National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 7541-a
No. +++

^{134}Cs, ^{137}Cs in Brown Rice

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 analyses and validating analytical methods and instruments used for determination of ^{134}Cs and ^{137}Cs in brown rice and rice.

Certified Values

The certified values (Reference date: 9:00:00 JST, August 1, 2012) for ^{137}Cs in this CRM are 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 %.

	Certified value, Massic activity (Bq/kg)	Expanded uncertainty, Massic Activity (Bq/kg)
^{134}Cs	33.6	3.7
^{137}Cs	51.8	4.7
^{134}Cs+^{137}Cs	85.4	6.0

Analysis

The certified values of this CRM were determined by the γ ray spectrometry using a Ge semiconductor detector.

Metrological Traceability

Each certified value of this CRM was determined by the γ ray spectrometry using a Ge semiconductor detector, and the weight of the sample weighed by a balance. The Ge semiconductor detector was calibrated by the radioactivity standard solutions of ^{134}Cs and ^{137}Cs traceable to the national measurement standards of Japan. The balance was calibrated through the Japan Calibration Service System (JCSS). Each certified value is traceable to the International System of Units (SI).

Expiration of Certification

This certificate is valid from the date of shipment to March 31, 2024, provided the material is used and stored in accordance with the instructions given in this certificate.

Sample Form

This CRM was prepared from brown rice grains. The brown rice grain of 81.00 g was sealed with a height of 5 cm in a polypropylene container (with an outside diameter of 55 mm and a height of 55 mm). And the container was sealed in an aluminum-coated bag.

Homogeneity

The homogeneity of this CRM was determined by analyzing 12 bottles selected with the stratified random sampling method from the total of 600 bottles. The radioactive nuclides (^{134}Cs and ^{137}Cs) were determined by the γ-ray spectrometry using a Ge semiconductor detector. The homogeneity of radioactive nuclides has been incorporated into the uncertainty of the certified value. This CRM is homogeneous within the range of the uncertainty of the certified value.

Instructions for Storage

This CRM should be stored at a temperature between 5 °C and 35 °C in a clean place and shielded from light.

Instructions for Use

(1) In order to maintain the filling state of the CRM, avoid shaking, vibrating and administering a shock.
(2) This certification is nullified if a sealed container is opened. The certified values are not guaranteed, once the container is opened.
(3) Do not contaminate the container surface with radioactive materials.
(4) The brown rice should not be used for measurement if it is cracked or its color changes.
(5) This CRM should be used in those instruments which are calibrated by the volume standard source of radioactivity.
(6) This CRM can be used for validation of measurement results. This CRM should not be used for calibration of instruments.
(7) The certified values are the massic activity of the CRM at the reference date: 9:00:00 JST, August 1, 2012. The massic activity values of this CRM should be calculated by using the radioactive decay law at the time of measurement.
(8) This CRM contains natural radioactive nuclides (^{214}Bi, ^{40}K, *etc*.).

Precautions for Handling

This CRM is for laboratory use only, and is not edible. A protective mask and gloves should be used for safety when the CRM is used. This CRM should be disposed of in accordance with all relevant laws regarding waste handling and management. Refer to the safety data sheet (SDS) on this CRM before use.

Preparation

The candidate material of this CRM was produced in the collaborative research program joined by NMIJ and National Food Research Institute/NARO. The brown rice harvested in 2011 was mixed to be homogenized by the cone and quartering method in National Food Research Institute/NARO. And then the homogenized brown rice grain of 81.00 g was sealed in a polypropylene container. Finally, the candidate material sealed in the container was sterilized with the γ-ray irradiation (^{60}Co, 25 kGy).

Technical Information

The massic activity of ^{40}K in this CRM was 72 Bq/kg at the time of certification (August 2012). The moisture content in this CRM was 14.7 % as measured by drying at 135 °C for 3 hours when at the certification (August 2012).

NMIJ Analysts

The technical and production manager for this CRM is MIURA T. and the analysts are YUNOKI A. and UNNO Y.

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.

Note

The certified value of this CRM was confirmed in the joint research "Measurement verification experiment related to CRM certification of radioactivity in food sample" jointly with the Japan Radioactive Isotope Association and Japan Chemical Analytical Center.

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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Phone: +81-29-861-4059; Fax: +81-29-861-4009, https://unit.aist.go.jp/nmij/english/refmate/

Revision history
November 12, 2014: The limit of validity of the certificate was extended from “March 31, 2016” to “March 31, 2019.”
April 1, 2015: "Metrology Management Center" was renamed to "Center for Quality Management of Metrology."
March 14, 2018: The limit of validity of the certificate was extended from “March 31, 2019” to “March 31, 2024.”
The expanded uncertainty of massic activity of ^{134}Cs, ^{137}Cs and ^{134}Cs+ ^{137}Cs were changed.