

**Certificate of the Reference Material**

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**Name of the Material** : L-PFOA and L-PFOS in Ground Water  
**Material Code** : UME EnvCRM 01  
**Issue Date** : 10.02.2021  
**Revision Date** : 20.02.2026 (Revision history can be found on the last page)  
**Validity Period of the Certificate** : 12 months from the sales date  
**Certified Values** :

Parameter (Abbreviation, Cas No)	Mass Fraction (ng/kg)	
	Certified Value <sup>[1]</sup>	Uncertainty <sup>[2]</sup>
Linear perfluorooctanoic acid (L-PFOA, 335-67-1)	4.8	0.7
Linear perfluorooctane sulfonate (L-PFOS, 1763-23-1)	3.8	0.6

- [1] Calculated from the arithmetic mean of the ID LC-HRMS and ID LC-MS/MS methods. The certified values and the uncertainties are traceable to the International System of Units (SI).  
[2] The expanded uncertainty of certified value includes characterization, homogeneity, stability components and is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k = 2$ , which for a normal distribution corresponds to a coverage probability of approximately 95 %. The standard uncertainty of measurement has been determined in accordance with GUM "Guide to the Expression of Uncertainty in Measurement".

TÜBİTAK UME has been accredited by TÜRKAK as a reference material producer under the accreditation number AB-0001-RM in accordance with the TS EN ISO 17034:2018 standard.

Turkish Accreditation Agency (TÜRKAK) is a signatory to the European Cooperation for Accreditation (EA) Multilateral Agreement (MLA) and the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) for the recognition of reference material certificates.

Sales Date



**Assoc. Prof. Mustafa ÇETİNTAŞ**  
Director

The following pages are an integral part of the certificate. The use of current certificate is customers' responsibility.

Most recent certificate can be downloaded from [www.ume.tubitak.gov.tr](http://www.ume.tubitak.gov.tr).

### Informative Values

Parameter	Value <sup>[1]</sup>
Density (at 20 °C)	1.0046 g/cm <sup>3</sup>
pH (at 20 °C)	7.72

[1] The value is based on two independent measurements of two units at one laboratory.

Parameter (Abbreviation, Cas No)	Mass Fraction (ng/kg)	
	Value	Uncertainty <sup>[3]</sup>
Perfluorobutanoic acid (PFBA, 375-22-4)	3.9 <sup>[1]</sup>	1.2
Perfluorobutane sulfonic acid (PFBS, 375-73-5)	3.3 <sup>[2]</sup>	1.0
Perfluorodecanoic acid (PFDA, 335-76-2)	3.9 <sup>[1]</sup>	1.0
Perfluoroheptanoic acid (PFHpA, 375-85-9)	4.0 <sup>[2]</sup>	1.0
Perfluorohexanoic acid (PFHxA, 307-24-4)	4.3 <sup>[1]</sup>	1.1
Perfluorohexane sulfonic acid (PFHxS, 355-46-4)	4.0 <sup>[1]</sup>	1.0
Perfluorononanoic acid (PFNA, 375-95-1)	4.3 <sup>[1]</sup>	1.3
Perfluoropentanoic acid (PFPA, 2706-90-3)	3.6 <sup>[2]</sup>	1.0

[1] The value is based on five independent measurements of five units by ID LC-MS/MS method applied by one laboratory.

[2] The value is based on five independent measurements of five units by IS LC-MS/MS method applied by one laboratory.

[3] The expanded uncertainty of value is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k = 2$ , which for a normal distribution corresponds to a coverage probability of approximately 95 %. The standard uncertainty of measurement has been determined in accordance with GUM "Guide to the Expression of Uncertainty in Measurement".

### Description

The material is filled in a HDPE plastic bottle containing about 98 g of ground water. The bottle and its content were sterilized by  $\gamma$ -irradiation at a minimum dose of 25 kGy. Additional information is presented in the certification report.

### Intended Use

This material is intended to be used for method validation of the determination L-PFOA and L-PFOS mass fractions in ground waters and for quality control purposes.

### Instructions for Use

The material is for single use therefore, measurement should be conducted using the entire content (~ 98 g) of the bottle. After transferring the content for measurement, for possible remaining sticking

content, it is recommended to wash inner surface of the bottle and cap with a solvent such as methanol and add this wash solution to the clean-up process at elution step.

This material can be safely dispatched under conditions where the temperature does not exceed 60 °C for up to one week, i.e. at ambient temperature without applying any cooling elements.

### Storage Conditions

This material should be stored at (18 ± 4) °C in a dark and clean environment.

TÜBİTAK UME cannot be held responsible for changes that might happen to the material at customer's premises due to noncompliance with the instructions for use, and the storage conditions given in the certificate.

### Safety Information

For laboratory use only. The usual laboratory safety measures apply.

### Participants

Information about the laboratories participated in the characterization study are given in the table.

Laboratory	Address
SYKE	Finnish Environment Institute, Helsinki, FINLAND
TÜBİTAK UME	Ulusal Metroloji Enstitüsü, P.K. 54 41470 Gebze - Kocaeli, TURKEY

### Methods and/or Techniques Used for the Determination of the Certified Values

Techniques used in the characterisation studies:

Method/Technique	Parameter
Isotope Dilution Liquid Chromatography Tandem Mass Spectrometry (ID-LC-MS/MS)	L-PFOA, L-PFOS
Isotope Dilution Liquid Chromatography High Resolution Mass Spectrometry (ID-LC-HRMS)	

### Revision History

Date	Remarks
10.02.2021	First issue.
11.10.2021	Certificate is updated due to changes in the format of certificate for reference materials.
20.02.2026	Certificate is updated due to corporate identity (logo) change of TÜBİTAK UME.