

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), Tris(hydroxymethyl)aminomethane [2-Amino-2-hydroxymethyl-1,3-propanediol], was produced in accordance with the NMIJ's management system and in compliance with ISO 17034 and ISO/IEC 17025. This CRM is intended for use in the standardization of titrants in titrimetry 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 tris(hydroxymethyl)aminomethane	99.99	0.10

**Analysis**

The certified value was determined by coulometric titration. At first, the concentration of a diluted hydrochloric acid solution was determined by coulometric titration; then, the diluted hydrochloric acid solution was added in excess to tris(hydroxymethyl)aminomethane, and its excess was determined by coulometric titration. The molar mass of tris(hydroxymethyl)aminomethane (121.135 2) was calculated from the IUPAC atomic weight table (2009). A value of  $96\,485.3365\text{ C mol}^{-1}$  was used for the Faraday constant (CODATA: 2010). A value of  $1.35\text{ g cm}^{-3}$  (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://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 and it of ca. 25 g in net volume is kept in a plastic bottle.

**Homogeneity**

The homogeneity of this CRM was determined by analyzing 11 bottles chosen from 200 bottles by a stratified random sampling with 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 and at a relative humidity of 60 % or less in a clean place shielded from light. It should not be affected by acids, bases, oxidants, reductants, organic substances and others.

**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 a mortar made of 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 recommended minimum sample mass is 0.2 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 for this CRM was purchased from Wako Pure Chemical Industries, Ltd.

**Technical Information**

The value of the bases, expressed as tris(hydroxymethyl)aminomethane was 99.922 % (mass fraction), when this CRM was dried for 24 hours in a vacuum desiccator (at less than 2 kPa of initial internal pressure) with silica gel at a temperature between 15 °C and 35 °C without crushing. The pH value of a solution including 0.06667 mol kg<sup>-1</sup> of this CRM dried at 70 °C for 2 hours and 0.05 mol kg<sup>-1</sup> of hydrogen chloride was determined by the Harned cell method as 7.693 (25 °C).

**NMIJ Analysts**

The technical manager for this CRM is MIURA T., the production manager is ASAKAI T., 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:  
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://unit.aist.go.jp/nmij/english/refmate/>

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 expanded uncertainty and Expiration of Certification were changed.

## 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).