

National Institute of Advanced Industrial Science and Technology

## National Metrology Institute of Japan



## Reference Material Certificate

NMIJ CRM 4213-a  
No. +++

## Benzo[a]pyrene in 2,2,4-Trimethylpentane

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. CRM is intended for use in the calibration of instruments or for confirming the validity of analytical methods or instruments during quantification of benzo[a]pyrene.

**Certified Value**

The certified value for this CRM is the concentration (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 (mg/kg)	Expanded uncertainty Mass fraction (mg/kg)
Benzo[a]pyrene	50-32-8	99.2	3.9

**Analysis**

The certified value of this CRM was obtained by multiplying the dilution ratio of the starting material (benzo[a]pyrene) in the prepared solution with the purity of the material. The purity was calibrated by the gas chromatograph with flame ionization detection (GC-FID) using high-purity benzo[a]pyrene, the purity of which was assessed by a differential scanning calorimeter.

**Metrological Traceability**

The mass fraction of the starting material in the prepared solution was calculated from the gravimetric preparation. The purity of the starting material was determined by using high-purity benzo[a]pyrene that was assessed by the freezing point depression method. The certified value of this CRM is traceable to the International System of Units (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 one year after the date of shipment, provided that the material 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. 1 g in net volume is sealed in a 2-mL brown glass ampoule under argon atmosphere.

### Homogeneity

The homogeneity of this CRM was determined by analyzing 10 ampoules selected by random sampling of 488 subdivided ampoules. The peak area of benzo[*a*]pyrene of each ampoule was measured by GC-FID. The variation of the results was estimated by ANOVA. The homogeneity of the material is reflected in the uncertainty of the certified value.

### Instructions for Storage

This CRM should be stored at a temperature between 15 °C and 25 °C under dark conditions.

### Instructions for Use

This CRM is for laboratory use only. This CRM should be used promptly once the ampoule is opened.

### Precautions for Handling

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

### Preparation

This CRM was prepared by dissolving benzo[*a*]pyrene as the starting material into 2,2,4-trimethylpentane.

### Technical Information

The density value of this CRM is 0.6919 g/mL at 20 °C.

### NMIJ Analysts

The technical manager for this CRM is NUMATA M. The production manager is HANARI N. and the analysts are HANARI N., ISHIKAWA K., OTSUKA S., HIGUCHI K. and IWASAWA R.

### 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:  
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National Metrology Institute of Japan,  
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Revision history

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

November 12, 2015: The description in "Expiration of Certification" was changed to "1 year after the date of shipment."

November 12, 2015: The description on "Mutual Recognition Arrangement under Meter Convention" was added.

Sample