

National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan



Reference Material Certificate

NMIJ CRM 3013-a
No. +++

Calcium Carbonate

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 standardization of ethylenediaminetetraacetic acid (EDTA) on chelatometric titration and for use in the calibration of procedures for calcium determination.

Certified Value

The certified value for calcium in this CRM is given in the table 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 %.

	Certified value, Mass fraction (%)	Expanded uncertainty, Mass fraction (%)
Calcium (Calcium expressed as calcium carbonate)	39.973 (99.824)	0.013 (0.032)

Analysis

The certified value of this CRM was determined by titrimetry based on a chelate-forming reaction between calcium ions and EDTA. The atomic weight of calcium (40.078) and the formula weight of calcium carbonate (100.0868) were calculated from the IUPAC atomic weight table (2017). The value of 2.711 g cm^{-3} (25 °C) was used as the density of calcium carbonate for air-buoyancy correction.

Metrological Traceability

The certified value of this CRM was determined by titrimetry as the primary method of measurement. The EDTA used as a titrant was standardized on the basis of high-purity copper assayed by both electrogravimetry and impurity analysis. Analytical instruments for the measurements were calibrated on Japan Calibration Service System (JCSS). Therefore, the certified value is 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

The 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.

Sample Form

This CRM is in the form of a white powder in a glass bottle (net mass 25 g).

Homogeneity

The homogeneity of this CRM was determined by chelatometric titration analyzing 10 bottles chosen from 200 bottles by stratified random sampling on the basis of the order of bottling. The homogeneity of calcium is reflected in the uncertainty of the certified value.

Instructions for Storage

This CRM should be stored at a temperature between 15 °C and 35 °C, at a relative humidity of 60% or less, and shielded from light. Careful attention is needed as this material is a deleterious substance.

Instructions for Use

This CRM should be dried for 2 h at 110 °C without crushing and then maintained at room temperature for 1 h in a silica-gel desiccator. The use of samples whose mass is less than 0.2 g is not recommended. Dried material should be used promptly after drying and should not be dried again.

Precautions for Handling

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

Preparation

Commercially available calcium carbonate subdivided into glass bottles by 25 g was purchased.

Technical Information

The mass fractions of strontium, magnesium, and zinc were determined as 19 mg kg⁻¹, 2.4 mg kg⁻¹, and 2.4 mg kg⁻¹, respectively, by ICP mass spectrometry. No other metal elements forming chelate complexes with EDTA were detected at a mass fraction greater than 0.5 mg kg⁻¹. The effect of these impurities on EDTA titration is reflected in the uncertainty of the certified value.

NMIJ Analysts

The technical manager for this CRM is MIURA T., the production manager is SUZUKI T., and the analysts are SUZUKI T. and NONOSE N.

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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National Metrology Institute of Japan,
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Revision history

April 1, 2015: “Metrology Management Center” was renamed to “Center for Quality Management of Metrology.”

July 4, 2018: The description on “Mutual Recognition Arrangement under Meter Convention” was added.

September 19, 2019: Expanded uncertainty of certified value for calcium expressed as calcium carbonate was changed to 0.032 %.

Sample