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) was produced in accordance with the NMIJ’s management system, and in compliance with ISO Guide 34:2000. 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 is purity (amount of substance fraction), 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 2.57, which gives a level of confidence of approximately 95%.

<table>
<thead>
<tr>
<th>CAS No.</th>
<th>Certified Value, Amount-of-Substance Fraction (mol/mol)</th>
<th>Expanded Uncertainty, Amount-of-Substance Fraction (mol/mol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>m-xylene</td>
<td>108-38-3</td>
<td>0.9980</td>
</tr>
</tbody>
</table>

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 and homogeneity test.

Metrological Traceability
The certified value is determined by the freezing point depression method with an adiabatic calorimeter and is traceable to the SI. Temperature (platinum resistance thermometer), voltage (digital multi-meter) and resistance (standard resistor) of the adiabatic calorimeter were calibrated and they were traceable to the SI.

Indicative Values
Purity (mass fraction) is (0.9981 ± 0.0002) kg/kg, which is obtained by converting the purity (amount of substance fraction) using the estimated average molecular weight of impurities. The number following the symbol ± is the half-width of an expanded uncertainty interval calculated using coverage factor ($k$) of 2.57, which gives a level of confidence of approximately 95%. Concentrations of ethylbenzene, $p$-xylene and $o$-xylene are 67 mg/kg, 1.33 g/kg and 0.76 g/kg, respectively. These concentrations of impurities were determined by gas chromatography.

Expiration of Certification
This certificate is valid until March 31, 2021, provided that the material remains unopened and 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 is sealed in an amber glass ampoule with argon gas. The net amount is 15 mL for each ampoule.

Homogeneity
Ten ampoules are sampled from 480 subdivided ampoules with almost same intervals in order of subdivision for homogeneity tests by gas chromatography and Karl-Fischer titrimetry. Area percentages of $m$-xylene by gas chromatography and water content by Karl-Fischer titrimetry were measured and evaluated as homogeneity tests. The evaluated variation of purity (amount of substance fraction) between the ampoules due to inhomogeneity were taken into account for the uncertainty of the
Date of shipment: Xxxxxx 00, 2017

Instructions for Storage
This CRM should be stored in a cold (around −20 °C) and dark place.

Instructions for Use
This CRM is for laboratory use only. The bottle of this CRM should be allowed to warm to room temperature before opening. The CRM should be used promptly once a bottle 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 Method
This CRM was purified and subdivided by KANTO CHEMICAL CO., INC. This CRM was purified by distillation and drying. 15 mL each of m-xylene was filled into an amber glass ampoule in argon atmosphere.

NMIJ Analysts
Technical manager for this CRM is A. Nomura. The person responsible for production and production analyst is Y. Shimizu.

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

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:
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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://www.nmij.jp/english/service/C/

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.”