

JOINT RESEARCH CENTRE
Directorate F – Health, Consumers and Reference Materials

CERTIFICATE OF ANALYSIS

ERM[®] - CA403

SEAWATER		
Mass Concentration		
	Certified value ²⁾ [µg/L]	Uncertainty ³⁾ [µg/L]
As ¹⁾	1.90	0.13
Cd ¹⁾	0.094	0.011
Co ¹⁾	0.074	0.011
Cu ¹⁾	0.87	0.13
Mn ¹⁾	2.47	0.11
Mo ¹⁾	12.0	0.6
Ni ¹⁾	1.04	0.16
Pb ¹⁾	0.098	0.010
Density		
	Certified value ²⁾ [g/mL]	Uncertainty ³⁾ [g/mL]
Density at 20 °C	1.02352	0.00005
<p>1) as obtained by measurement methods with quantification by Inductively Coupled Plasma Mass Spectrometry</p> <p>2) Certified values are values that fulfil the highest standards of accuracy. The given values represent the unweighted mean value of the means of accepted sets of data, each set being obtained in a different laboratory and/or with a different method of determination. The certified value and its uncertainty are traceable to the International System of Units (SI).</p> <p>3) The uncertainty of the certified value is the expanded uncertainty with a coverage factor $k = 2$ corresponding to a level of confidence of about 95 % estimated in accordance with ISO/IEC Guide 98-3, Guide to the Expression of Uncertainty in Measurement (GUM:1995), ISO, 2008.</p>		

This certificate is valid for one year after purchase.

Sales date:

The minimum amount of sample to be used is 2 mL.

Geel, March 2018

Signed:



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Indicative Values

Mass concentration

	Indicative value ²⁾ [µg/L]	Uncertainty ³⁾ [µg/L]
Zn ¹⁾	4.6	0.6

1) as obtained by measurement methods with quantification by Inductively Coupled Plasma Mass Spectrometry

2) Indicative values are provided as too few independent datasets are available to allow certification and are therefore less reliable than certified values. Great caution should be used when using these values. The given value is an unweighted mean value of the means of accepted sets of data, each set being obtained in a different laboratory. The indicative value and its uncertainty are traceable to the International System of Units (SI).

3) The uncertainty of the indicative value is the expanded uncertainty with a coverage factor $k = 2$ corresponding to a level of confidence of about 95 % estimated in accordance with ISO/IEC Guide 98-3, Guide to the Expression of Uncertainty in Measurement (GUM:1995), ISO, 2008.

Additional Material Information

Mass concentration

	Range ¹⁾ [µg/L]
Cr	0.21 – 0.31
Fe	2.7 – 4.2
Se	0.060 – 0.094

1) Three laboratories in the characterisation exercise provided results for the Cr and Fe concentrations, and a single laboratory provided results for the Se concentration by two independent techniques (Atomic Fluorescence Spectrometry and ICP-MS). These were used to calculate approximate concentration ranges. These values must be regarded as informative only and cannot be, in any case, used as certified or indicative values.

DESCRIPTION OF THE MATERIAL

The sample consists of about 500 mL of seawater acidified to $1 < \text{pH} < 2$ with hydrochloric acid.

ANALYTICAL METHODS USED FOR CERTIFICATION

Mass concentrations of elements: Inductively Coupled Plasma Mass Spectrometry

Density: Oscillating type density meter; Gravimetric density determination with Pycnometer

PARTICIPANTS

AGQ Labs & Technological Services S.L., Burguillos (ES)
(measurements under the scope of ISO/IEC 17025 accreditation ENAC; accreditation number 305/LE1322)

ALS Laboratory Group, ALS Scandinavia AB, Luleå (SE)
(measurements under the scope of ISO/IEC 17025 accreditation SWEDAC; accreditation number 1087)

Agenzia Regionale per la Prevenzione e Protezione Ambientale del Veneto, Mestre (IT)
(measurements under the scope of ISO/IEC 17025 accreditation ACCREDIA No. 0838)

BEV - Bundesamt für Eich- und Vermessungswesen, Wien (AT)

Brooks Rand Labs L.L.C., Seattle (USA)
(measurements under the scope of ISO/IEC 17025 accreditation NELAP; accreditation number E87982)

EVANS Analytical group SAS, Tournefeuille (FR)
(measurements under the scope of ISO/IEC 17025 accreditation COFRAC; accreditation number E879821-1993)

Helmholtz Zentrum München – Forschungszentrum für Gesundheit und Umwelt GmbH, München (DE)
(measurements under the scope of ISO/IEC 17025 accreditation DACH; accreditation number DAC-PL-0141-01-10)

International Atomic Energy Agency - Marine Environmental Studies Laboratory (MC)

INM - National Institute of Metrology, Bucharest (RO)

Institut "Jozef Stefan", Ljubljana (SI)

(measurements performed under ISO/IEC 17025 accreditation; Slovenska Akreditacija LP-090)

I.N.R.I.M - Istituto Nazionale di Ricerca Metrologica, Pavia (IT)

(measurements performed under the scope of ISO/IEC 17025 accreditation, BELAC, accreditation number 015-TEST)

INTA - Instituto Nacional de Tecnica Aeroespacial "Esteban Terradas" (ES)

(measurements under the scope of ISO/IEC 17025 accreditation ENAC; accreditation number 16/LC10.007)

IPQ - Instituto Português da Qualidade, Caparica (PT)

Marine Institute, Cork (IE)

(measurements performed under the scope of ISO/IEC 17025 accreditation, INAB, accreditation number 130T)

Paragon Scientific Limited, Birkenhead (GB)

(measurements performed under the scope of ISO/IEC 17025 accreditation, UKAS, accreditation number 0640)

Reagecon Diagnostics Ltd, Shannon (IE)

(measurements under the scope of ISO/IEC 17025 accreditation NSAI, accreditation number 19.2769)

VSL - Dutch Metrology Institute, Delft (NL)

(measurements under the scope of ISO/IEC 17025 accreditation RvA, accreditation number K 999)

SAFETY INFORMATION

The usual laboratory safety precautions apply.

INSTRUCTIONS FOR USE AND INTENDED USE

The main purpose of this material is to assess method performance, i.e. for checking accuracy of analytical results/calibration. As any reference material, it can also be used for control charts or validation studies.

The bottles shall be shaken by turning upside down for at least 2 min before opening to ensure material re homogenisation.

STORAGE

The material shall be stored at $18\text{ °C} \pm 5\text{ °C}$ in the dark.

However, the European Commission cannot be held responsible for changes that happen during storage of the material at the customer's premises, especially of opened samples.

LEGAL NOTICE

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NOTE

A detailed certification report is available at <https://crm.jrc.ec.europa.eu/>.

A paper copy is obtainable from the Joint Research Centre, Directorate F – Health, Consumers and Reference Materials on request.

