

PFAS Testing in Water

Cheat sheet



Drinking water (tap, finished, source)



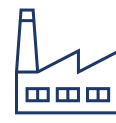
Ambient waters (ground, surface, storm)



Municipal wastewater (influent and effluent)



Industrial wastewater (effluents, process waters)



Targets

- EPA 537.1 or EPA 533; add HFPO-DA where required.
- EPA 537.1 set: measure mid- to long-chain PFAS; EPA 533 - short- to mid-chain PFAS.
- EPA 1633 list for nonpotable waters; add site-specific precursors as needed.
- EPA 1633 set: expand if facility profile indicates broader PFAS.
- EPA 8327 set: dilute-and-shoot method for rapid screening.
- EPA 1633 core plus extended targeted panel; broaden to 70–100+ analytes if compliance requires.

Objective

- Low-ng/L quantitation with minimal background and fast turnaround.
- Robust isotope-dilution quantitation across variable matrices at low-ng/L.
- Accurate results in high-background matrices with proven carryover control.
- Wide-scope quantitation with LOQs at or below action ranges and defensible precision.

Sample prep

- Collect prescribed preservatives and dechlorination.
- Spike isotope surrogates on receipt.
- Load ~250 mL onto SPE; finish at ~1 mL with internal standards.
- Preserve per program and adjust to pH 6–7.
- Spike extracted internal standards up front.
- Spike extracted internal standards; adjust pH 6–7.
- Include matrix blanks and low/high spikes.
- Add extracted internal standards at extraction; adjust pH 6–7.
- Include LSQ/HSQ spikes and matrix blanks each batch.

Extraction

- SPE per method: EPA 537.1 uses reverse-phase SPE, EPA 533 uses WAX SPE; follow elution and reconstitution that retain short chains.
- WAX SPE with method-defined washes and elution.
- Concentrate and reconstitute; add nonextracted internal standards.
- Filtration not recommended. If a lot of suspended solid is observed, additional treatments such like centrifuging may be required.
- WAX SPE followed by carbon cleanup.
- Typical 20x preconcentration.
- WAX SPE and carbon cleanup capturing short and long chains plus polar classes.

Cleanup

- Use PFAS-screened solvents, vials, caps, and rinse solutions.
- Add a PFAS delay column to suppress system background.
- Carbon polishing to reduce interferences.
- Screen all glassware and plastics prior to use.
- Dual-phase WAX-GCB cartridge is applicable for this process.
- Extra water or buffered rinses when surfactants are present.
- Confirm recovery windows before batch release.
- Additional buffering and rinses for heavy surfactant loads.
- Verify no analyte breakthrough or loss across the cleanup train.

Analysis

- LC/MS/MS, negative ESI, dMRM on PFAS-compatible C18.
- Sub-10-minute runs are achievable with optimized gradients and column choice.
- Calibrate 1/x through zero; verify with matrix-matched checks.
- GC/MS/MS (volatile PFAS): HS-SPME or purge-and-trap for FTOHs and related volatiles on a low-bleed column using NCI or EI in dMRM, with inlet and liner blanks.
- LC/MS/MS, negative ESI, dMRM with validated transitions and scheduled windows.
- Bracket with CCVs; apply isotope dilution for all reportables.
- GC/MS/MS (volatile PFAS): HS-SPME from raw water or thermal desorption from sampling media for FTOHs using NCI or EI in dMRM, with baked glassware.
- LC/MS/MS, negative ESI, dMRM with optimized dwell and cycle time.
- Enforce instrument blanks and robust rinse/bake sequences after high hits.
- GC/MS/MS (volatile PFAS): HS-SPME or stir-bar sorptive extraction for FTOHs on a low-bleed column using NCI or EI in dMRM, with rigorous inlet maintenance.
- LC/MS/MS, negative ESI, dMRM with scheduled transitions and retention-window guards.
- Demonstrate LOQs and QC acceptance across the full panel.
- GC/MS/MS (volatile PFAS): Thermal desorption or HS-SPME for FTOHs from process waters using NCI or EI in dMRM, with instrument and solvent blanks.

Common pitfalls

- PFAS background from tubing, caps, wash solvents, or autosampler parts
- Surrogates added after extraction or missing nonextracted internal standards
- Carryover after high hits without instrument blanks or wash runs
- Loss of short chains due to inappropriate final solvent or reconstitution
- Unscreened solvent lots or vials elevating baseline noise
- pH drift outside the method window affecting retention and recovery

QA/QC essentials

- Isotope dilution with extracted internal standards at extraction and nonextracted internal standards postprep
- Initial calibration 5-7 points with 1/x weighting; verify in matrix
- CCV every 10-20 injections; procedural and reagent blanks each batch
- Matrix spikes and duplicates at defined frequency with set recovery and precision limits
- MDL and LOQ established and verified in each matrix
- Record retention times, qualifier ion ratios, and batch acceptance criteria

Reporting and decisions

1. Potable water: report per program method at ng/L with required qualifiers
2. Nonpotable waters: follow method targets with isotope-dilution results and qualifiers
3. Include method ID, analyte list, matrix-specific LOQs, measurement uncertainty, and surrogate recoveries
4. Apply required sum rules and flag exceedances against program limits
5. Note and justify any method deviations

Toolbox

1. Agilent LC/MS/MS and GC/MS/MS platforms with stable dMRM for high throughput and low-level sensitivity in water
2. Agilent columns and plumbing: PFAS-compatible C18 analytical column, PFAS delay column, and low-PFAS flowpath kit
3. Agilent HPLC conversion kits optimized for PFAS - for system background PFAS reduction
4. Agilent SPE and cleanup kits: WAX cartridges for aqueous matrices and carbon polishing where required
5. Agilent PFAS databases and methods: PFAS dMRM transition libraries and eMethod packages for rapid setup and QC
6. Agilent consumables: PFAS-optimized vials, caps, solvent lots, and rinse solutions to suppress background
7. Agilent SLIMS EPA 1633 package to automate many tasks



Know more:

<https://www.agilent.com/en/solutions/environmental/water-testing/pfas-in-water>

See how Agilent supports PFAS analyses:

<https://explore.agilent.com/pursuit-of-pfas>