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National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 3402 – b02

Sulfur Dioxide

National Institute of Advanced Industrial Science and Technology
AIST

This certified reference material (CRM) was produced based on NMIJ's quality system in compliance with JIS Q 0034 (ISO GUIDE 34). It is intended for the calibration of instruments used for the sulfur dioxide determination.

Certified Value

The certified value of this CRM is purity (amount of substance fraction) as shown below. The expanded uncertainty was determined using coverage factor $k = 2$, corresponding to an estimated confidence interval of approximately 95%.

	CAS No.	Certified Value, Amount of Substance Fraction (mol/mol)	Expanded Uncertainty, Amount of Substance Fraction (mol/mol)	Cylinder No.
Sulfur dioxide	7466-09-5	0.99996	0.00010	5K-88925

Analytical Methods

The certified value was determined by the subtraction method, which is described in ISO6142:2001. Impurities in this CRM were analyzed by the methods listed in the following table.

Impurities	Analytical Methods
Carbon dioxide	Gaschromatograph with thermal conductivity detector
Nitrogen	Gaschromatograph with thermal conductivity detector
Oxygen	Gaschromatograph with thermal conductivity detector
Argon	Gaschromatograph with thermal conductivity detector
Methane	Gaschromatograph with flame ionization detector
Propane	Gaschromatograph with flame ionization detector
Water	Fourier transform infrared spectroscopy (FT-IR)

Traceability

The gaschromatograph used for the certification was calibrated using primary reference gases, which were prepared by the gravimetric blending method in NMIJ. The FT-IR was calibrated using primary reference gases analyzed by the dew-point hygrometer in NMIJ. The dew-point hygrometer is traceable to the primary standard at National Physical Laboratory (UK). The certified value is traceable to SI.

Expiration of Certification

This certification is valid until 31st March in 2015, under the condition that this CRM is handled and stored in accordance with the instructions given in Precautions for Storage. Stability monitoring for the same lot as this CRM is performed at NMIJ.

Cylinder

This CRM is toxic gas, and it is supplied in a manganese steel cylinder with an inner volume of 10 L. Specification of the outlet of the cylinder is W22-14thread right male. The residual mass of the filled gas in this CRM is more than 5 kg. The

residual mass can be estimated by the following procedure; (1) Take out a large cap for the attached valve and an outlet of valve. (2) Weigh the cylinder. (3) When the mass of cylinder is *a*, the mass of value is *b*, and, the mass of body of cylinder is *c*, the mass of gas in the cylinder equals to *a* minus (*b*+*c*).

Precautions for Storage

This CRM should be stored in compliance with regulations of high pressure gas (liquefied gas, toxic gas) and so on. Avoid direct sunlight, and keep temperature below 40 ºC at any time. Store the CRM at a place with good ventilation. Fasten the cylinder with chain to avoid it from falling down. Since sulfur dioxide gas is toxic gas, take care to leaks and inhalation, do not use fire near the cylinder and do not place any flammable objects nearby. Store the CRM according to its material safety data sheet (MSDS).

Precautions for use

We recommend sufficient substitution of residual gas in stainless regulators, valves, piping, measuring instruments, and so on with this CRM gas before use. To avoid contamination, we recommend check leakage from a joint of piping. Operation for purge should be repeated adequately. This CRM should be under the residual mass of filled gas more than 4 kg, because the amount of each impurity might depend on the residual mass. It is desirable that the CRM is used around room because the certified value is based on the analytical results in this temperature range.

Use this sulfur dioxide under gas phase (not liquid phase), although the gas phase and the liquid phase coexists. If you use this sulfur dioxide gas as liquid, the certified value in this CRM will be not assured.

Precautions for Handling

Do not use fire near the cylinder and do not place any flammable objects nearby. Use the CRM at a place with good ventilation. Use this CRM in compliance with regulations of high pressure gas and so on. Return this CRM to Metrology Management Center of AIST after use, or after the expiry date. Handle the CRM according to the MSDS.

Production of CRM

This CRM was filled in a 10 liter manganese-steel high-pressure gas cylinder, by Sumitomo Seika Chemicals Co., LTD.

NMIJ Analysts

The technical manager for this CRM is K. Kato. The production manager is N. Matsumoto. Analyst for the production is N. Matsumoto and C. Nakata.

Technical Information

Customers will be notified in the case of important revision, such as a change in the certified values. Technical information about this CRM can be obtained from the contact shown below.

Reproduction of Certificate

In reproducing this certificate, it should be clearly indicated that the document is a copy.

March 30, 2010

Tamotsu Nomaguchi
President
National Institute of Advanced Industrial Science and Technology

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If you have any questions about this CRM, please contact
National Institute of Advanced Industrial Science and Technology,
National Metrology Institute of Japan,
Metrology Management Center, Reference Materials Office,
1-1-1, Umezono, Tsukuba, Ibaraki 305-8563, Japan
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