



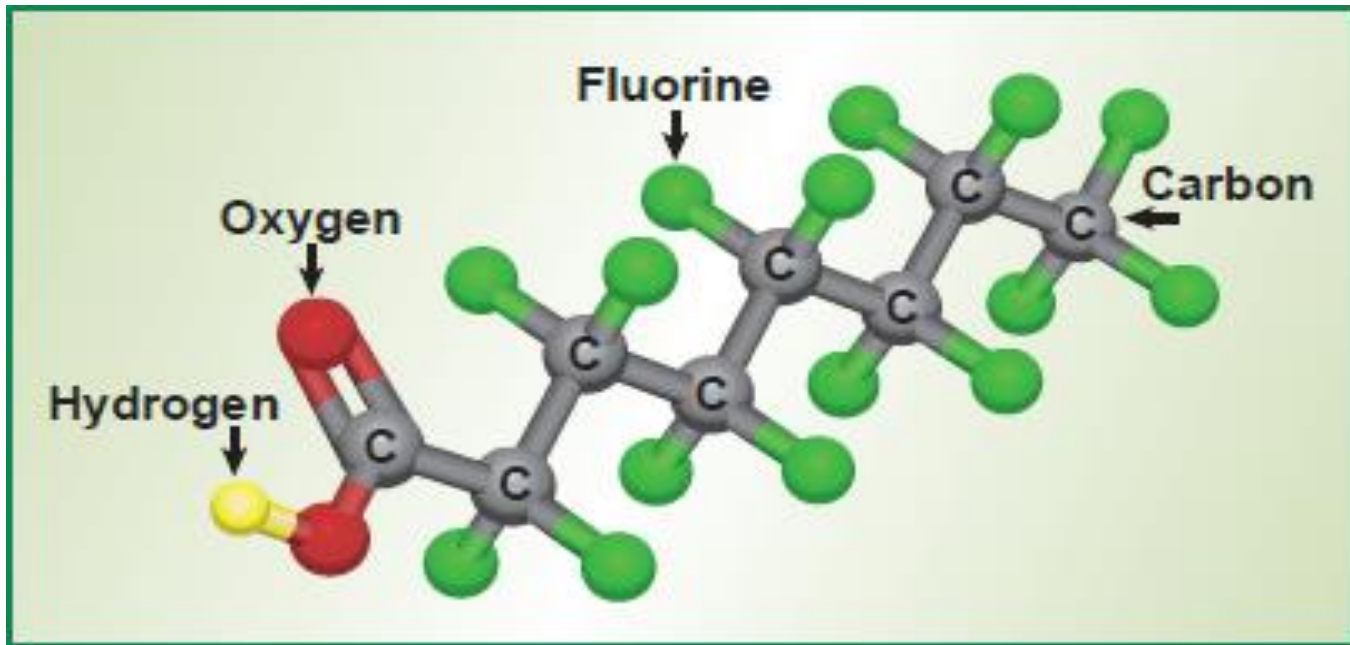
Per – and Polyfluoroalkly Substances in Ohio

MEGAN HURD

ANALYST II

ALLOWAY

What are PFAS?



