

National Institute of Advanced Industrial Science and Technology

## National Metrology Institute of Japan



## Reference Material Certificate

NMIJ CRM 3005-a  
No. +++

Sodium 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 titrants for acidimetry and so on.

**Certified Value**

The certified value of 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 (%)
Bases expressed as sodium carbonate	99.970	0.020

**Analysis**

The certified value of this CRM was determined by analyzing 10 bottles, which were chosen by stratified random sampling on the basis of the order of bottling. At first, the concentration of a diluted sulfuric acid solution was determined by acidimetric coulometric titration; then, the diluted sulfuric acid solution was added in excess to sodium carbonate, and its excess was gravimetrically titrated with a sodium hydroxide solution whose concentration was determined by gravimetric titration with the diluted sulfuric acid. The molar mass of sodium carbonate (105.9884) was calculated from the IUPAC atomic weight table (2007). A value of  $96\,485.3399\text{ C mol}^{-1}$  was used for the Faraday constant (CODATA: 2006). A value of  $2.54\text{ g cm}^{-3}$  (25 °C) was used as the density of sodium carbonate for air-buoyancy correction.

**Metrological Traceability**

The certified value of this CRM was determined by coulometric titration as a primary method of measurement, and 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**

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.

**Sample Form**

This CRM is in the form of a white powder at room temperature, contained within an amber glass bottle (net mass 50 g).

### Homogeneity

The homogeneity of this CRM was determined by coulometric titration analysis of 10 bottles, which were chosen by stratified random sampling on the order of bottling. The homogeneity 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.

### Instructions for Use

This CRM should be dried for 4 h at 280 °C (within  $\pm 10$  °C) and then held at room temperature for 1 h in a silica-gel desiccator. The recommended minimum sample mass is 0.4 g or more for one analysis. The 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

The source material of this CRM was purchased from Wako Pure Chemical Industries, Ltd., and the original source was GFS Chemicals.

### NMIJ Analysts

The technical and production managers for this CRM are HIOKI A. and the analyst is ASAKAI T.

### 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,  
Center for Quality Management of Metrology, Reference Materials Office,  
1-1-1 Umezono, Tsukuba, Ibaraki 305-8563, Japan  
Phone: +81-29-861-4059; Fax: +81-29-861-4009, <https://unit.aist.go.jp/nmij/english/refmate/>

Revision history

August 10, 2012: The expiration of this certificate was changed from March 31, 2014 to March 31, 2019.

August 10, 2012: The description on the Mutual Recognition Arrangement (CIPM MRA) was added.

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

October 25, 2017: The description in "Expiration of Certification" was changed to "one year from the date of shipment."  
Expanded uncertainty of certified value was changed to 0.020 %.

Sample