National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 8110-b
No. +++

Polybrominated Diphenyl Ethers in Polystyrene (High Concentration)

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 quality control of analysis and the validation of analytical methods or instruments, for the analysis of decabromodiphenyl ether (DBDE) in polystyrene.

Certified Value

The certified value of this CRM, mass fraction of DBDE, is given in the table below. The uncertainty of the certified value is the expanded uncertainty obtained by multiplying the combined standard uncertainty by a coverage factor (k) of 2, and it is the half-width of an interval of confidence estimated to have a level of confidence of approximately 95 %.

Substance	CAS No.	Certified value, Mass fraction (mg/kg)	Expanded uncertainty, Mass fraction (mg/kg)
Decabromodiphenyl ether	1163-19-5	978	57

Analysis

The certified value of this CRM was a weighted average of DBDE measurement results obtained from the following two different analytical methods using dilution-gas chromatography/mass spectrometry (ID-GC/MS).

1. Re-precipitation technique and ID-GC/MS
   [Dissolution] Solvent: Toluene
   [Cleanup] Adding methanol to reprecipitate polystyrene
   [GC/MS] UA-PBDE column; Electron impact ionization (EI); Selected ion monitoring (SIM)
2. Size exclusion liquid chromatography and ID-GC/MS
   [Dissolution] Solvent: Chloroform
   [Cleanup] Size exclusion chromatography
   [GC/MS] UA-PBDE column; EI; SIM

Metrological Traceability

The certified value of DBDE was determined by IDMS as a primary method of measurement and the calibration solution for the measurements was calibrated by a certified reference material (NIST SRM 2258). The certified value of DBDE is traceable to the International System of Units (SI). All of the calibration solutions were prepared by the gravimetric method using a balance calibrated in the Japanese Calibration Service System (JCSS).

Expiration of Certification

This certificate is valid for one year from the date of shipment, provided that the material is stored in accordance with the instructions given in this certificate.

Description of the material

This CRM is polystyrene containing DBDE and in the form of a clear and colorless disk at room temperature. The diameter,

thickness and mass of the disk are about 30 mm, 2 mm and 1.5 g, respectively. Five of the disks are packed in an aluminum-laminated plastic bag with argon gas.

Instructions for Storage

This CRM should be kept in an aluminum-laminated plastic bag and should be stored in a dark place at temperature of 5 °C to 35 °C.

Instructions for Use

This CRM is for laboratory use only. This CRM should be used up as soon as possible once the bag is opened. When a disk is pulverized to prepare specimen, a whole single disk should be used to ensure homogeneity of the specimen. In each analysis, a specimen of more than 0.1 g should be used to ensure homogeneity.

Precautions for Handling

This CRM should be kept away from heat and ignition sources. Personal protective equipment, such as a protective mask and gloves, should be used when handling this CRM. This CRM should be used, handled, and stored according to applicable laws. Refer to the safety data sheet (SDS) on this CRM before use.

Preparation

This CRM was prepared by mixing commercially-available polystyrene powder and DBDE. To ensure homogeneity, the mixture was kneaded by a two-axis kneading machine twice. The mixture was formed into a plate by an injection molding machine. Then, the plates were diced into disks. This CRM was prepared by DJK Corporation.

Technical Information

The mass fraction of bromine in this CRM was 810 mg/kg when the certified value was determined. This value of mass fraction was estimated by the combustion ion chromatography performed by Tokyo Metropolitan Industrial Technology Research Institute.

NMIJ Analysts

The technical manager for this CRM is HANARI N., the production manager is NAKAMURA K., and the analysts are NAKAMURA K., MATSUYAMA S., and ORIHARA Y.

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.

February 25, 2021

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/

Instruction of attachment

Polystyrene

This material attached to NMIJ CRM 8110-b (polystyrene) was made from the same lot of polystyrene resin as NMIJ CRM 8110-b, without decabromodiphenyl ether mixed. Unlike NMJI CRM 8110-b, however, the attached material did not go through the kneading process. This attached material should be stored under the same conditions as NMIJ CRM 8110-b.

If you have any questions about this CRM, please contact:
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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/