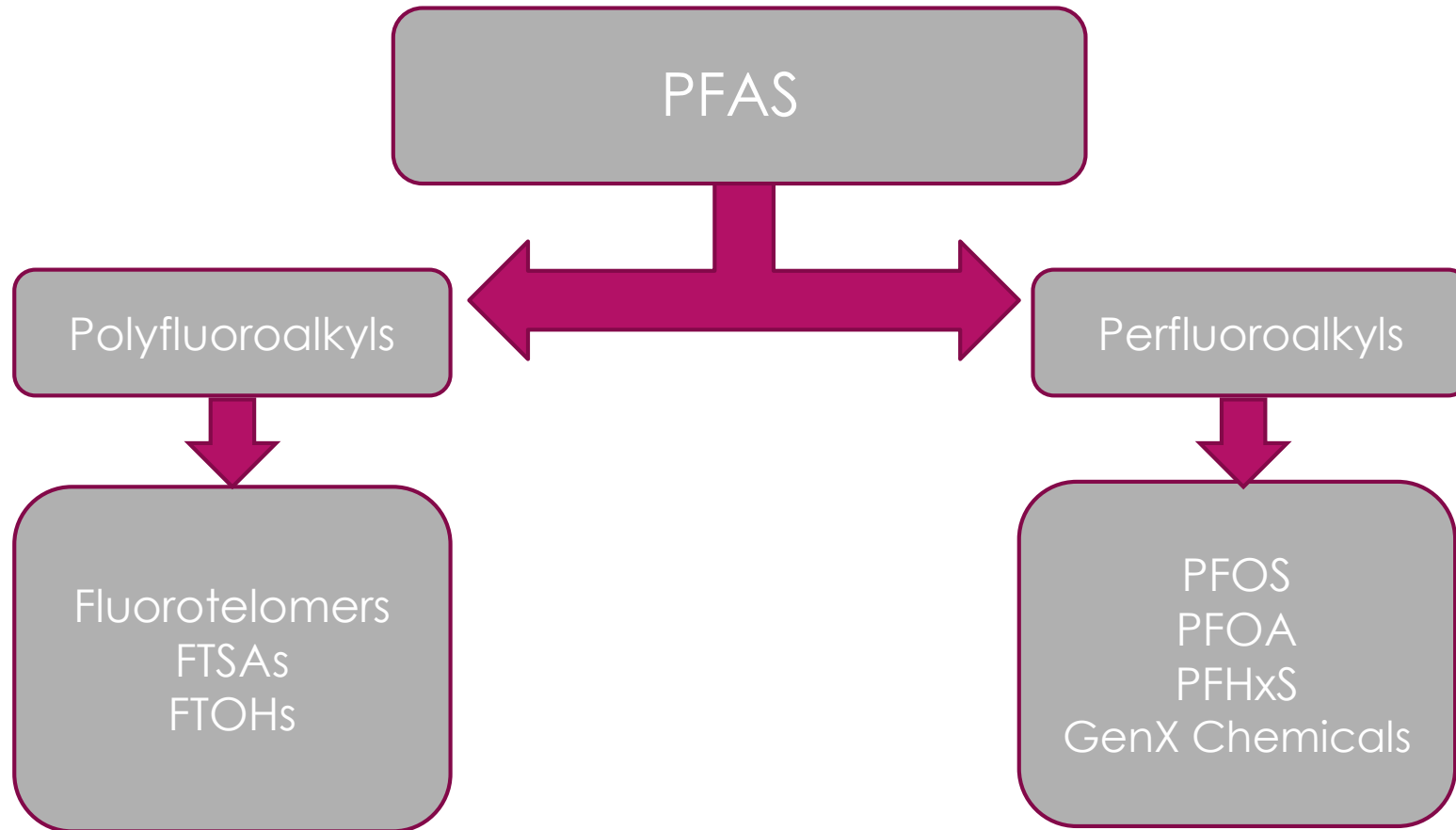
PFAS are a man made chemical used in a variety of industries globally and in the US since 1940

There are over 4000 compounds that belong to the PFAS Family

Perfluorooctanoic Acid (PFOA), Perfluorooctanesulfonic Acid (PFOS), and GenX Chemicals are the most common PFAS studied

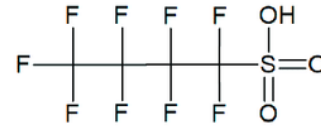
Pictured PFOA

What are PFAS

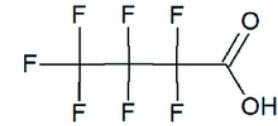


What are PFAS

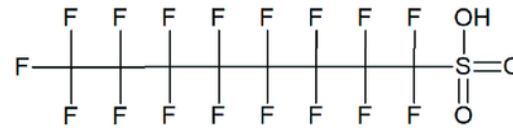
- ▶ The difference between per- and polyfluoroalkyl substances
 - ▶ Per are compounds where the carbon atoms in the chain are completely fluorinated
 - ▶ Poly are compounds where at least one carbon is not completely fluorinated
- ▶ GenX Compounds are a trade name for a technology producing high performance fluoropolymers without using perfluorooctanoic Acid (PFOA)
- ▶ PFBS and PFBA were used as replacements for PFOA



