

National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan



Reference Material Certificate

NMIJ CRM 4050-a

No. +++

Thiobencarb



This certified reference material (CRM) was produced based on NMIJ's quality system in compliance with JIS Q 0034 (ISO GUIDE 34). Intended uses for this CRM are calibration of analytical instruments and reference materials, quality control of analytical instrument and validation of analytical techniques and instruments.

Certified Value

The certified value for the purity (in mass fraction) of thiobencarb is given in the following table. The expanded uncertainty was determined using coverage factor $k=2$, corresponding to an estimated confidence interval of approximately 95%.

	CAS Number	Certified Value Mass fraction (kg/kg)	Expanded Uncertainty Mass fraction (kg/kg)
Thiobencarb (S-4-chlorobenzyl diethyl(thiocarbamate))	28249-77-6	0.990	0.001

Analytical Methods

The certified value was determined by subtracting the mass fractions of impurities measured by gas-chromatography with flame ionization detection (GC-FID), high performance liquid chromatography (HPLC) and Karl-Fischer titration (KF), by the mass fraction of total impurities measured by the freezing point depression method by means of differential scanning calorimetry and by the mass fraction of thiobencarb measured by nuclear magnetic resonance (NMR).

Traceability

The certified value of this CRM is based on the analytical results of subtraction method and NMR. Mass fractions of major impurities including *p*-chlorobenzaldehyde and orbencarb were determined by using their calibration standards evaluated at NMIJ. The mass fraction of thiobencarb was obtained by subtracting the mass fractions of the impurities from 1. The mass fraction of the impurities were also determined by freezing point depression method using NIST SRM 2225(Mercury) and NIST SRM 2232(Indium) as calibration standards. The mass fraction of thiobencarb was also evaluated by NMR using 1,4-bis(trimethylsilyl)benzene-*d*₄ calibrated by NMIJ CRM 4039-a (1,4-dichlorobenzene). The certified value obtained by the weighted mean of these values is traceable to the International System of Units (SI).

Expiration of Certification

The certification of this CRM is valid until March 31, 2020, provided that the material is unopened and stored in accordance with the instructions given in this certificate.

Sample Form

The form of this CRM is pale yellow oily liquid at room temperature and a net amount of 100 mg is encapsulated in a 2 mL amber glass ampoule.

Homogeneity

The homogeneity of the CRM was determined by analyzing ten ampoules randomly selected out of 302 subdivided vials. Area

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percentages of thiobencarb measured by GC-FID were evaluated to prove the homogeneity of the CRM. Variation of purity (mass fraction) between ampoules was estimated by the analysis of variance and was reflected in the uncertainty estimation of the certified value.

Precautions for Storage

This CRM should be stored in a refrigerator (around 5 °C) at a clean and dark place.

Precautions for use

Sampling more than 10 mg is recommended for ensuring homogeneity. Keep the CRM at room temperature before opening and use quickly after opening. Do not use the CRM other than testing and research purposes. The use, handling and storage of this CRM should be made observing the laws regulating those of thiobencarb.

Precautions for handling

Wear protective equipments such as a safety mask and safety gloves in handling.

Preparation Method

Raw material of this CRM was commercially available thiobencarb pre-selected by the quality evaluation by NMIJ. This CRM was prepared and subfractioned into ampoules with Ar gas by Wako Pure Chemical Industries, Ltd.

Information Values

This CRM contains *p*-chlorobenzaldehyde (1.0 g/kg, mass fraction) and orbencarb (3.2 g/kg, mass fraction).

NMIJ Analysts

The technical manager for this CRM is M. Numata. The production manager is K. Ishikawa. The analysts are K. Ishikawa, N. Hanari, T. Saito, S. Otsuka, K. Higuchi, N. Fujiki, R. Iwasawa and T. Miura.

Technical Information

Customers will be notified of any revision to this CRM including a change in certified value. Technical information on this CRM can be obtained from the home page and other contact shown below.

Reproduction of Certificate

In reproducing this certificate, it should be clearly indicated that the document is a copy.

March 30, 2010

Tamotsu Nomakuchi

President

National Institute of Advanced Industrial Science and Technology

If you have any questions about this CRM, please contact
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