

National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan



Reference Material Certificate

NMIJ CRM 4039-a
No. +++

1,4-Dichlorobenzene

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 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, which gives a level of confidence of approximately 95 %.

	CAS No.	Certified Value, Amount-of-Substance Fraction (mol/mol)	Expanded Uncertainty, Amount-of-Substance Fraction (mol/mol)
1,4-Dichlorobenzene	106-46-7	0.9999	0.0003

Analysis

The certified value of this CRM was determined by a 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 of this CRM was determined by the freezing point depression method with the adiabatic calorimeter. Temperature (platinum resistance thermometer), voltage (digital multi-meter), resistance (standard resistor) and heating duration (universal counter) 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

Purity in the mass fraction is given in the table below. It 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 %.

	CAS No.	Indicative value, Mass fraction (kg/kg)	Expanded uncertainty Mass fraction (kg/kg)
1,4-Dichlorobenzene	106-46-7	0.9999	0.0003

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 solid at ambient temperature. This CRM of 5 g in net volume is kept in an amber glass vial with argon gas and is sealed in an aluminum-laminated bag.

Homogeneity

Ten vials were sampled from 400 subdivided vials with almost same intervals in order of subdivision for homogeneity tests by gas chromatography. Area percentages of 1,4-dichlorobenzene by gas chromatography were measured and evaluated as homogeneity tests. The evaluated variation of purity between the vials due to inhomogeneity was taken into account for the uncertainty of the certified value. Thus, 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 2 °C and 10 °C and shielded from lights.

Instructions for Use

This CRM is for laboratory use only. This CRM should be opened after reaching ambient temperature and used promptly once the vial is opened. Considering the homogeneity, a minimum sample mass of 0.6 g should be used.

Precautions for Handling

Keep away from heat and ignition sources. Wear 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 prepared by KANTO CHEMICAL CO., INC. Raw material of this CRM was purified by drying and distillation. The purified 1,4-dichlorobenzene was filled into an amber glass vial and sealed into an aluminum-laminated bag in argon atmosphere.

NMIJ Analysts

Technical manager for this CRM is KATO K. The production manager is SHIMIZU Y. The analysts are SHIMIZU Y., KITAMAKI Y., ISHIKAWA K., BAO X., OHTE Y., YOSHIMURA E., HORIUCHI U. and FUJIKI N.

Collaborator

Stability monitoring 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.

Date of Shipment: XXXXX XX, 20XX

4039a00-080501-190627

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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1-1-1 Umezono, Tsukuba, Ibaraki 305-8563, Japan
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Revision history

December 20, 2012: The expiration of this certificate was extended from “March 31, 2014” to “March 31, 2020.”

The description on Mutual Recognition Arrangement under Metre Convention was added.

April 1, 2015: “Metrology Management Center” was renamed to “Center for Quality Management of Metrology.”

November 16, 2018: The description in “Expiration of Certification” was changed to “one year from the date of shipment”

The descriptions in “Instructions for storage” was changed.

“Collaborator” was added.