National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 8115-a
No. +++

Heavy Metals (Cd, Cr, Hg, Pb) in ABS Resin - Low Concentration Disk

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 controlling the precision of analysis and validating analytical methods and instruments during the X-ray fluorescence analysis of Cd, Cr, Hg and Pb in ABS resin and similar polymers.

Certified Values

The certified values of Cd, Cr, Hg and Pb in this CRM are given in the table below. This CRM should be used without any drying. 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 %.

	Certified value, Mass fraction (mg/kg)	Expanded uncertainty, Mass fraction (mg/kg)
Cd	9.341	0.266
Cr	94.27	1.12
Hg	93.81	2.76
Pb	94.21	0.98

Analysis

Each certified value was determined by the following analytical method:
(1) Microwave digestion using sulfuric acid and nitric acid / isotope dilution – inductively coupled plasma mass spectrometry.

Metrological Traceability

Each certified value of this CRM was determined by more than one method, including isotope dilution – mass spectrometry as a primary method of measurement with NMIJ primary standard solutions of Cd, Cr, Hg and Pb. The certified values are 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 until March 31, 2026, provided that the CRM remains unopened and is stored in accordance with the instructions given in this certificate.

Description of the Material

This CRM is in the form of a disk with diameter 30 mm and thickness 2 mm, kept in a plastic case.

Homogeneity

The homogeneity of the CRM was determined by analyzing 16 disks. The elements (Cd, Cr, Hg and Pb) were determined by X-ray fluorescence method. The homogeneity of each element is reflected to the uncertainty of the certified value. The homogeneity of lead within a surface was also determined and reflected to the uncertainty of each certified value.

Instructions for Storage

This CRM should be stored at a temperature between 15 °C and 35 °C, and shielded from light.

Instructions for Use

From the homogeneity, the certified values of this CRM represent the sample concentrations of the surface area more than 20 mm^2 (an area corresponding to a circle with diameter 5 mm). In measuring X-ray fluorescence, X-ray should be irradiated from the opposite side to the side on which there are 7 circles with diameter 6 mm formed during the injection-molding process. Please note that this sample contains hundreds mg/kg of Br.

Precautions for Handling

Do not use this standard substance for testing/research purposes only. Pay attention to fire and ventilation; wear protective mask, protective gloves, etc. DBDE (deca brominated biphenyl ether) is designated as Class 1 Designated Chemical Substances in the Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. It is also designated as Class I Designated Chemical Substances in the Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (PRTR law). Handle in compliance with these laws. Refer to the safety data sheet (SDS) on this CRM before use.

Preparation

Commercial ABS resin and powders of CdO, $PbCrO_4$, chromium(III) acetylacetonate and HgS were mixed and then pellets were produced from extruding the mixture. The extruding process was repeated two more times. These master pellets produced were mixed with commercial ABS resin and the extruding process was repeated three times. From the obtained pellets, the disks with thickness 2 mm and diameter 30 mm were produced by the injection-molding method.

NMIJ Analysts

The technical and production managers for this CRM are HIOKI A. and the analyst is OHATA M.

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,
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

March 10, 2011: The expiration of certification was extended from March 31, 2012 to March 31, 2017.
The description on Mutual Recognition Arrangement (CIPM MRA) was added.

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 "3 years after the date of shipment."

February 16,2023 The description in "Expiration of Certification" was changed to "until March 31, 2026".