[This document is just explanation translated from the original Japanese certificate and some information is omitted from it.]

National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 4052-b0X

Propane

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 ISO GUIDE 34:2000 and ISO/IEC 17025:2005, for use in calibration of analytical instruments, quality control of analytical instrument and validation of analytical techniques and instruments.

Certified Value

The certified value for this CRM is given in the following table. The expanded uncertainty was determined using coverage factor k =2, corresponding to an estimated confidence interval of approximately 95 %.

	CAS No.	Certified value, Molar fraction (mol/mol)	Expanded uncertainty Molar fraction (mol/mol)	Cylinder Number
Propane	74-98-6	0.9999	0.0001	GAJ-54118

Analytical Methods

The certified value was determined by the subtracting method which complied with requirement described in the ISO 6142:2001. Impurities in this CRM were determined by gas chromatograph with thermal conductivity detector (GC-TCD), gas chromatograph with flame ionization detector (GC-FID), and capacitance type hygrometer. The expanded uncertainty of this CRM was evaluated from combined standard uncertainty, owing to uncertainties of the subtracting method, long-term stability, dependence of concentration on the inner content, and coverage factor (k=2).

Impurities	Analytical Methods
Nitrogen	Gas chromatograph with thermal conductivity detector (GC-TCD)
Oxygen	Gas chromatograph with thermal conductivity detector (GC-TCD)
Argon	Gas chromatograph with thermal conductivity detector (GC-TCD)
Carbon dioxide	Gas chromatograph with thermal conductivity detector (GC-TCD)
Ethane	Gas chromatograph with flame ionization detector (GC-FID)
Propene (Propylene)	Gas chromatograph with flame ionization detector (GC-FID)
Cyclopropane	Gas chromatograph with flame ionization detector (GC-FID)
Butane	Gas chromatograph with flame ionization detector (GC-FID)
2-Methylpropane (Isobutane)	Gas chromatograph with flame ionization detector (GC-FID)
Water	Capacitance type hygrometer

Metrological Traceability

GC-TCD and GC-FID were calibrated using NMIJ's primary reference gases prepared by the gravimetric blending method. The capacitance type hygrometer was calibrated using reference dew point meter which is traceable to the primary standard at National Institute of Standard Technology (Gathersburg, USA). Concentrations of the impurities are traceable to the International System of Units (SI), and therefore the purity is traceable to the SI.

Expiration of Certification

The certification of this CRM is valid until March 31, 2020, provided that the material is handled and stored in accordance with the instructions given in this certificate.

[This document is just explanation translated from the original Japanese certificate and some information is omitted from it.]

Sample Form

This CRM is supplied in a manganese steel cylinder with an inner volume of 4.8 L. Specification of the outlet of the cylinder is W22.5-14threads left female. A nominal content of the propane in the cylinder is 0.5 kg. This CRM is colorless gas at ambient temperature.

Precautions for Storage

This CRM should be stored in compliance with regulations of high pressure gas and so on. Avoid direct sunlight, and keep temperature below 40 °C. Store the CRM at a place with good ventilation. Fasten the cylinder with chain to avoid it from falling down. Since propane is flammable material, do not use fire near the cylinder. Take care to leaks. Store the CRM according to material safety data sheet (MSDS).

Precautions for Use

Do not use fire near the cylinder. Use the CRM at a place with good ventilation. NMIJ recommend sufficient substitution of residual gas in a regulator, valves, piping, measuring instruments, and so on with this CRM gas before use. To avoid contamination, NMIJ recommend check that there is no leakage from the joint of piping. Do not elute this CRM as liquid phase. The certification is not valid if the CRM is used as liquid. To avoid change in purity, do not use the CRM below 0.1 kg of residual amount. It is desirable that this CRM is used around approximately 24 °C, because the certified value is based on the analysis at about 24 °C. Return this CRM to Metrology Management Center of AIST after use, or after the expiry date.

Preparation Method

This CRM is a commercially available high-purity propane gas whose certified value was determined by NMIJ.

NMIJ Analysts

The technical manager for this CRM is K. Kato. The production manager is T. Watanabe. The analysts are T. Watanabe and K. Kato.

Technical Information

Customer registration on the NMIJ WEB site shown below will facilitate notification of above revision. Technical report about this CRM can be also obtained from the contact shown below.

Reproduction of Certificate

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

December 22, 2010

Tamotsu Nomakuchi
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,
Metrology Management Centre, Reference Materials Office,
1-1-1, Umezono, Tsukuba, Ibaraki 305-8563, Japan
Phone: +81-29-861-4059; Fax: +81-29-861-4009, http://www.nmij.jp/english/service/C/

Note: This certificate is a translation of the original Japanese certificate and is not an official document.