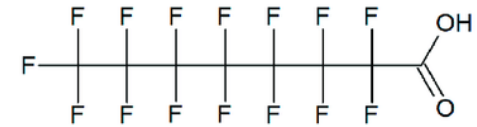
PFBS



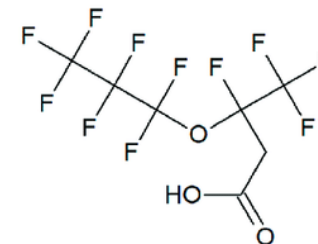
PFBA



PFOS



PFOA



GenX

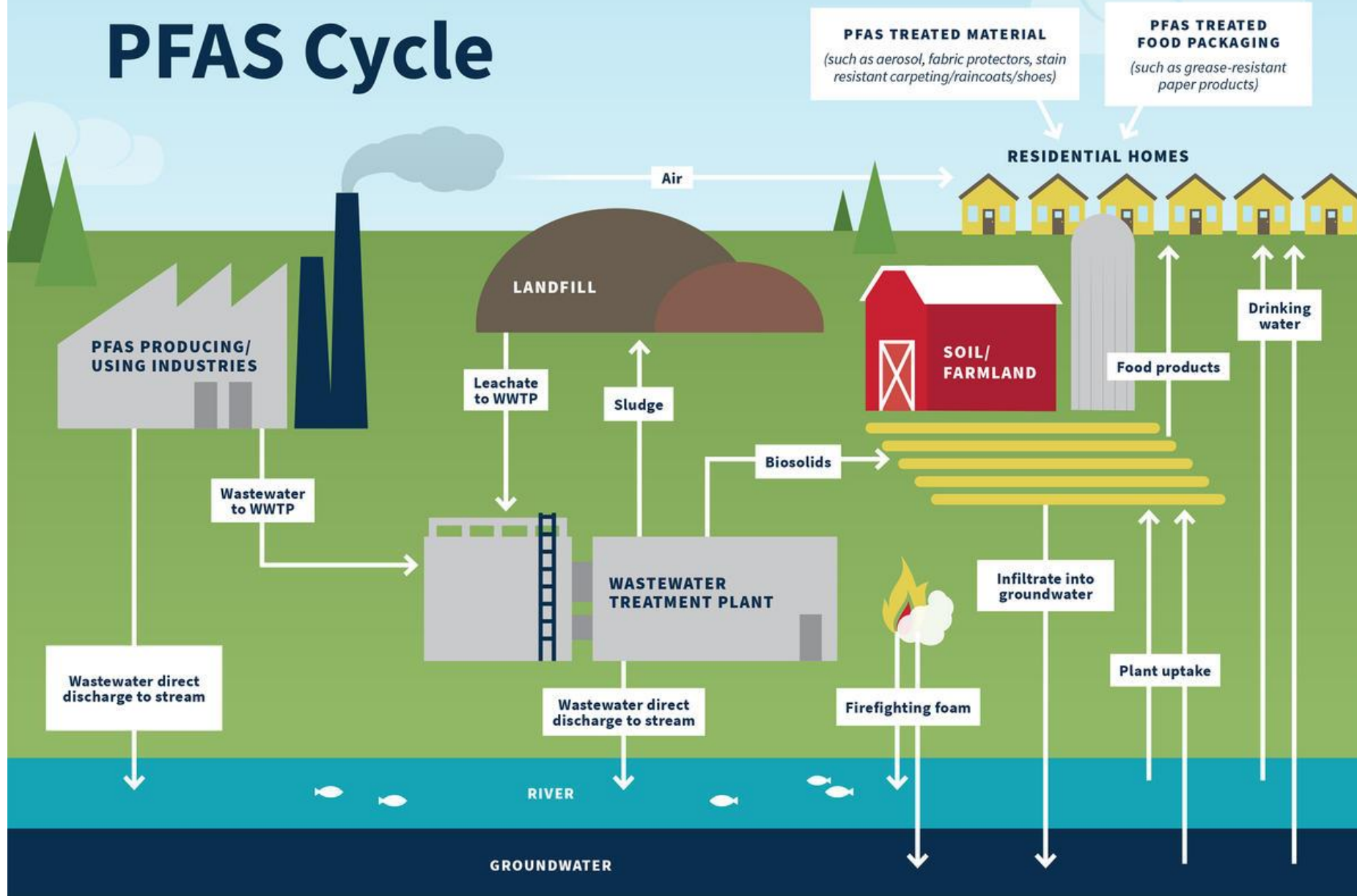
Where are PFAS Found?

