

National Institute of Advanced Industrial Science and Technology

## National Metrology Institute of Japan



## Reference Material Certificate

NMIJ CRM 4056-a  
No. +++



## Perfluorooctanoic acid

This certified reference material (CRM) is produced in accordance with the NMIJ's management system and is in compliance with ISO 17034 and ISO/IEC 17025. This CRM is intended for use in the calibration of instruments or for confirming the validity of analytical methods or instruments during quantification of perfluorooctanoic acid (PFOA).

**Certified Value**

The certified value for this CRM is the purity (mass fraction) given in the table below. The uncertainty of the certified value is the expanded uncertainty obtained by multiplying the combined standard uncertainty by a coverage factor ( $k$ ) of 2, and it is the half-width of an interval estimated to have a level of confidence of approximately 95 %.

Substance	CAS No.	Certified value Mass fraction (kg/kg)	Expanded uncertainty Mass fraction (kg/kg)
Perfluorooctanoic acid (2,2,3,3,4,4,5,5,6,6,7,7,8,8,8- pentadecafluorooctanoic acid	335-67-1	0.959	0.005

**Analysis**

The certified value of this CRM was determined as an average value of the analytical results based on the titration and subtraction methods. The analytical results based on the titration method were determined by subtracting the mass fractions of impurities measured by using a liquid chromatograph equipped with a mass spectrometer (LC-MS) from those of purity expressed as acid measured by the neutralization titration method using a potentiometric titrator (PT). The analytical results based on the subtraction method were determined by subtracting the mass fractions of impurities measured with LC-MS and a Karl Fischer (KF) titrator from 1. As for the subtraction method, no notable mass was observed by the test method for evaluation of residue upon evaporation.

**Metrological Traceability**

The certified value of this CRM was determined by titration as the primary method of measurement with NMIJ CRM 3001-a (potassium hydrogen phthalate) and by the subtraction method, where impurities were measured with calibration standards evaluated at NMIJ. The certified value is traceable to the International System of Units (SI).

**Indicative Value**

This CRM contains water, the indicative value of the mass fraction is given in the table below. It was estimated with KF titrator. The uncertainty of the indicative value is the expanded uncertainty obtained by multiplying the combined standard uncertainty by a coverage factor ( $k$ ) of 2, and it is the half-width of an interval estimated to have a level of confidence of approximately 95 %.

Substance	Indicative value, Mass fraction (g/kg)	Expanded uncertainty Mass fraction (g/kg)
Water	40.7	0.6

**Mutual Recognition Arrangement under Meter Convention**

The certified value of this CRM is recognized for international equivalence based on the Mutual Recognition Arrangement under the Metre Convention (CIPM MRA). The calibration measurement capability (CMC) of NMIJ related to this CRM is registered in the Key Comparison Database (KCDB) (see <https://www.bipm.org/kcdb/>) of the International Bureau of Weights and Measures (BIPM).

**Expiration of Certification**

This certificate is valid for one year from the date of shipment, provided that the material is stored in accordance with the instructions given in this certificate.

**Description of the material**

This CRM is PFOA in the form of a white powder at room temperature. This CRM of 50 mg in net volume is sealed in a 4-mL amber glass vial, and the vial is sealed in an aluminum-laminated plastic bag.

**Instructions for Storage**

This CRM should be stored at a temperature between 0 °C and 6 °C and shielded from light.

**Instructions for Use**

This CRM is for laboratory use only. The recommended sample mass is 10 mg or more for one analysis. The vial of this CRM should be allowed to warm to room temperature for one hour or more before opening. This CRM should be used promptly once the vial is opened. Careful attention should be paid to this material as it is a hygroscopic substance. Any notable change in water concentration was not observed under ambient conditions (23 °C to 25 °C, RH: 20 % to 60 %).

**Precautions for Handling**

Keep away from heat and ignition sources. Wear personal protective equipment such as safety mask and gloves in handling. The use, handling, and storage of this CRM should be carried out according to the laws regulating the components of this CRM. Refer to the safety data sheet (SDS) on this CRM before use.

**Preparation**

This CRM was prepared using commercial PFOA.

**Technical Information**

This CRM contains branched PFOA. The mass fraction of this impurity in this CRM at the time of the certification was estimated to be 0.001 kg/kg by using LC-MS.

**NMIJ Analysts**

The technical manager for this CRM is NUMATA M. The production manager is HANARI N. The analysts are HANARI N., YAMAZAKI T., ITOH N, YARITA T., FUJIKI N., IWASAWA R. and AOYAGI Y.

**Information**

If substantive technical changes occur that affect the certification before the expiration of this certificate, NMIJ will notify the registered customer. Customer registration on the NMIJ Website (given below) will facilitate notification. Technical reports regarding this CRM can be obtained from the contact details given below.

**Reproduction of Certificate**

In reproducing this certificate, it should be clearly indicated that the document is a copy.

April 1, 2020

ISHIMURA Kazuhiko  
President

National Institute of Advanced Industrial Science and Technology

If you have any questions about this CRM, please contact:  
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Revision history

- April 1, 2015: "Metrology Management Center" was renamed to "Center for Quality Management of Metrology."
- May 14, 2015: The description in "Expiration of Certification" was changed to "one year from the date of shipment."
- May 14, 2015: The description on Mutual Recognition Arrangement under Metre Convention was added.