

National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan



Reference Material Certificate

NMIJ CRM 4020-a
No. +++

Bromodichloromethane

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 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 %.

Substance	CAS No.	Certified Value, Amount-of-Substance Fraction (mol/mol)	Expanded Uncertainty, Amount-of-Substance Fraction (mol/mol)
Bromodichloromethane	75-27-4	0.9993	0.0012

Analysis

The certified value of this CRM was determined by the freezing point depression method with a differential scanning calorimeter (DSC) by using stepwise scan method. Combined standard uncertainty of the certified value 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 a primary method of measurement, the freezing point depression method with a DSC. Scales of temperature and enthalpy of the DSC were calibrated with NIST SRM 2225 (mercury) and NIST SRM 2232 (indium) and they are 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. Purity in the mass fraction 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 %.

Substance	CAS No.	Indicative value, Mass fraction (kg/kg)	Expanded uncertainty Mass fraction (kg/kg)
Bromodichloromethane	75-27-4	0.9995	0.0012

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 colorless and clear liquid at room temperature. This CRM of ca. 5 mL in net volume is kept in an amber glass ampule with argon gas.

Homogeneity

Ten ampules were sampled from 200 subdivided ampules with almost same intervals in order of subdivision for homogeneity tests by gas chromatography and Karl-Fischer titrimetry. Area percentages of bromodichloromethane 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 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 around $-20\text{ }^{\circ}\text{C}$ in clean place and shielded from light.

Instructions for Use

This CRM is for laboratory use only. The ampule of this CRM should be allowed to warm to room temperature before opening. Prior to use, the ampule should be shaken thoroughly but gently at room temperature. This CRM should be used promptly once the ampule is opened.

Precautions for Handling

Keep away from heat and ignition sources. Avoid breathing vapor. Use only with adequate ventilation. 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 purified and subdivided by KANTO CHEMICAL CO., INC. Raw material of this CRM was purified by distillation and drying. 2-methyl-2-butene was added to distillate as a stabilizer. Five milliliters each of Bromodichloromethane was filled into amber glass ampule in argon atmosphere.

NMIJ Analysts

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

Collaborator

Stability tests 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.

April 1, 2020

ISHIMURA Kazuhiko

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://unit.aist.go.jp/nmij/english/refmate/>

Revision history

March 16, 2011: This CRM was recertificated: The certified value was reassigned based on the reassessments of homogeneity and stability.

March 18, 2015: The description in “Expiration of Certification” was changed to “one year from the date of shipment.”
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 20, 2017: An expanded uncertainty in “Indicative Value” was changed.”