National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan, Certificate

Reference Material Certificate

NMIJ CRM 3003-a
No. +++

Arsenic(III) Trioxide

National Institute of Advanced Industrial Science and Technology
AIST

This certified reference material (CRM) was produced in accordance with the NMIJ's management system, and in compliance with JIS Q 0034 (ISO GUIDE 34). This CRM is intended for use in the standardization of titrants for iodometry and so on.

Certified Value

The certified value, mass fraction (%) of reductants expressed as arsenic(III) trioxide, 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 (%)
Reductants expressed as arsenic(III) trioxide	100.001	0.018

Analysis

The certified value of this CRM was determined by analyzing 9 bottles selected by stratified random sampling on the basis of the order of bottling. The analysis was based on oxidimetric coulometric titration using electrogenerated iodine. The possible amount of As(V) generated during analysis or existing in the material was considered in order to estimate the uncertainty. The certified value is the mass fraction of reductants expressed as arsenic(III) trioxide. The formula mass of arsenic(III) trioxide (197.8414) was calculated on the basis of the IUPAC atomic weight table (2007). The value 96 485.339 9 C/mol was used for the Faraday constant. The value 3.74 g/cm^3 (25 °C) was used as the density of the arsenic(III) trioxide for the purpose of air-buoyancy correction.

For the oxidimetric coulometric titration, the following solution was used as the sample: This material (1.3 g) was dissolved into 20 mL of a 2.6 mol/L ammonia solution using mild heating for 30 min. After the solution was neutralized with 1.0 mol/L sulfuric acid and diluted with water to 1000 mL, the pH of the solution was 3 to 6. Although the preparation was carried out in the atmosphere, the water for the dilution was used after deaeration by a supersonic wave. The amount-of-substance fraction of As(V) to As(III) in this solution was approximately 0.020%. If this material is dissolved into a sodium hydroxide or sodium carbonate solution, the amount-of-substance fraction of As(V) to As(III) would increase as compared with the dissolution into the ammonia solution, according to our investigation.

Metrological Traceability

The certified value of this CRM was determined by oxidimetric coulometric titration as the primary method of measurement and is traceable to the International System of Units (SI).

Mutual Recognition Arrangement (CIPM MRA)

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 until March 31, 2019, provided that the material remains unopened and stored in accordance with the instructions given in this certificate.

Sample Form

This CRM is in the form of a white powder. The net mass is 10 g, kept in a brown glass bottle.

Homogeneity

The homogeneity of this CRM was determined by analyzing 9 bottles selected by stratified random sampling on the basis of the order of bottling. The homogeneity is reflected in the uncertainty of the certified value.

Instructions for Storage

This CRM should be kept at room temperature (15 °C to 35 °C) and a humidity of 60% or less and should not be affected by acids/bases and others. Careful attention is needed as this material is poisonous.

Instructions for Use

This CRM should be dried for 2 h at 110 °C and then maintained at room temperature for 30 min in a silica-gel desiccator. The recommended minimum sample mass is 1.3 g or more for one analysis. Dried material should not be dried again. Refer to the safety data sheet (SDS) on this CRM before use.

Preparation Method

This CRM was purchased from Wako Pure Chemical Industries, Ltd.

NMIJ Analysts

The technical and production manager for this CRM is A. Hioki and the analyst is T. Suzuki.

Technical Information

Customer registration on the NMIJ Website (given below) will facilitate notification of any revision of the information given above. 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, 2015

Ryoji Chubachi
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
December 20, 2012: The expiration of this certificate was changed from March 31, 2014 to March 31, 2019.
December 20, 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."