TÜBİTAK
ULUSAL METROLOJİ ENSTİTÜSÜ

Certificate of the Reference Material

Name of the Material	:	Elements in Sea Water
Material Code	:	UME CRM 1206
Issue Date	:	12.02.2021
Revision Date	:	11.10.2021 (Revision history can be found on the last page)
Validity Period of the Certificate	:	12 months from the sales date
Certified Values	:	

Element	Mass Fraction[1,3] µg/kg	Uncertainty[2,3] µg/kg
Cd	0.433	0.010
Cr	2.44	0.20
Cu	1.019	0.023
Fe	12.7	1.4
Ni	4.568	0.043
Pb	1.068	0.017
Zn	8.52	0.42

[1] Certified values have been assigned by using ID-ICP-MS method.

[2] The expanded uncertainty of certified value includes characterization, homogeneity, stability components and is stated as the standard uncertainty multiplied by the coverage factor k = 2, which for a normal distribution corresponds to a coverage probability of approximately 95 %. The standard uncertainty of measurement has been determined in accordance with GUM "Guide to the Expression of Uncertainty in Measurement".

[3] The certified values and the uncertainties are traceable to the International System of Units (SI).

TÜBİTAK UME, as a reference material producer, has been accredited by TÜRKAK according to TS EN ISO 17034 with the accreditation number AB-0001-RM.

Sales Date

Dr. Mustafa ÇETİNTAŞ
Director

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Informative Values

Element	Mass Fraction[1] µg/kg	Uncertainty[2] µg/kg
As	2.52	0.10

[1] The value has been characterized by using matrix matched external calibration technique via ICP-MS/MS and is traceable to SI.

[2] The expanded uncertainty of the informative value has contribution from characterization, homogeneity, stability and is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 %. The standard uncertainty of measurement has been determined in accordance with GUM "Guide to the Expression of Uncertainty in Measurement.

Description

The material in LDPE bottle containing about 250 mL sea water acidified to pH 1.6 with HNO_3. Additional information is available in the certification report.

Intended Use

This material is intended to be used for method validation on the determination of trace elements in sea water mass fractions and for quality control purposes.

Instructions for Use

Before use, the bottle should be kept in the laboratory environment to equilibrate with room temperature and should be shaken before opening the cap to avoid a bias due to condensed water at the bottleneck. To avoid contamination, it is highly recommended that the bottle should be kept and opened in a clean environment and pipette should not be inserted into the bottle. Minimum sample intake is 5 mL for Cd, Cr, Cu, Fe, Ni, Pb, Zn and 1 mL for As. After use, the bottle should be immediately and tightly recapped.

This material can be safely dispatched under conditions where the temperature does not exceed 40 °C for up to 2 weeks without applying any cooling elements.

Storage Conditions

This material should be stored at (18 ± 4) °C in a dark and clean environment.

TÜBİTAK UME cannot be held responsible for changes that might happen to the material at customer's premises due to noncompliance with the instructions for use, and the storage conditions given in the certificate.

Safety Information

Usual laboratory safety measures apply as in the case of similar solutions.

It is highly recommended that the material must be handled and disposed according to the safety guidelines where applicable. Please refer to the Safety Datasheet before any use of the material.

Participants

Information about the laboratory participated in the characterization study is presented in the table below.

Laboratory	Address
TÜBİTAK UME	TÜBİTAK Gebze Yerleşkesi, Barış Mahallesi, Dr. Zeki Acar Caddesi No.1, 41470 Gebze - Kocaeli / Turkey

Methods and/or Techniques Used for the Determination of the Certified Values

Methods and techniques used in characterization studies are presented below.

Method/Technique	Parameter
$Mg(OH)_2$ co-precipitation-Isotope Dilution Inductively Coupled Plasma Mass Spectrometry (ID-ICP-MS)	Cd, Cu, Cr, Fe, Ni, Pb, Zn
Inductively Coupled Plasma Mass Spectrometry (ICP- MS/MS)	As

Revision History

Date	Remarks
12.02.2021	First Issue
11.10.2021	Certificate is updated due to changes in the format of certificate for reference materials.