

Date of Shipment: XXXXX xx, 20xx

3411a00-230320-230320

National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan



Reference Material Certificate

NMIJ CRM 3411-a



Carbon Dioxide in Air for Atmospheric Observation (168 $\mu\text{mol/mol}$)

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 intended for the calibration of instruments.

Certified Value

The certified value of this CRM is given in the table below. The uncertainty of the certified value is the expanded uncertainty obtained by multiplying the combined standard uncertainty by a coverage factor (k) of 2, and it is the half-width of an interval estimated to have a level of confidence of approximately 95 %.

Substance	CAS No.	Certified value Amount-of-substance fraction ($\mu\text{mol/mol}$)	Expanded uncertainty Amount-of-substance fraction ($\mu\text{mol/mol}$)	Cylinder No.
Carbon dioxide	124-38-9	167.59	0.26	CPC00494

Analysis

The certified value of this CRM was the amount-of-substance fraction calculated in accordance with ISO 6142-1:2015 for a gravimetric method. The uncertainty of the certified value was estimated from uncertainties for the determination based on the gravimetric method, the adsorption on the inner surface of the cylinder, the long-term stability and the dependence of the amount-of-substance fraction of carbon dioxide on the inner pressure.

Metrological Traceability

The certified value was determined by a gravimetric method at NMIJ using a mass comparator calibrated by mass pieces and the source gases of which purities were determined based on primary gas mixtures. The mass pieces and the primary gas mixtures were traceable to the International System of Units (SI). The certified value, therefore, is traceable to the International System of Units (SI).

Expiration of Certification

This certificate is valid for six months from the date of shipment, provided that this CRM is stored in accordance with the instructions given in this certificate.

Description of the Material

This CRM is a colorless, odorless and inert gas and it is supplied in an aluminum cylinder with an inner volume of 9.6 L. Specification of the outlet of the cylinder is W22-14-threads right. At the time of supply, the in-cylinder gauge pressure is 10 MPa or more at 35 °C.

Instructions for Storage

This CRM should be stored in compliance with regulations of high pressure gas and so on. This CRM should not be exposed to sunlight. This CRM should be stored at a temperature below 40 °C and in a well-ventilated area. The CRM should be fixed with chain to avoid overturning. Refer to the safety data sheet (SDS) on this CRM for storage.

Instructions for Use

This CRM should be used at around room temperature (18 °C to 30 °C). This CRM should be allowed to stand overnight or more near the analytical room before use. It is recommended to sufficiently displace residual gas in a regulator, valves, piping systems, measuring instruments, and so on with this CRM prior to use. To avoid contamination, it is recommended to check leakage from the joints of piping system. When the gauge pressure of the CRM is less than 2 MPa, use of the CRM should be stopped.

Precautions for Handling

The CRM should be used in compliance with the High Pressure Gas Safety Law. Refer to the Safety data sheet (SDS). This CRM should be returned to the Center for Quality Management of Metrology of AIST after it will become unnecessary or after the expiry date. Refer to the SDS on this CRM before use.

Preparation

This CRM was prepared from high purity carbon dioxide and scrubbed air by NMIJ using a gravimetric method in accordance with ISO 6142-1:2015.

Technical Information

In the assessment of dependence on the inner pressure for this CRM, the amount fraction of carbon dioxide increased by 0.046 $\mu\text{mol/mol}$ as the inner pressure decreased from 11 MPa (abs) to 2 MPa (abs). This uncertainty has been incorporated in the uncertainty of the certified value.

NMIJ Analysts

The technical manager for this CRM is SHIMOSAKA T., the production manager is AOKI N., and the analysts are AOKI N., MATSUMOTO N. and TAKADA K.

Information

If substantive technical changes occur that affect the certification before the expiration of this certificate, NMIJ will notify the registered customers. 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.

March 20, 2023

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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