

National Institute of Advanced Industrial Science and Technology

## National Metrology Institute of Japan



Reference Material Certificate

NMIJ CRM 3403-b01

Dinitrogen oxide in nitrogen (300  $\mu\text{mol/mol}$ )

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. It is intended for use in the calibration of analytical instruments.

**Certified Value**

The certified value for dinitrogen oxide in this CRM 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 %.

	CAS No.	Certified value, Amount-of-substance fraction ( $\mu\text{mol/mol}$ )	Expanded uncertainty, Amount-of-substance fraction ( $\mu\text{mol/mol}$ )	Cylinder No.
Dinitrogen oxide	10024-97-2	302.4	1.5	YA002949

**Analysis**

The certified value of this CRM was determined using a gas chromatograph with a thermal conductivity detector. The uncertainty of the certified value was estimated from uncertainties for the analysis using the gas chromatograph, long-term stability, and dependence of the amount-of-substance fraction of dinitrogen oxide on the inner pressure.

**Metrological Traceability**

The certified value of this CRM was determined by a gas chromatograph calibrated by the primary gas mixtures, which are traceable to the International System of Units (SI). The certified value is therefore traceable to the SI.

**Mutual Recognition Arrangement under Meter 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 two years from the date of shipment, provided that the material is stored in accordance with the instructions given in this certificate.

**Sample Form**

This CRM 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 male. At the time of supply, the in-cylinder gauge pressure is 9.5 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. A cylinder of this CRM should be stored away from direct sunlight and fire at a temperature of 40 °C or less in a well-ventilated place. The CRM should be fixed with chain to avoid overturning.

### Instructions for Use

This CRM should be allowed to stand overnight or more near the analytical instrument before use. This CRM should be used at a temperature between 20 °C and 28 °C. We recommend sufficient substitution of residual gas in the regulator, valves, piping, measuring instruments, *etc.* with this CRM prior to use. To avoid contamination, we also recommend checking all piping joints for leakage. When the gauge pressure of the CRM is less than 1 MPa, use of the CRM should be stopped.

### Precautions for Handling

Use personal protective equipment when handling this CRM. Keep away from open flames. The CRM should be used in a well-ventilated place. Refer to the safety data sheet (SDS) on this CRM before use.

### Preparation

This CRM was filled by Takachiho Chemical Industrial Co., LTD.

### NMIJ Analysts

The technical manager for this CRM is SHIMOSAKA T., the production manager is MATSUMOTO N., and the analysts are 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 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/>

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Reference Material Certificate

NMIJ CRM 3403-b02

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Dinitrogen oxide	10024-97-2	301.0	1.5	YA002950

**Analysis**

The certified value of this CRM was determined using a gas chromatograph with a thermal conductivity detector. The uncertainty of the certified value was estimated from uncertainties for the analysis using the gas chromatograph, long-term stability, and dependence of the amount-of-substance fraction of dinitrogen oxide on the inner pressure.

**Metrological Traceability**

The certified value of this CRM was determined by a gas chromatograph calibrated by the primary gas mixtures, which are traceable to the International System of Units (SI). The certified value is therefore traceable to the SI.

**Mutual Recognition Arrangement under Meter Convention**

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## Reference Material Certificate

NMIJ CRM 3403-b03

Dinitrogen oxide in nitrogen (300  $\mu\text{mol/mol}$ )

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Dinitrogen oxide	10024-97-2	300.6	1.5	YA002951

**Analysis**

The certified value of this CRM was determined using a gas chromatograph with a thermal conductivity detector. The uncertainty of the certified value was estimated from uncertainties for the analysis using the gas chromatograph, long-term stability, and dependence of the amount-of-substance fraction of dinitrogen oxide on the inner pressure.

**Metrological Traceability**

The certified value of this CRM was determined by a gas chromatograph calibrated by the primary gas mixtures, which are traceable to the International System of Units (SI). The certified value is therefore traceable to the SI.

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