National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 3012-a
No. +++
Tris(hydroxymethyl)aminomethane

This certified reference material (CRM) was produced in accordance with the NMIJ’s management system and in compliance with ISO GUIDE 34:2009 and ISO/IEC 17025:2005. This CRM is intended for use in the standardization of titrants in titrimetry.

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%.

<table>
<thead>
<tr>
<th>Bases expressed as</th>
<th>Certified value, Mass fraction (%)</th>
<th>Expanded uncertainty, Mass fraction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>tris(hydroxymethyl)aminomethane</td>
<td>99.99</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Analysis
The certified value was determined by analyzing 11 bottles, which were chosen by stratified random sampling based on the order of bottling. At first, the concentration of a diluted hydrochloric acid solution was determined by acidimetric coulometric titration; then, the diluted hydrochloric acid solution was added in excess to tris(hydroxymethyl)aminomethane, and its excess was determined by acidimetric coulometric titration. The molar mass of tris(hydroxymethyl)aminomethane (121.135 2) was calculated from the IUPAC atomic weight table (2009). A value of 96.485.3365 C mol⁻¹ was used for the Faraday constant (CODATA: 2010). A value of 1.35 g cm⁻³ (25 °C) was used as the density of tris(hydroxymethyl)aminomethane for air-buoyancy correction.

Metrological Traceability
The certified value 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://kdcb.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, contained within a plastic bottle (net mass 25 g).

Homogeneity
The homogeneity of the CRM was determined by coulometric titration analysis of 11 bottles, which were chosen by stratified random sampling based on the order of bottling. The homogeneity is reflected in the uncertainty of the certified value.

Instructions for Storage
This CRM should be kept at 15 °C to 35 °C at a relative humidity of 60 % or less, and shielded from light. Careful attention should be paid to handling of this material, given that it is deleterious.

Instructions for Use
A 0.5 g to 3 g portion of this CRM is crushed to a fine powder (to prevent thermal decomposition, it should not be ground) using an agate or other nonreactive material for 3 min to 6 min. This crushed material is held for 24 h in a vacuum desiccator (less than 2 kPa of initial internal pressure) with silica gel at 15 °C to 35 °C. The dried material should be used promptly after drying and should not be dried again. The use of samples with a mass of less than 0.2 g is not recommended.

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

Preparation Method
The source material of this CRM was purchased from Wako Pure Chemical Industries, Ltd.

Information
The value of the bases, expressed as tris(hydroxymethyl)aminomethane dried for 24 hours in a vacuum desiccator (at less than 2 kPa of initial internal pressure) with silica gel at room temperature (15 °C to 35 °C) without crushing, was 99.922 % (mass fraction). The pH value of a solution including 0.06667 mol kg$^{-1}$ of tris(hydroxymethyl)aminomethane dried at 70 °C for 2 hours and 0.05 mol kg$^{-1}$ of hydrochloric acid was determined by the Harned cell method as 7.693 (25 °C).

NMIJ Analysts
The technical manager for this CRM is T. Miura, the production manager is T. Asakai, and the analyst is T. Asakai.

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:

National Institute of Advanced Industrial Science and Technology,
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://www.nmij.jp/english/service/C/

Revision history
April 1, 2015: “Metrology Management Center” was renamed to “Center for Quality Management of Metrology.”
October 3, 2017: The description in “Expiration of Certification” was changed to “one year from the date of shipment.”
The certified value and the expanded uncertainty were changed to 99.99% and 0.10%, respectively.
Supplement

Tris(hydroxymethyl)aminomethane

This picture shows the forms of this CRM before and after the crushing described in the “Instructions for Use” of the certificate. This CRM should be crushed to a fine powder, only as outlined in the certificate.

The forms before crushing (left) and after crushing (right).