National Institute of Advanced Industrial Science and Technology
National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 4022-b
No. +++
Diethyl Phthalate

This certified reference material (CRM) was produced in accordance with the NMIJ's management system, and in compliance with JIS Q 0034: 2001 (ISO Guide 34: 2000). It 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 in the 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, which gives a level of confidence of approximately 95%.

<table>
<thead>
<tr>
<th>Substance</th>
<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>Diethyl Phthalate</td>
<td>84-66-2</td>
<td>0.9974</td>
<td>0.0009</td>
</tr>
</tbody>
</table>

Analysis

The certified value was determined by freezing point depression method with the 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 is determined by the freezing point depression method with the 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 Value

Purity in the mass fraction is (0.9998±0.0001) kg/kg, which is obtained by converting the purity in the 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, which gives a level of confidence of approximately 95%.

Mutual Recognition Arrangement under Metre 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 after the date of shipment, 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 1.5 mL for each ampoule.

Homogeneity
Ten ampoules were sampled from 250 subdivided ampoules with almost same intervals in order of subdivision for homogeneity tests by gas chromatography and Karl-Fischer titrimetry. Area percentages of diethyl phthalate by gas chromatography and water content by Karl-Fischer titrimetry were measured and evaluated as homogeneity tests. From the results, variation of purity (amount of substance fraction) between the ampoules due to inhomogeneity was estimated and it was taken into account for the uncertainty of the certified value.

Instructions for Storage
This CRM should be stored in a cold (around -20 °C) and shielded from lights.

Instructions for Use
This CRM is for laboratory use only. The ampoules of this CRM should be allowed to warm to room temperature and then shaken well before opening. This CRM should be used promptly once an ampoule is opened.

Precautions for Handling
Keep away from heat and ignition sources. Avoid breathing vapor. Use only with adequate ventilation. Wear personal protective equipment such as safety glasses, safety mask and safety gloves in handling. Handle the CRM according to the Safety Data Sheet (SDS) on this CRM.

Preparation Method
This CRM was synthesized, purified and subdivided by Wako Pure Chemical Industries, Ltd. This CRM was purified by vacuum distillation. 1.5 mL each of diethyl phthalate was filled into an amber glass ampoule in argon atmosphere.

NMIJ Analysts

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

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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Tel: +81-29-861-4059; Fax: +81-29-861-4009, https://www.nmij.jp/english/service/C/

Revision history
March 22, 2006: The expiration of this certificate was changed to “March 31, 2012” from “May, 2006”.
March 16, 2011: The expiration of this certificate was changed to “March 31, 2017” from “March 31, 2012”.
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 after the date of shipment.”
The description on Mutual Recognition Arrangement was added.