

National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan



Reference Material Certificate

NMIJ CRM 4012-a

No. +++

m-xylene

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 primarily intended for use in calibrating analytical instruments. It is also intended for quality control of analytical instruments, and validation of analytical techniques and instruments.

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 %.

Substance	CAS No.	Certified value, Amount-of-substance fraction (mol/mol)	Expanded uncertainty, Amount-of-substance fraction (mol/mol)
<i>m</i> -Xylene	108-38-3	0.9980	0.0004

Analysis

The certified value was determined by freezing point depression method with an adiabatic calorimeter by using fractional melting method. The combined standard uncertainty was estimated by the combination of standard uncertainties due to purity determination, homogeneity test and stability test.

Metrological Traceability

The certified value was determined by the freezing point depression method using the adiabatic calorimeter. A platinum resistance thermometer (temperature), a digital multi-meter (voltage) and a standard resistor (resistance, temperature) of the adiabatic calorimeter were calibrated and they were traceable to the International System of Units (SI). Therefore, the certified value is traceable to the SI.

Indicative Value

The indicative value of this CRM is given in the table below. The purity in the mass fraction was obtained by converting the purity in the amount-of-substance fraction using the average molecular weight of impurities. The uncertainty of the indicative 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	CAS No.	Indicative value, Mass fraction (kg/kg)	Expanded uncertainty, Mass fraction (kg/kg)
<i>m</i> -Xylene	108-38-3	0.9981	0.0004

Mutual Recognition Arrangement under Meter Convention

The certified value 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 this CRM remains unopened and is stored in accordance with the instructions given in this certificate.

Sample Form

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

Homogeneity

Ten ampoules were sampled from 480 subdivided ampoules with almost the same intervals in order of subdivision for homogeneity tests by gas chromatography and Karl-Fischer titrimetry. Area percentages of *m*-xylene were measured by the gas chromatography while water contents were measured by Karl-Fischer titrimetry. The evaluated variation of purity among the ampoules due to inhomogeneity has been incorporated into the uncertainty of the certified value. It is concluded, therefore, that this CRM is homogeneous within the range of the uncertainty of the certified value.

Instructions for Storage

This CRM should be stored at a temperature between $-15\text{ }^{\circ}\text{C}$ and $-25\text{ }^{\circ}\text{C}$ in a clean place and shielded from light.

Instructions for Use

This CRM is for laboratory use only. The bottles of this CRM should be allowed to warm to room temperature before opening. The CRM should be used promptly once the ampule is opened.

Precautions for Handling

Keep away from heat and ignition sources. Wear personal protective equipment such as safety glasses, safety mask and safety gloves in handling. Refer to the safety data sheet (SDS) on this CRM before use.

Preparation

This CRM was purified and subdivided by KANTO CHEMICAL CO., INC. This CRM was purified by distillation and drying.

Technical Information

This CRM contains ethylbenzene, *p*-xylene and *o*-xylene as impurities. The mass fractions of ethylbenzene, *p*-xylene and *o*-xylene determined by gas chromatography were 67 mg/kg, 1.33 g/kg and 0.76 g/kg, respectively at the time of certification.

NMIJ Analysts

Technical manager for this CRM is NOMURAA. The person responsible for production is SHIMIZU Y. Production analysts are SHIMIZU Y., IHARA T., ISHIKAWA K., OTSUKA S., BAO X., KITAMAKI Y., YOSHIMURA E. and FUJIKI N.

Collaborator

Impurity analysis and stability tests until 2005 were performed by National Institute of Technology and Evaluation.

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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Revision history

March 23, 2004:	The expiration of this certificate was changed to "July 2007" from "July 2004".
March 19, 2007:	The expiration of this certificate was changed to "March 31, 2013" from "July 2007".
December 20, 2011:	The expiration of this certificate was changed to "March 31, 2021" from "March 31, 2013".
April 1, 2015:	"Metrology Management Center" was renamed to "Center for Quality Management of Metrology."
October 17, 2019:	Expanded uncertainties in "Certified Value" and "Indicative Value" were changed The description in "Mutual Recognition Arrangement under Meter Convention" was added. The descriptions in "Analysis," in "Instructions for Storage" and in "Technical Information" were changed. The description in "Expiration of Certification" was changed to "one year after the date of shipment"