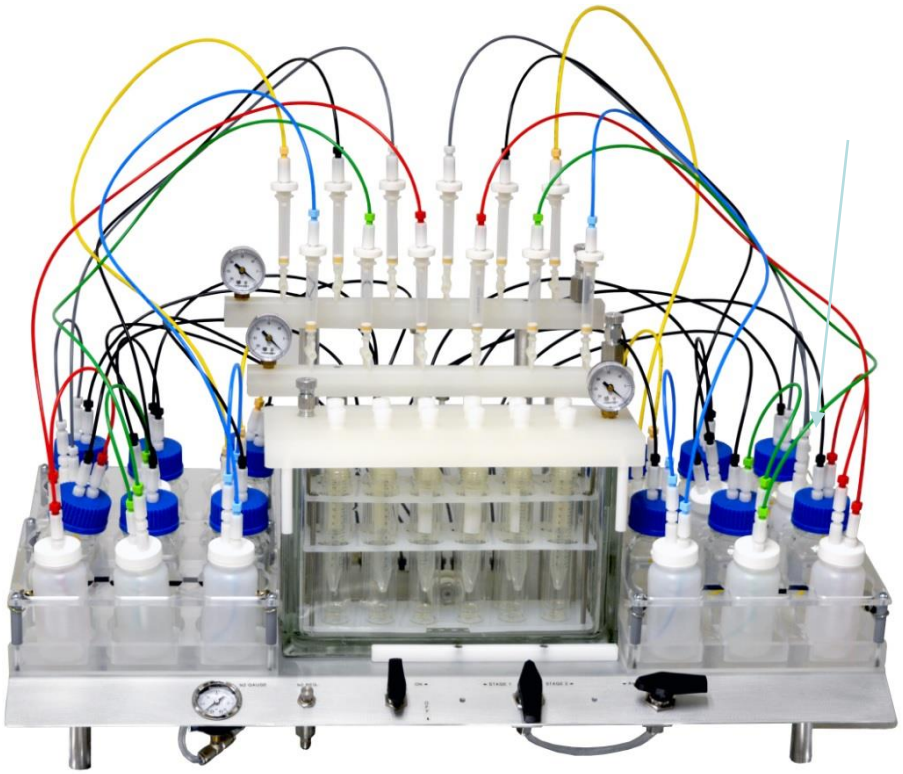


EZPFC

LC/MS

EZPFC®

Drinking Water,
Wastewater,
Particulate laden samples



EZPFC 12 sample

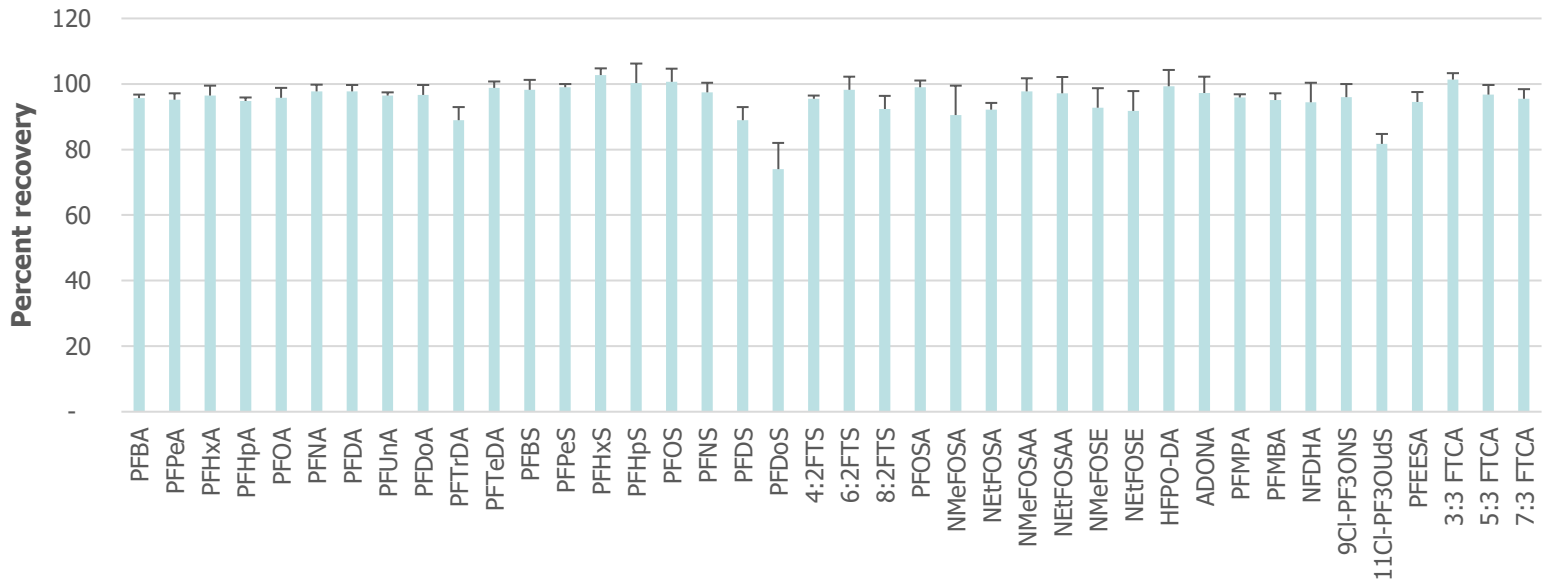
EZPFC Semi Automated SPE

- **Low Cost**
  - Run and Concentrate a batch of 24 samples 2 to 3 hours
- **Self Installable**
  - Unpacking and Installation/training video
- **Easy to Operate**
  - No Computers or Electronics to fail or maintain
- **Semi - Automated**
  - Hyphenates the entire Solid Phase Extraction Process – Extraction, Bottle Rinse, Inline Drying and Direct to 15ml Centrifuge tube for easy Concentration
- **Fast**
  - The fastest sample processing available for SPE
  - Run up to 12 samples simultaneously
  - Vacuum for fast loading of large volume samples
  - Unattended Sample loading walkaway time
- **Closed system**
  - Eliminate potential outside contamination

EZPFC Semi Automated SPE

- **Efficient**
  - Uses all SPE cartridge sizes
  - Dedicated manifold for cartridge conditioning and sample loading
  - Dedicated manifold for extraction and extracts
  - Separates Organic from Aqueous waste
  - Vacuum cartridge drying, Nitrogen cartridge drying or combined
  - Automated Bottle Rinse and Elution
  - Inline Extract Drying
  - Small number of components to clean

EPA 1633 results using the EZPFC



Data from
Vogon Labs
Using the EZPFC

Summary

Automated SPE for PFAS

- **EconoTrace**
  - Fully automated, positive pressure system, automated bottle rinse, direct delivery to SuperVap Concentrator
  - Designed for cleaner samples
  - Modular and Expandable

- **TurboTrace**
  - Fully automated, Vacuum pump for loading "dirty samples", automated bottle rinse, direct delivery to SuperVap Concentrator
  - Designed for Drinking water and WasteWater
  - Modular and Expandable

Semi Automated SPE for PFAS

- **EZPFC**
  - Low Cost, High Throughput
  - 2 EZPFC 12 position systems and the SuperVap PFC Concentrator for 24 samples
  - Run a batch of 24 in 2 hours

Information Links

- EconoTrace Webpage
- TurboTrace PFC Parallel Sequential Webpage
- EZPFC Webpage