National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan

Reference Material Certificate

NMIJ CRM 4203-a
No. +++

γ-HCH in 2,2,4-Trimethylpentane

This CRM is produced in accordance with the NMIJ's management system which conforms to ISO Guide 34, and is intended for use in calibration of analytical equipment as well as in accuracy control of equipment, and validation of analytical methods/equipment, for quantification of chlorinated pesticides by means of gas chromatograph/mass spectroscopy, gas chromatography, high-performance liquid chromatography, and the like.

**Certified Value**
The certified value of this CRM is mass fraction of γ-HCH. The quoted uncertainty 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 %.

<table>
<thead>
<tr>
<th>CAS No.</th>
<th>Certified value, Mass fraction (mg/kg)</th>
<th>Expanded uncertainty Mass fraction (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>58-89-9</td>
<td>10.05</td>
<td>0.19</td>
</tr>
</tbody>
</table>

**Analysis**
The certified value of this CRM is determined by the synthesized value of γ-HCH obtained by the gravimetric blending method and the purity of this CRM obtained by the gas-chromatograph flame ionization detector (GC-FID).

The uncertainty of the certified value is estimated by combining the purity of γ-HCH, the variation of synthesis through the gravimetric blending method, and the uncertainties derived from the homogeneity and the stability of this CRM.

**Metrological Traceability**
The certified value of this CRM is traceable to the International System of Units (SI) as it is calculated by multiplying the synthesized value of γ-HCH obtained by the gravimetric blending method by the purity of this CRM.

**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 from the date of shipment to March 31, 2023, provided that the material remains unopened and stored in accordance with the instructions given in this certificate.

**Sample Form**
This CRM is in the form of a colorless and transparent liquid at room temperature. About 1 g of this CRM is packed into a 2 mL amber ampule in the argon gas ambience.
Homogeneity
The homogeneity was determined by sampling ten ampules randomly from the subdivided 140 ampules and by quantifying γ-HCH by the GC-FID. The uncertainty derived from the evaluated homogeneity was incorporated in the uncertainty of the certified value. This CRM, therefore, is homogeneous within the range of the uncertainty of its certified value.

Instructions for Storage
This CRM should be kept at 15 °C to 25 °C and shielded from light.

Instructions for Use
Once an ampule is opened, the solution should be used promptly.

Precautions for Handling
Care must be taken against fire and ventilation. Wear a protective mask, protective gloves, etc. This CRM, which contains substance designated as specified chemical substance, should be handled in accordance with the Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc., and should be stored and deposed of in accordance with the Waste Management and Public Cleansing Act. See the safety data sheet (SDS) as well.

Preparation Method
This CRM was synthesized by diluting the constituent, whose purity was determined by the above-described purity determination method, with 2,2,4-trimethylpentane by using the gravimetric blending method. About 1 g of this CRM was packed into a 2 mL amber ampule in the argon gas ambience.

Information
Density of this CRM is 0.6918 g/mL (20 ºC).

NMIJ Analysts
The technical and production manager for this CRM is T. Maeda; the production manager is K. Ishikawa and the analysts are K. Ishikawa, T. Ihara, Y. Shimizu, S. Otsuka, Y. Ohte and X. Bao.

Technical Information
Customer registration on the NMIJ Website (given below) will facilitate notification of any revision of the information given above. 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, 2015
Ryoji Chubachi
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://www.nmij.jp/english/service/C/

Revision history
April 22, 2010: Items related to Class I Specified Chemical Substances were added to “Precautions for Handling.”
March 21, 2013: The limit of validity of the certificate was extended from “December 31, 2013” to “March 31, 2023.”
Uncertainty of the certified value was changed based on the result of stability monitoring.
Description on “Mutual Recognition Arrangement under Meter Convention” was added.
April 1, 2015: “Metrology Management Center” was renamed to “Center for Quality Management of Metrology.”