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Issue #119 February 2018

ALS NATA Accreditation now extends to PFAS in Biota

Introduction

PFAS compounds have been shown to bioaccumulate and biomagnify through the food chain, with a unique affinity for binding to proteins compared to other halogenated organic pollutants which generally favour fatty tissues.

As such, there is growing interest in the analysis of PFAS in biota (plants and animals) for the purposes of understanding impacts to ecosystems in and around contaminated sites, identifying and assessing exposure pathways, and investigating risk to human health. The Guidance Statement issued by EnHealth (April 2017) considered ingestion of food contaminated with PFAS to be the major exposure pathway for human health, with risk-based guidance values for Total Daily Intake (TDI) provided for PFOS/PFHxS (20ng/kgbw/day) and PFOA (160ng/kgbw/day). These values have also been adopted in EPA's recently issued interim statement on PFAS (October 2017).

ALS has recently completed a comprehensive validation on a diverse range of plant and animal matrices for which NATA accreditation has been granted. ALS NATA accreditation covers all Perfluoroalkyl Sulfonic Acids, Perfluoroalkyl Carboxylic Acids and (n:2) Fluorotelomer Sulfonic Acids as listed in the Table 1 (with the exception of Perfluorobutanoic Acid in fish for which accreditation is pending). Accreditation covers the range of biota types, including aquatic species, plants & grasses, and fruits & vegetables. Non-accredited analytes and matrices are still covered by this method and will be flagged as such on the analytical report.

METHOD AND LOR INFORMATION

ALS Method Code

EP231

Limits of Reporting

0.5 TO 5 µg/Kg (see Table 1)

Method Reference

In house

UNIQUE ANALYTICAL CHALLENGES FOR BIOTA SAMPLES

Matrix Interferences

Biota is a broad term, encompassing a diverse range of matrix types. Biota matrices present unique challenges for analysis in that co-extracted components such as proteins, lipids (fats) and pigments have the potential to interfere with detector response (i.e. through enhancement or suppression effects, and through isobaric interferences). A mechanism of clean-up is required to remove or deplete the interfering components. ALS method validation comprised a comprehensive range of biota matrices to ensure method robustness across the biota spectrum, including aquatic species, plants & grasses, and fruits & vegetables.

Sample Homogenisation

For the analytical subsample to be representative of the sample submitted, the sample must be well homogenised. Biota samples can include a combination of both soft parts (e.g. flesh, guts, leaves, etc.) and very hard parts (e.g. shells, bone, branches, etc.) presenting particular challenges for sample homogenisation. ALS has developed comprehensive sample homogenisation procedures including specific apparatus aimed at ensuring that the subsample taken for analysis best represents the sample as submitted.

Subsampling

The decision to test the entire plant/animal sample or only a particular component would be dependent on the site conceptual model and the identified exposure pathways to be investigated. For human exposure, only the edible portion of the sample may be of interest. In the case of crustaceans such as crabs for example, only the meat inside the shell may be of relevance as opposed to the entire crab, including shell. Ideally, only that component of the sample required for analysis should be submitted to the laboratory for analysis. If subsampling a particular component of the submitted sample is required to be performed by the laboratory, this information needs to be clearly communicated to the laboratory prior to sample submission. Note, additional preparation charges may apply depending on the complexity of the procedure required for subsampling. Unless otherwise requested, ALS will process the whole sample as submitted.

Field Sampling

Particular attention needs to be paid to field sampling practices in general when sampling for PFAS, but in particular for biota to avoid the potential for sample cross contamination. The WA Department of Environment Regulation's interim guideline on assessment and management of PFAS provides specific details in terms of field sampling protocols for PFAS, of note is the requirement to change gloves between samples. Glass containers and containers containing Teflon components should be avoided. Samples can be submitted to the laboratory in zip-lock bags (double bagging recommended) or in HPDE plastic containers (both of which can be supplied by ALS).

Table 1. PFAS analytes currently offered for Biota samples

GROUP / ANALYTES – ALS Method Code EP231X	LOR (µg/kg)
Perfluoroalkane Sulfonic Acids	
Perfluorobutane sulfonic acid (PFBS)	1
Perfluoropentane sulfonic acid (PFPeS)	1
Perfluorohexane sulfonic acid (PFHxS)	1
Perfluoroheptane sulfonic acid (PFHpS)	1
Perfluorooctane sulfonic acid (PFOS)	1
Perfluorooctane sulfonic acid (PFOS) - Linear	0.5
Perfluorooctane sulfonic acid (PFOS) - Branched	0.5
Perfluorodecane sulfonic acid (PFDS)	2
Perfluoroalkane Carboxylic Acids	
Perfluorobutanoic acid (PFBA)**	5
Perfluoropentanoic acid (PFPeA)	2
Perfluorohexanoic acid (PFHxA)	1
Perfluoroheptanoic acid (PFHpA)	1
Perfluorooctanoic acid (PFOA)	1
Perfluorononanoic acid (PFNA)	1
Perfluorodecanoic acid (PFDA)	1
Perfluoroundecanoic acid (PFUnDA)	1
Perfluorododecanoic acid (PFDoDA)	2
Perfluorotridecanoic acid (PFTrDA)	2
Perfluorotetradecanoic acid (PFTeDA)	2
Perfluoroalkyl Sulfonamides	
Perfluorooctane sulfonamide (FOSA)	5
N-Methyl perfluorooctane sulfonamide (MeFOSA)	5
N-Ethyl perfluorooctane sulfonamide (EtFOSA)^	2
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)^	2
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)^	2
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)^	1
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)^	1
(n:2) Fluorotelomer Sulfonic Acids	
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	2
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	2
Sums	
Sum of PFAS	1

^ Analytes for which NATA accreditation is pending
** NATA accreditation pending for PFBA in Fish

REFERENCES

WA DER Interim Guideline on the Assessment and Management of PFAS – January 2017
https://www.der.wa.gov.au/images/documents/your-environment/contaminated-sites/guidelines/Guideline_on_Assessment_and_Management_of_PFAS_v2.1.pdf
enHealth – Health Based Guidance Values for PFAS – April 2017
http://www.health.gov.au/internet/main/publishing.nsf/Content/2200FE086D480353CA2580C900817CDC/$File/fs-Health-Based-Guidance-Values.pdf
EPA Interim Position Statement on PFAS – November 2017
http://www.epa.vic.gov.au/our-work/publications/publication/2017/november/1669-1