National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 4222-a
No. +++

Water in Mesitylene (0.1 mg/g)

National Institute of Advanced Industrial Science and Technology
AIST

This certified reference material (CRM) was produced in accordance with NMIJ's management system, and in compliance with ISO GUIDE 34:2009 and ISO/ICE 17025:2005. The intended uses for this CRM are the calibration of instruments and confirming the validity of analytical methods or instruments during quantification of water by Karl-Fischer (KF) titration.

Certified Values

The certified value for this CRM is its concentration (mass fraction of water in mesitylene), as shown below. The quoted uncertainty 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 %.

	CAS No.	Certified value, Mass fraction (mg/kg)	Expanded uncertainty Mass fraction (mg/kg)
Water	7732-18-5	134	4

Analysis

The certified value is the weighted mean of the analytical results obtained by coulometric and volumetric KF titration, where the reciprocal of the uncertainty of the result obtained by each method was used as the weight. The uncertainty arisen from the difference between the two methods is reflected in the uncertainty of the certified value.

Metrological Traceability

The certified value was determined by coulometric and volumetric titrations as the primary methods of measurement. To confirm the traceability of an applied current on coulometric KF titration, JCSS-calibrated standard resistors were connected in series to the circuit of the applied current of the KF instrument, and the voltage drop of both ends was measured by a JCSS-calibrated voltmeter. In addition, by measuring time using a JCSS-calibrated frequency counter, the traceability of the electric charge (current × time) applied was ensured. The analytical results of volumetric KF titrations were obtained using a KF reagent, the titer of which was determined by NMIJ CRM 8301-a. As a result, the certified value is traceable to the International System of Units (SI).

Expiration of Certification

The certification of this CRM is valid until March 31, 2016, provided that the material remains unopened and stored in accordance with the instructions given in this certificate.

Sample Form

The form of this CRM is approximately 8.5 mL of clear liquid, sealed in an amber ampoule.

Homogeneity

The homogeneity of this CRM was determined by analyzing 10 ampoules, selected by a random sampling of 205 subdivided ampoules. The inhomogeneity of the analyte was evaluated by ANOVA and is reflected in the uncertainty of the certified value.

Precautions for Storage

This CRM should be kept at room temperature (15 °C to 30 °C), under dark and clean conditions.

Instructions for Use

This CRM is for laboratory use only. Shake gently, and after several minutes, break open the ampoule. To avoid sample evaporation, and moisture sorption or desorption, this CRM should be used as soon as possible after opening. Samples should be taken using a gas-tight syringe, and the rubber cap accompanying this CRM, and it is recommended that all the operations from ampoule opening to measuring be performed under conditions of 20 % to 50 % relative humidity. An additional hypodermic needle must be stabbed into the cap in order to ensure the ampoule does not depressurize while sampling.

Instructions for Handling

A mask, gloves and other protective equipment must be worn during handling. The handling, storage and disposal of this CRM must be performed in accordance with all applicable laws. The CRM should also be handled according to the SDS.

Preparation Method

Mesitylene is first stirred in the glass bottle under ambient air. Once the remaining water content reaches a constant value, 8.5 mL of the solution is dispensed and sealed in an amber ampoule.

Information

When the sample was taken, and its water content was measured at 16 % relative humidity (23 °C) and 67 % relative humidity (26 °C), a significant change in water content was not observed within 15 minutes and the obtained results remained within the uncertainty of the certified value. For these measurements, the rubber cap was attached to the ampoule just after breaking it open. The sample was taken from the bottom of the ampoule, using a gas-tight syringe through the cap.
The density of this CRM at room temperature is 0.86111 g/cm^3 (25 °C), 0.86520 g/cm^3 (20 °C), and 0.86927 g/cm^3 (15 °C).

NMIJ Analysts

The technical manager and production manager for this CRM is M. Numata and S. Inagaki, respectively. Analytical measurements for the certification of this CRM were performed at NMIJ by S. Inagaki, N. Hanari, T. Asakai, and K. Ishikawa.

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.

January 8, 2014

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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Note: This certificate is a translation of the original Japanese certificate and is not an official document.