

National Institute of Advanced Industrial Science and Technology

National Metrology Institute of Japan



Reference Material Certificate

NMIJ CRM 7602-a
No. +++

Seawater for Nutrients - Middle 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 controlling the precision of analysis and for confirming the validity of analytical methods and instruments during analysis of nutrients in seawater.

Certified Values

The certified values of this CRM are given in the table below. The uncertainty of each 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 estimated to have a level of confidence of approximately 95 %.

Substance	Certified value, *1 Mass fraction (mg/kg)	Expanded uncertainty, Mass fraction (mg/kg)	Analytical methods *2
Nitrate ions	0.942	0.027	1), 3), 4)
Nitrite ions	0.019	0.002	1), 3)
Dissolved silica	0.837	0.018	1), 2), 5)

*1 The certified value for dissolved silica is expressed as the mass fraction of silicon.

*2 Analytical methods: See the next section "Analysis".

Analysis

The certified values of this CRM were arithmetic mean of the results of the following analytical methods:

- 1) Colorimetric method (continuous flow mode and batch one)
- 2) Ion exclusion chromatography/isotope dilution-inductively coupled plasma mass spectrometry
- 3) Ion chromatography by direct analysis
- 4) Ion chromatography after halogen-ion separation
- 5) Ion exclusion chromatography with post-column detection

Metrological Traceability

Each certified value was determined by more than one method with using one of NIST (National Institute of Standards and Technology) SRM 3150 of a silicon standard solution and the NMIJ primary standard solutions of nitrate ions and nitrite ions. The certified values, therefore, are traceable to the International System of Units (SI).

Indicative Value

The indicative value was determined with the NMIJ primary standard solution of phosphate ions. The indicative value of this CRM is given in the table below.

Substance	Indicative value, Mass fraction (mg/kg)	Analytical method (see the section "Analysis" (<i>vide supra</i>))
Phosphate ions	0.101 ± 0.005	1)

The value following the ± in the column of the indicative 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 %.

Expiration of Certification

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

Description of the material

This CRM is a blended solution of seawater collected from 1500 m depth in the Atlantic Ocean, 397 m depth in Suruga Bay, and 690 m depth in the Arctic Ocean. This CRM is in the form of a colorless and transparent liquid at ordinary temperature, and *ca.* 90 mL is kept in a polypropylene bottle. The bottle is sealed in an aluminum-laminated plastic bag.

Instructions for Storage

This CRM should be kept in the polypropylene bottle sealed in the aluminum-laminated plastic bag. This CRM should be stored in a clean place at temperatures of 5 °C to 30 °C and protected from light.

Instructions for Use

The bottle should be allowed to warm to room temperature before opening. Prior to use, the bottle should be shaken thoroughly but gently at room temperature. This CRM is for laboratory use only.

Precautions for Handling

Refer the safety data sheet (SDS) on this CRM before use.

Preparation

The raw material seawater of this CRM was a blend of the following seawaters: (1) Arctic Sea, 690 m depth collected with the cooperation of the Meteorological Research Institute, Japan Meteorological Agency (MRI) and the Japan Agency for Marine-Earth Science and Technology (JAMSTEC), (2) Atlantic Ocean, 1500 m depth collected with the cooperation of MRI and the Plymouth Marine Laboratory, UK (PML), and (3) Suruga-wan Bay, 397 m depth collected with the cooperation of General Environmental Technos Co., Ltd. (current: KANSO Co., Ltd.). The nutrient composition is similar to the original one of the 1500 m depth seawater of the Atlantic Ocean. Note that, the three kinds of seawaters were blended because the concentrations of nutrients from the 1500 m depth seawater of the Atlantic Ocean changed during transportation. The blended seawater was sterilized in an autoclave of stainless steel, followed by subdividing in polypropylene bottles and sealing by the aluminum-laminated plastic bags in a clean room. This bottling process was carried out with the cooperation of General Environmental Technos Co., Ltd.

Technical Information

The value 1.023 g/cm³ (25 °C) can be used as the density of the seawater for the purpose of air-buoyancy correction. This CRM contains a silicon compound which cannot be detected by the colorimetric method using the molybdenum blue method or the molybdenum yellow method, but can be separated and detected by ion exclusion chromatography-inductively coupled plasma mass spectrometry.

NMIJ Analysts

The technical manager for this CRM is HIOKI A., the production manager is MIURA T. and the analysts are CHEONG C., NONOSE N., SUZUKI T., MIURA T., YAMAUCHI Y. and ISHIZAWA 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.

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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Revision history

April 1, 2015: "Metrology Management Center" was renamed to "Center for Quality Management of Metrology."

September 24, 2015: The indicative value for phosphate ions was revised.

September 6, 2016: The description in "Expiration of Certification" was changed to "one year from the date of shipment."

Certified values of nitrate ions, nitrite ions and dissolved silica were revised. Indicative value of phosphate ions was revised.

January 21, 2021: "Sample Form" was changed to "Description of the material" and collection site of the seawater was added.

"Certified values" the uncertainty of dissolved silica was revised.