- ▶ Food
- ▶ Household Products
 - ▶ Stains
 - ▶ Non-stick products (Teflon)
 - ▶ Water Repellant Fabric
 - ▶ Polishes
 - ▶ Waxes
 - ▶ Cleaning Products
- ▶ Fire Fighting Foams
- ▶ Production/Industries
 - ▶ Chrome Plating
 - ▶ Electronics
 - ▶ Oil Recovery
- ▶ Imported Products
 - ▶ Carpet
 - ▶ Leather
 - ▶ Textiles
 - ▶ Paper
 - ▶ Coatings
 - ▶ Rubber
 - ▶ Plastics

Contamination and Exposure

- ▶ Most common exposure is ingestion
 - ▶ Children are the most susceptible
- ▶ PFAS have been found in air, water and soil
 - ▶ Highly Moveable
 - ▶ Not easily broken down by metabolic systems
 - ▶ Incredibly stable and very very low biodegradability
 - ▶ Commonly found in blood sample
- ▶ Drinking Water
 - ▶ Typical contamination comes from nearby industries and are localized
- ▶ Groundwater
 - ▶ Fire fighting foams are the biggest source of contamination
- ▶ Landfills
- ▶ Soils
 - ▶ Like drinking water contamination comes from industries
- ▶ Humans and Animals
 - ▶ Exposure to an area heavy in PFAS
 - ▶ Eating or drinking contaminated food and water

PFAS Cycle



Health Risks

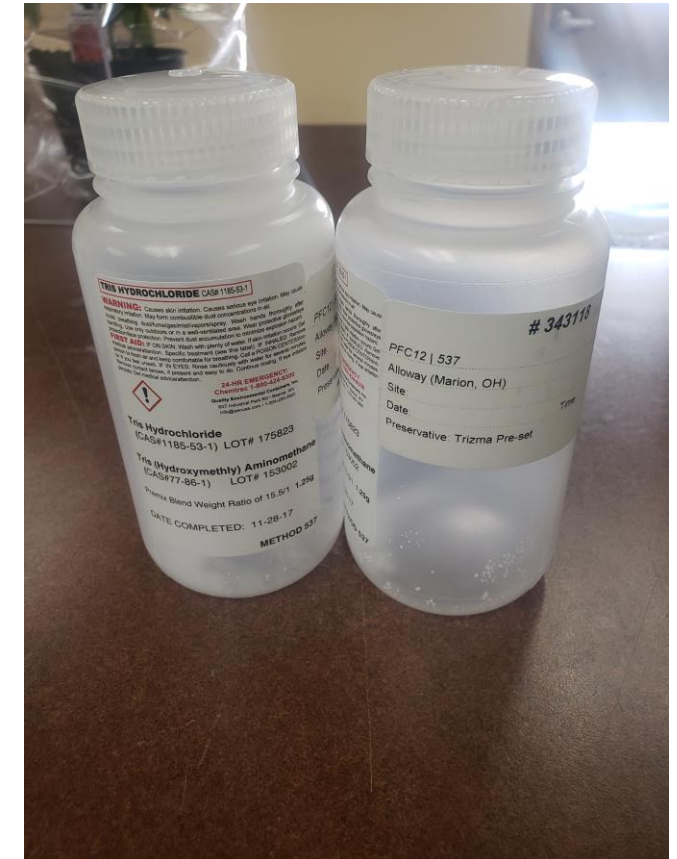
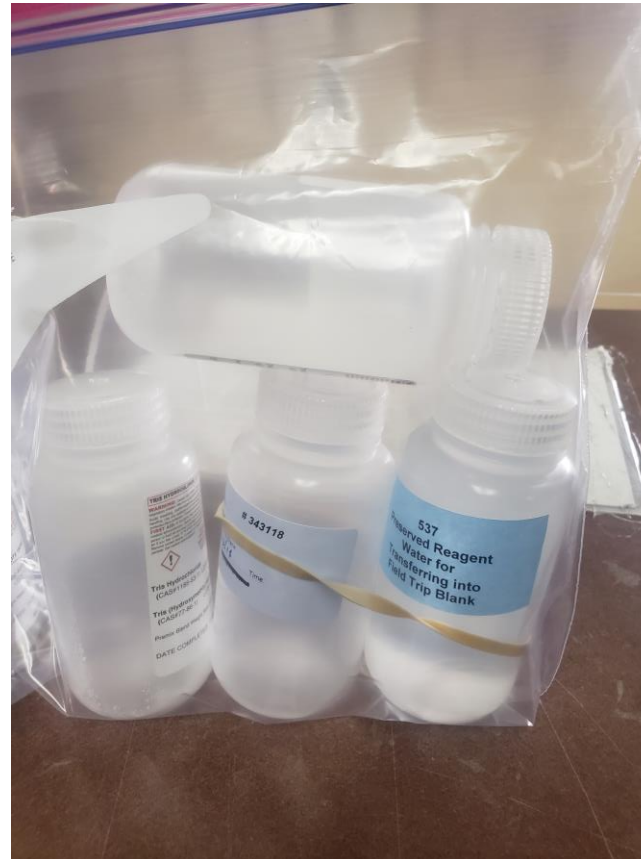
- ▶ Increased Cholesterol
 - ▶ The most consistent and reproduced finding
- ▶ Limited Studies and Finding linked PFAS to
 - ▶ Decreased Vaccine Response
 - ▶ Changes in Liver Enzymes / Liver Damage
 - ▶ Increased risk of high blood pressure or preeclampsia in pregnant women
 - ▶ Low birth weights and developmental effects
 - ▶ Decreased fertility
 - ▶ Increased risk of Kidney or testicular cancer
 - ▶ Thyroid Hormone Disruption (PFOS)
 - ▶ Cancer (PFAS)

