National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 6005-a
No. +++
Creatinine

This certified reference material (CRM) was produced in accordance with the NMIJ’s management system and in compliance with ISO GUIDE 34:2000 and ISO/IEC 17025:2005. This CRM is intended for use in the calibration of analytical instruments and reagents, control of the precision of analysis, and validation of analytical methods and instruments.

Certified Value
The certified value of purity (in mass fraction) 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%.

<table>
<thead>
<tr>
<th>CAS No.</th>
<th>Certified value, Mass fraction (kg/kg)</th>
<th>Expanded uncertainty, Mass fraction (kg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creatinine 60-27-5</td>
<td>0.999</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Analysis
The certified value is calculated on the basis of the results of acidimetric titration and nitrogen determination by the Kjeldahl method.

Metrological Traceability
The certified value was determined by titrimetry as a primary method of measurement, with NMIJ CRM 3001-a (potassium hydrogen phthalate) and NIST SRM 351 (sodium carbonate) as primary standards. It is traceable to the International System of Units (SI).

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

Sample Form
This CRM is in the form of a white powder. A small amount (2 g) of this material was bottled in a glass vial and kept in an aluminum-laminated bag.

Homogeneity
The homogeneity of the CRM was measured by acidimetric titration for 11 vials selected from 275 vials. 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 25 °C in a clean place and shielded from bright lights.

**Instructions for Use**
Considering the homogeneity, a minimum sample mass of 100 mg should be used. This CRM is for laboratory use only and not for *in vivo* use.

**Precautions for Handling**
Refer to the safety data sheet (SDS) on this CRM before use.

**Preparation**
This CRM was prepared by Wako Pure Chemical Industries, Ltd. Purified creatinine was bottled into vials under an argon atmosphere, and each vial was sealed in an aluminum-laminated bag.

**Technical Information**
The following values are not certified but are provided for information. The creatine content as determined by HPLC was 0.06 g/kg. The moisture content as determined by Karl Fischer titration was 0.1 g/kg. The concentration of soluble chlorides as determined by ion chromatography was 0.9 mg/kg.

**NMIJ Analysts**
For this CRM, the technical and production manager is A. Takatsu and the analysts are A. Takatsu, S. Eyama, and M. Saeki.

**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, 2015

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

**Revision history**
April 1, 2015: “Metrology Management Center” was renamed to “Center for Quality Management of Metrology.”
October 13, 2015: The description in “Expiration of Certification” was changed to “one year from the date of shipment.”
The description on Mutual Recognition Arrangement under Mete Convention was added.