National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 3003-b
No. +++

Arsenic(III) Trioxide

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 to standardize titrants for iodometry 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 (%)
Reductants expressed as arsenic(III) trioxide	100.001	0.015

Analysis

The certified value was determined by analyzing 10 bottles which was selected by a stratified random sampling on the basis of the order of bottling. The analysis is based on oxidimetric coulometric titration using electrogenerated iodine. The possible amount of As(V) generated during analysis or existing in the material was considered to correct the result of the coulometric titration and estimate the uncertainty. The certified value is the mass fraction of reductants expressed as arsenic(III) trioxide. The formula mass of arsenic(III) trioxide (197.84139) was calculated on the basis of the IUPAC atomic weight table (2013). The value 96485.33289 C/mol was used for Faraday constant on the basis of 2014 CODATA recommended values. The value 3.738 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 (1.0 g) was dissolved into 20 mL of a 2.6 mol/L ammonia solution using mild heating for 30 min. After the solution was neutralised with 1.0 mol/L sulfuric acid and diluted with water to 757 g, the pH of the solution was 3 to 6. Though the preparation was carried out in the atmosphere, the water for the dilution was used after deaeration by a supersonic wave.

Metrological Traceability

The certified value was determined by oxidimetric coulometric titration as a primary method of measurement with analytical instruments calibrated on Japan Calibration Service System (JCSS), 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. The net mass is 10 g, kept in a brown glass bottle. The glass bottle is sealed in a plastic bag.

Homogeneity

The homogeneity of this CRM was determined by analyzing 10 bottles which was selected by a 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 stored at a temperature between 15 °C and 35 °C, at a relative humidity 60 % or less, and shielded from light.

Instructions for Use

It should be dried for two hours at 110 °C and then stood at room temperature for 30 min in silica-gel desiccator. The recommended minimum sample mass is 1.0 g or more for one analysis. The material dried should not be dried again.

When this material was dissolved into the ammonia solution in accordance with the procedure given in this certificate, the amount-of-substance ratio of As(V) to As(III) in the solution was approximately 0.020 %. On the other hand, this material was dissolved into a sodium hydroxide solution or a sodium carbonate one, the ratio would increase compared with the dissolution into the ammonia solution, according to our investigation.

Precautions for Handling

Careful attention should be paid to this material being poison. Refer to the safety data sheet (SDS) on this CRM before use.

Preparation

Commercially available arsenic trioxide was purchased.

NMIJ Analysts

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