National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 6009-a
No. +++

Triolein

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 the primary standard in the SI traceability system. It is intended for use in calibration of analytical instruments, quality control of analytical instruments, and validation of analytical techniques and instruments for the determination of triolein. In addition, this CRM can be used for the preparation of standard solutions used in triglyceride analysis for the measurement of levels of neutral fat in serum. When this CRM is used in a particular assay, the commutability should be verified.

Certified Values

The certified value is purity (in mass fraction) of triolein and mass fraction of total triglyceride, given in the tables below. The uncertainty of the certified value is the half-width of the expanded uncertainty interval calculated using a coverage factor (k) of 2, which gives a level of confidence of approximately 95 %.

	CAS No.	Certified value, Mass fraction (kg/kg)	Expanded uncertainty, Mass fraction (kg/kg)
Triolein (2,3-Bis[[(Z)-octadec-9-enoyl]oxy]propyl (Z)-octadec-9-enoate)	122-32-7	0.994	0.003

	Certified value, Mass fraction (kg/kg)	Expanded uncertainty, Mass fraction (kg/kg)
Total triglyceride	1.000	0.002

Analysis

The certified value for total triglyceride is the weighted mean of mass fractions determined by the subtraction method and nuclear magnetic resonance (NMR) method. In the subtraction method, impurities were analyzed using Karl Fischer titration, a head space-gas chromatograph/mass spectrometer (HS-GC-MS), and a thermogravimeter (TG).

The certified value for triolein purity was determined by subtracting the mass fraction of triglyceride impurities other than triolein from that of total triglyceride. Triglyceride impurities other than triolein were analyzed using a high-performance liquid chromatograph equipped with a corona-charged aerosol detector (HPLC-CAD).

Metrological Traceability

The mass fraction of total triglyceride was determined with NMR by using benzoic acid, as an internal standard, calibrated using 1,4-dichrolobenzene (NMIJ CRM 4039-a). Water content in the CRM was determined by Karl Fischer titration. Residue after ignition was determined with a TG calibrated with a JCSS-calibrated weight. The residual solvent amount was determined with an HS-GC-MS by using standard solutions. Organic impurities including triglyceride impurities were determined with an HPLC-CAD by using standard solutions. The purity of the standard materials used in the measurements was evaluated by NMIJ. The certified value was traceable to the International System of Units (SI).

Mutual Recognition Arrangement under Meter Convention

This certificate is consistent with the calibration and measurement capabilities (CMCs) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures (CIPM). Under the MRA, all participating institutes recognize the validity of each other's calibration and measurement certificates for the quantities, ranges and measurement uncertainties specified in Appendix C (as for Appendix C of MRA, see http://kcdb.bipm.org/AppendixC/default.asp).

Expiration of Certification

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

Sample Form

This CRM is in the form of a white solid at –20 °C and a clear liquid at room temperature. The CRM of ca. 250 mg in net volume is kept in an amber glass vial with argon gas. The glass vial is sealed in an aluminum-laminated bag.

Homogeneity

The homogeneity of the CRM was measured by analyzing the ten vials selected from 200 vials by a random sampling method. The area percentage of triolein was determined with an HPLC-CAD. From the results, variation in purity (in mass fraction) between vials was estimated as homogeneity. This was reflected in the uncertainty of the certified value.

Precautions for Storage

This CRM should be stored at a temperature of –20 °C or less in a clean place and shielded from light.

Instructions for Use

Considering the homogeneity, a minimum sample mass of 10 mg should be used for each measurement and sample preparation. The vial of this CRM should be allowed to warm to room temperature before use. Further, the CRM should be used promptly once the vial is opened to prevent oxidation. This CRM is for laboratory use only and not for "in vivo" use.

Precautions for Handling

Refer to the safety data sheet (SDS) on this CRM before use.

Preparation

The CRM was synthesized and purified by Tsukishima Foods Industries Co., Ltd. Purified triolein was filled into amber glass vials in an argon atmosphere by Wako Pure Chemical Industries, Ltd.

Technical Information

The CRM contained several triglyceride impurities. The total concentration of triglyceride impurities was estimated as 5.5 g/kg by using an HPLC-CAD. The average molecular weight of total triglyceride was 885.49, which was very close to the molecular weight of triolein (885.46).

NMIJ Analysts

The technical manager is TAKATSU A., the production manager is KAWAGUCHI M., and the analysts are KAWAGUCHI M., YAMAZAKI T., KITAMAKI Y., YOSHIOKA M. and EYAMA S.

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
March 19, 2014: The limit of validity of the certificate was extended from "March 31, 2015" to "March 31, 2018."
April 1, 2015: "Metrology Management Center" was renamed to "Center for Quality Management of Metrology."
November 22, 2016: The description on Mutual Recognition Arrangement under Meter Convention was added.
The description in "Expiration of Certification" was changed to "one year from the date of shipment."