Ohio's Response

- ▶ Post UCMR3 December 2019
- ▶ 1. Gather Sampling Data for levels in drinking water
- ▶ 2. Assist private Water system owners with guidelines and resources
- ▶ 3. Establish Action Levels
- ▶ 4. Work with communities to identify resources to assist public water systems with preventative measures
- ▶ 5. Develop educational information
- ▶ 6. Continue ongoing engagement to ensure Ohio stays up to date with the current research and regulations set by the US EPA

Sampling

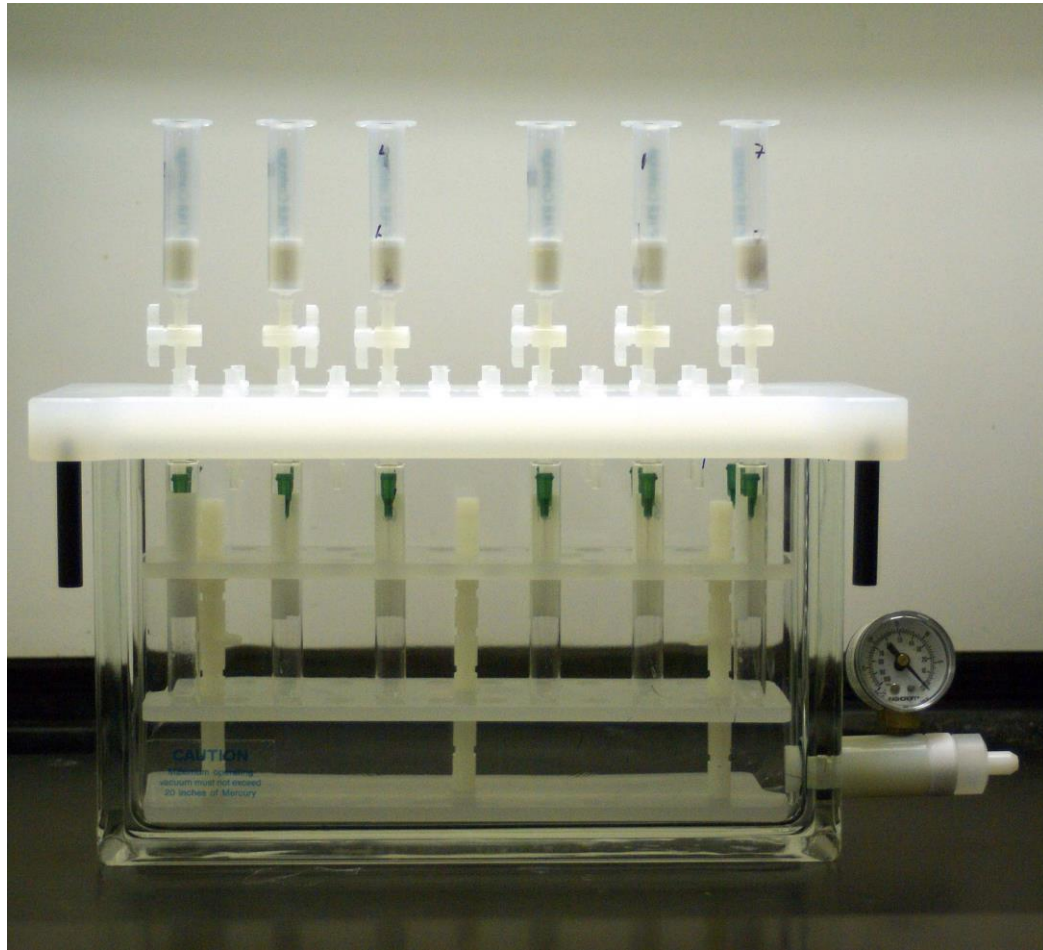
- ▶ Samples are collected in a 250mL Polypropylene Bottle preserved with Trizma (for drinking water)
- ▶ Water should be flushed until temperature stabilizes
- ▶ Sampler must wash hands and wear gloves for sample collection
- ▶ A Field Blank is collected with the sample
- ▶ Samples must be received on Ice <6 C
- ▶ Drinking Water hold time is 14 days and 28 days after extraction



