

National Institute of Advanced Industrial Science and Technology

## National Metrology Institute of Japan



## Reference Material Certificate

NMIJ CRM 4058-a  
No. +++*tert*-Butylmethylether (MTBE)

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 calibration of analytical instruments, quality control of analytical instruments, and validation of analytical techniques and instruments.

**Certified Values**

The certified values are purities in the amount-of-substance fraction and in the mass fraction, given in the tables 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 %.

Substance (IUPAC Name)	CAS No.	Certified Value, Amount-of-substance Fraction (mol/mol)	Expanded Uncertainty, Amount-of-substance Fraction (mol/mol)
<i>tert</i> -Butylmethylether (2-Methoxy-2-methylpropane)	1634-04-4	0.9986	0.0004

Substance (IUPAC Name)	CAS No.	Certified Value, Mass Fraction (kg/kg)	Expanded Uncertainty, Mass Fraction (kg/kg)
<i>tert</i> -Butylmethylether (2-Methoxy-2-methylpropane)	1634-04-4	0.9995	0.0003

**Analysis**

Purity in the amount-of-substance fraction was determined by the freezing point depression method with an adiabatic calorimeter by using a fractional melting method. Combined standard uncertainty of the purity in the amount-of-substance fraction was estimated by the combination of standard uncertainties due to the purity determination, homogeneity test and stability test. Purity in the mass fraction was converted from the purity in the amount-of-substance fraction by using the molecular weight of MTBE and concentrations of impurities. Combined standard uncertainty of the purity in the mass fraction was estimated by combination of standard uncertainties due to the molecular weight of MTBE, average molecular weight of impurities and the purity in the amount-of-substance fraction.

**Metrological Traceability**

The purity in the amount-of-substance fraction was determined by the freezing point depression method with an adiabatic calorimeter. Temperature (platinum resistance thermometer), voltage (digital multi-meter), resistance (standard resistor) and heating duration (universal counter) of the adiabatic calorimeter were calibrated and they were traceable to the International System of Units (SI). The purity in the mass fraction was converted from the purity in the amount-of-substance fraction based on the results of an impurity analysis with a gas chromatograph with the flame ionization detector calibrated with standard solutions prepared by NMIJ and a validated Karl-Fischer titrimeter. Therefore, the certified values are traceable to the SI.

**Mutual Recognition Arrangement under Meter Convention**

The purity in the mass fraction 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 <https://www.bipm.org/kcdb/>).

#### **Expiration of Certification**

This certificate is valid for one year from the date of shipment, provided that the material remains unopened and is stored in accordance with the instructions given in this certificate.

#### **Description of the material**

This CRM is in the form of a colorless and clear liquid at room temperature. This CRM of ca. 15 mL in net volume is kept in an amber glass ampule with argon gas.

#### **Instructions for Storage**

This CRM should be stored at a temperature between 2 °C and 10 °C in a clean place and shielded from light.

#### **Instructions for Use**

This CRM is for laboratory use only. The ampules of this CRM should be allowed to warm to room temperature and then shaken well before opening. This CRM is hygroscopic and should be used promptly once the ampule is opened.

#### **Precautions for Handling**

Keep away from heat and ignition sources. The CRM should be used in a well-ventilated place. Wear personal protective equipment such as safety glasses, safety mask and safety gloves when handling. Refer to the safety data sheet (SDS) on this CRM before use.

#### **Preparation**

This CRM was subdivided by KANTO CHEMICAL CO., INC. Fifteen milliliters each of MTBE was filled into an amber glass ampule in an argon atmosphere.

#### **NMIJ Analysts**

The technical manager for this CRM is NUMATA M. The production manager is SHIMIZU Y. and the analysts are SHIMIZU Y., KITAMAKI Y., YOSHIMURA E., FUJIKI N. and BAO X.

#### **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

April 1, 2015:	“Metrology Management Center” was renamed to “Center for Quality Management of Metrology.”
November 12, 2015:	The description in “Expiration of Certification” was changed to “one year from the date of shipment.”
February 13, 2018:	The description on Mutual Recognition Arrangement under Meter Convention was added.
December 24, 2020:	The description in “Mutual Recognition Arrangement under Meter Convention” was revised.

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