National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 6025-a
No. +++

L-Cystine

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 primarily intended for the calibration of analytical instruments, preparation of standard solutions, and validation of analytical methods and instruments used for the amino acid analysis.

Certified Values

The certified value for the purity (in mass fraction) of L-cystine is 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)
L-Cystine ((2*R*)-2-amino-3-{[(2R)-2-amino-2-carboxyethyl] disulfanyl} propanoic acid)	56-89-3	0.998	0.003

The purity (in mass fraction) of cystine including L-, D- and *meso*- isomers is 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	Certified value, Mass fraction (kg/kg)	Expanded uncertainty, Mass fraction (kg/kg)
Cystine (L-, D-, *meso*-isomers)	0.998	0.003

Analysis

These certified values are based on the results of acidimetric titration, nitrogen determination by the Kjeldahl method, and impurity determination by high performance liquid chromatography (HPLC). Impurities of amino acids were identified and quantified by HPLC with visible detection after derivatization using ninhydrin and by liquid chromatography/mass spectrometry (LC/MS).

Metrological Traceability

The certified value was determined using titrimetry as the primary method of measurement, with NMIJ CRM 3001-a (potassium hydrogen phthalate) and NMIJ CRM 3005-a (sodium carbonate) as the primary standards, and by impurity determination using a HPLC calibrated with purity-evaluated amino acids. It is traceable to the International System of Units (SI).

Mutual Recognition Arrangement under Meter Convention

The certified value and expanded uncertainty of this CRM without enantiomeric separation (mass fraction) 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 this CRM remains unopened and is stored in accordance with the instructions given in this certificate.

Description of the material

This CRM is in the form of a white powder of L-Cystine. This CRM of 0.5 g in net volume is kept in a brown 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 15 °C and 25 °C in a clean desiccator and shielded from light.

Instructions for Use

From the homogeneity, a minimum sample mass of 30 mg should be used. This CRM is for laboratory use only and not for in vivo use. The CRM should be used promptly once the vial is opened. In preparing standard solutions, the stability of the cystine standard solution should be considered, as cystine in aqueous solution is known to be gradually decomposed into cysteine.

Precautions for Handling

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

Preparation

Preparation of the material was performed by Wako Pure Chemical Industries, Ltd. Highly purified L-cystine provided by Wako Pure Chemical Industries, Ltd. was bottled into vials under argon atmosphere, and each vial was then sealed in an aluminum-laminated bag.

Technical Information

At the time of the certification, the mass fraction of *meso*-cystine was approximately 0.2 g/kg, and the mass fraction of cysteine was under 0.1 g/kg.

NMIJ Analysts

The technical manager for this CRM is TAKATSU A. and the production manager is YAMAZAKI T. The analysts are YAMAZAKI T., KATO M., EYAMA S. and YOSHIOKA M.

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."
November 20, 2017: The description in "Expiration of Certification" was changed to "one year from the date of shipment."
January 28, 2019: The description on "Mutual Recognition Arrangement under Meter Convention" was added.