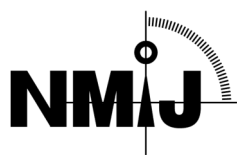


National Institute of Advanced Industrial Science and Technology

## National Metrology Institute of Japan



## Reference Material Certificate

NMIJ CRM 4040-b  
No. +++

Acrylonitrile

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 use in the calibration of analytical instruments, quality control of analytical instruments, and validation of analytical techniques and instruments.

**Certified Value**

The certified value is purity in the mass 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 %.

	CAS No.	Certified value Mass fraction (kg/kg)	Expanded uncertainty Mass fraction (kg/kg)
Acrylonitrile	107-13-1	0.9997	0.0010

**Analysis**

The certified value of this CRM was weighted mean of the results of the following analytical methods:

- (1) A freezing point depression method by differential scanning calorimeter (DSC).
- (2) A subtracting method which is complying with the requirement described in the ISO GUIDE 35:2006: concentration of impurities in the CRM were determined by a gas chromatograph with a flame ionization detector (GC-FID), Karl-Fischer titrator (KF), and an analytical balance for weighing of residue after evaporation.

The expanded uncertainty of the certified value is equal to  $U = ku_c$ , where  $u_c$  is the combined standard uncertainty derived from the concentrations of the impurities, between-method variance, homogeneity, long-term stability, with coverage factor ( $k=2$ ) corresponding to an approximately 95 % confidence interval.

**Metrological Traceability**

NMIJ CRM 5401-a (cyclohexane) which is traceable to the International System of Units (SI), was used for calibration of the DSC. The purity by the subtracting method was determined from volatile impurity measured with a GC-FID calibrated with standard solution prepared by NMIJ, mass fraction of water evaluated by coulometry, and mass fraction of the residue evaluated with a calibrated balance. Therefore, the certified value is traceable to the SI.

**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. 15 mL in net volume is kept in an amber glass ampule with argon gas.

**Homogeneity**

The homogeneity of this CRM is determined by measuring of ten ampules using GC-FID and KF. The homogeneity is

reflected in the uncertainty of the certified value.

**Instructions for Storage**

This CRM should be stored in a cold ( $-20\text{ }^{\circ}\text{C}$ ) and dark place.

**Instructions for Use**

This CRM is for laboratory use only. The ampule of this CRM should be allowed to warm to room temperature before use, and then shaken well. Pay attention to avoid contamination with water from air. This CRM should be used promptly once the ampule is opened.

**Precautions for Handling**

Keep away from heat and ignition sources. Wear personal protective equipment such as safety glasses, safety mask and safety gloves when handling. Refer to the safety data sheet (SDS) on this CRM before use.

**Preparation**

This CRM is purified and packed by KANTO CHEMICAL CO., INC. Commercially high purity acrylonitrile was distilled and then 15 mL of this distilled acrylonitrile is separated into an amber glass ampule and sealed by melting for 200 ampules. All procedures were done in an argon atmosphere.

**Technical Information**

Mass fraction of benzene in this CRM was 9.2 mg/kg which was determined by the GC-FID on March 2010. The CRM contains trace amount of water and 4-methoxyphenol as stabilizers.

**NMIJ Analysts**

The technical manager for this CRM is KATO K. A responsibility for production is WATANABE T. Analysts for production are KITAMAKI Y., SHIMIZU Y., WATANABE T., OHTE Y., KATO K., and BAO X.

**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.

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

September 11, 2014: The description in “Expiration of Certification” was changed to “one year from the date of shipment.”

April 1, 2015: “Metrology Management Center” was renamed to “Center for Quality Management of Metrology.”

November 18, 2019: The description in “Indicative Values” was moved into “Technical Information.”

Sample