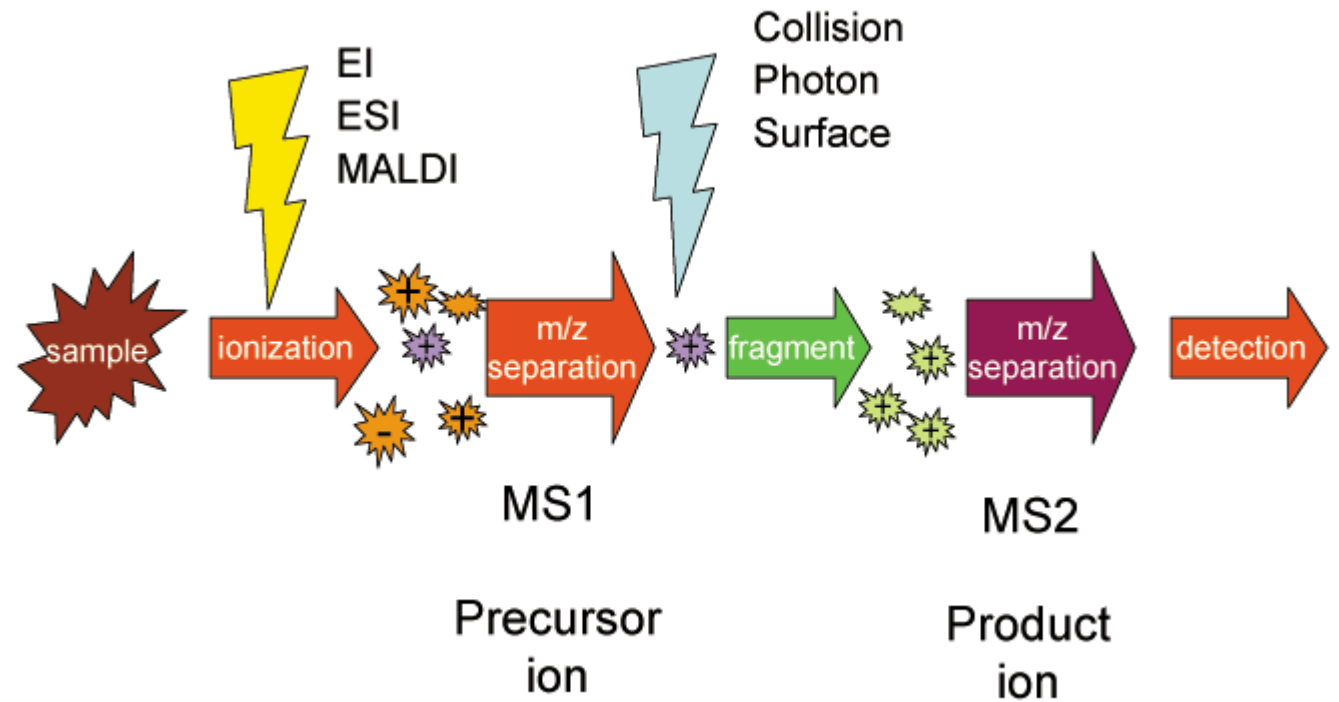
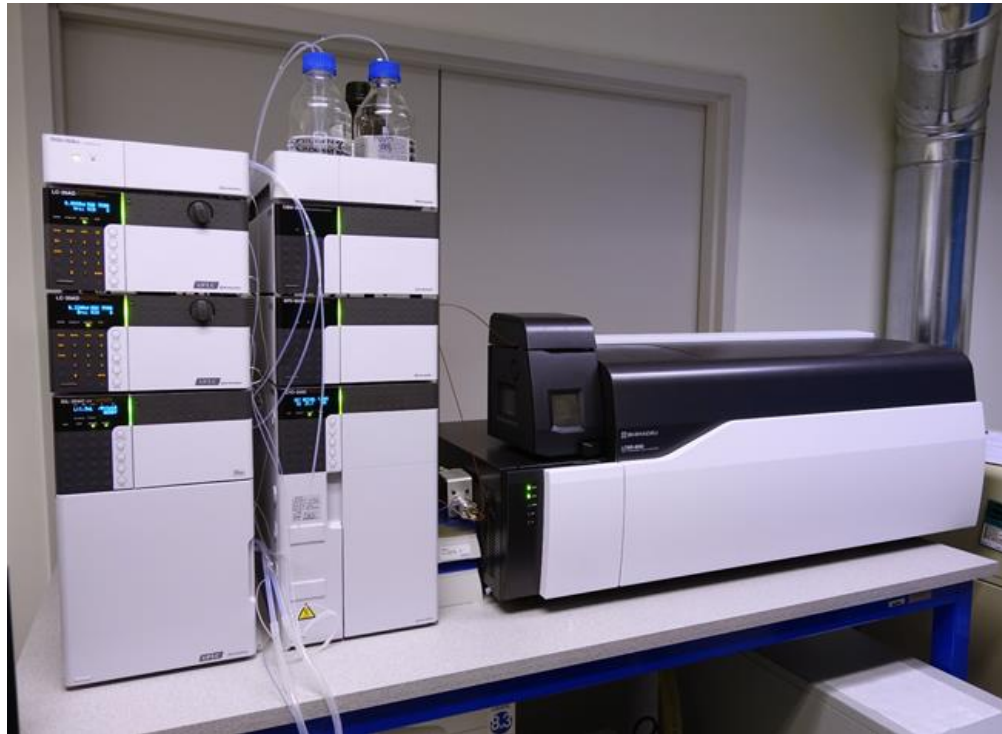
Analysis –Method 537 and 8327

- ▶ Perfluorononanoic acid
- ▶ Perfluorooctanesulfonic acid
- ▶ Perfluorooctanoic acid
- ▶ Perfluorotetradecanoic acid
- ▶ Perfluorotridecanoic acid
- ▶ Perfluoroundecanoic acid
- ▶ 1-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
- ▶ 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid
- ▶ 4,8-dioxa-3H-perfluorononanoic acid
- ▶ Hexafluoropropylene oxide dimer acid
- ▶ N-ethyl perfluorooctanesulfonamidoacetic acid
- ▶ N-methyl perfluorooctanesulfonamidoacetic acid
- ▶ Perfluorobutanesulfonic acid
- ▶ Perfluorodecanoic acid
- ▶ Perfluorododecanoic acid
- ▶ Perfluoroheptanoic acid
- ▶ Perfluorohexanesulfonic acid
- ▶ Perfluorohexanoic acid

Analysis – Solid Phase Extraction and Concentration



Analysis – LC/MS/MS



Questions?

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