Reference Materials for Per- and polyfluoroalkyl substances (PFAS)

Alix E. Rodowa, Jessica L. Reiner, Jennifer M. Lynch, Benjamin J. Place

Chemical Sciences Division, National Institute of Standards and Technology
alix.rodowa@nist.gov

What are Reference Materials (RMs)?

- Reference Materials (RMs) and Standard Reference Materials (SRMs) are homogeneous, well-characterized materials that are used to validate measurements and improve the quality of analytical data.
- RMs and SRMs can serve as target materials for method development and measurement for per- and polyfluoroalkyl substances (PFAS)

How do you choose a Reference Materials?

- Similar matrix
  - Same sample preparation requirements
  - Likelihood of similar analyte recovery
- Similar analyte levels
  - Results fall within the same general range of the calibration curve
- Values assigned for analyte(s) of interest
  - Check that the uncertainties on assigned values make the material suitable for your purpose

Reference Materials are too expensive to analyze every day. What can I do?

- Develop an in-house QC material – a stable, homogeneous material with a composition similar to that of the samples
- Analyze your in-house material and the SRM repeatedly (**at least 10 times**) to establish means and standard deviations for the analytes of interest
- Confirm that your results for the SRM agree with the assigned values provided on the Certificate of Analysis or Report of Investigation
- Analyze your in-house QC material with your samples to document control. Establish control charts with your expected mean ± 2 standard deviations to demonstrate control and to identify outliers
- If you want to claim **traceability** to NIST (or another reference material producer) maintain records of your analyses of the in-house QC material and the RM/SRM and calculate all uncertainties

There are 11 Existing NIST Reference Materials for PFAS

What's Measured?

Soil – SRM 2586
Sediment – SRM 1936
Domestic Sludge – SRM 2781
House Dust – SRM 2585
Fish Tissue – SRMs 1946 and 1947

PFSAs in Methanol – RM 8447
PFCAs and PFOSA in Methanol – RM 8446

Human Serum – SRMs 1957 and 1958
Human Plasma – SRM 1950

One to twelve analytes per material

Perfluorocarboxylic acids (PFCAs; C4-C14)
Perfluorosulfonic acids (PFSAs; C4, C6, C8)
Perfluorooctane sulfonamide (PFOSA)

Scan the QR code to view a list of NIST Reference Materials for PFAS

NIST Reference Materials Currently in Progress

Four Aqueous Film Forming Foams (AFFFs)
RMs 8690-8693
Three PFAS in Contaminated Meat Tissues
RMs 8694-8696
Two PFAS in Contaminated Soils
RGTMs 10203 and 10204
Fish Tissue
SRM 1947a

Jar of meat homogenate

Preliminary AFFF aliquots

When using RMs/SRMs: Pay attention to all the information in the Certificate of Analysis, not just the assigned values

- Intended purpose of the material
- Instructions for use such as reconstitution, handling, drying procedures, and storage requirements
- Possible hazard warnings
- Recommended sample sizes (homogeneity)

Table 4. Reference Mass Fractions for Selected Perfluorinated Alkyl Acids (PFAAs)

	Value assigned	Mass Fraction[a] (µg/kg)	Uncertainty
Perfluorohexanoic Acid (PFHxA)	13.0	±	2.0
Perfluoroheptanoic Acid (PFHpA)	7.96	±	1.50
Perfluorooctanoic Acid (PFOA)	28.5	±	3.3
Perfluorohexanesulfonic Acid (PFHxS)	9.39	±	1.76
Perfluorooctanesulfonic Acid (PFOS)	225	±	41
Perfluorooctane Sulfonamide (PFOSA)	6.31	±	0.97

[a] The reference mass fraction value is a weighted mean of the mass fractions determined by the methods indicated for each analyte [1]. The uncertainty listed with each value is an expanded uncertainty about the mean [1,2], with coverage factor, $k = 2$, calculated by combining a pooled within-method variance with a between-method variance [3] following the ISO/JCGM Guide [4,5]. The reference values are reported on a dry-mass basis. For reference values to be valid, the material must be dried according to the instructions provided above.

Need more NIST information on Reference Materials for PFAS?

Email: pfas@nist.gov

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PFAS program at NIST