

CERTIFICATE OF ANALYSIS

ERM[®]-AE125

Boric acid in water			
Certified quantity ¹⁾	Unit	Certified value ¹⁾	Uncertainty ²⁾
$\delta^{11}\text{B}_{\text{NIST SRM 951a}}$	‰	-124.00	0.48
<p>1) $\delta^{11}\text{B}$ is a measure for the isotope variation. It is expressed as the shift of the isotopic composition relative to an internationally accepted standard given in per mill. It is calculated according to the following equation, with NIST SRM 951a (isotope reference material for boron) being used as reference: $\delta^{11}\text{B} = ((R_{\text{sample}}/R_{\text{reference}})-1)$. 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 each calibrated against NIST SRM 951a. This certified isotope reference material (iRM) is traceable to the international δ-scale for boron with the origin being represented by NIST SRM 951a.</p> <p>2) The uncertainty of the certified value is the expanded uncertainty U with a coverage factor of $k = 2$ corresponding to a 95 % confidence level estimated in accordance with international guidelines (JCGM 100:2008, EURACHEM/CITAC 2012).</p>			

This certificate has a minimum validity until June 2030 for units with unbroken seal stored under required conditions. This validity may be extended as further evidence of stability becomes available.

NOTE

European Reference Material ERM[®]-AE125 was produced and certified under the responsibility of Bundesanstalt für Materialforschung und -prüfung (BAM) according to the principles laid down in the technical guidelines of the European Reference Materials[®] co-operation agreement between BAM-LGC-IRMM.

Accepted as an ERM[®], Berlin, Germany, September 2020

Dr. S. Richter
Committee for Certification

Dr. J. Vogl
Project Coordinator

Indicative Values			
Quantity	Unit	Indicative value ¹⁾	Uncertainty ²⁾
Isotope amount ratio $n(^{10}\text{B})/n(^{11}\text{B})$	mol/mol	0.282 12	0.000 38
Isotope amount ratio $n(^{11}\text{B})/n(^{10}\text{B})$	mol/mol	3.5446	0.0048
Isotope amount fraction $n(^{10}\text{B})/n(\text{B})$	mol/mol	0.220 04	0.000 23
Isotope amount fraction $n(^{11}\text{B})/n(\text{B})$	mol/mol	0.779 96	0.000 23
Molar mass of Boron in solution $M(\text{B})$	g/mol	10.790 07	0.000 23
Mass fraction of boron in solution, $w(\text{B})$	mg/kg	101.4	2.0
<p>1) The indicative values of this European Reference Material[®] (ERM[®]) were obtained by gravimetric preparation and measurements by MC-TIMS and MC-ICP-MS. The indicative values are traceable to the International System of units (SI) in the shortest possible way, as every measurement and correction was calibrated using SI traceable calibrators.</p> <p>2) The uncertainties of the indicative values are the expanded uncertainty U with a coverage factor of $k = 2$ corresponding to a 95 % confidence level estimated in accordance with international guidelines (JCGM 100:2008, EURACHEM/CITAC 2012).</p>			

DESCRIPTION OF THE SAMPLE

The isotopic reference material ERM[®]-AE125 is a solution of boric acid in ultrapure water with a B mass fraction of 101 mg/kg. Approximately 20 mL of this solution each is filled in perfluoralkoxy alkane bottles.

INTENDED USE

This material carries a B isotopic composition outside the natural range and is designed for verification, validation and calibration of all procedures (e.g. TIMS, ICP-MS) being used for the determination of $\delta^{11}\text{B}$ -values.

ANALYTICAL METHOD USED FOR CERTIFICATION

The certified values were determined by multi-collector ICP-MS and multi collector TIMS. The measurements were calibrated by using the primary boron isotope reference materials IRMM-011 and NIST SRM 951a. More details can be obtained from the certification report, which can be requested from BAM.

PARTICIPANTS

Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin, Germany

INSTRUCTIONS FOR USE

Once opened, the bottle lid should be left open as little as possible. The bottle weight might be monitored to track any evaporative losses during storage. These losses, however, will only affect the nominal B mass fraction in the solution and not the certified B isotope amount ratios. The introduction of any contaminant to this solution may change the $\delta^{11}\text{B}$ value and will therefore render these certified values null and void.

The minimum amount of sample to be used is 100 μL .

SAFETY INFORMATION

The usual laboratory safety precautions apply.

ERM[®]-AE125 is an aqueous solution of boric acid filled in PFA bottles. All appropriate safety precautions, including the use of gloves and safety glasses, should be taken.

STORAGE

ERM-AE125 should be stored under cool (5 ± 3) °C and dark conditions to reduce evaporation effects.

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

LEGAL NOTICE

Neither BAM, its contractors nor any person acting on their behalf:

- (a) make any warranty or representation, express or implied, that the use of any information, material, apparatus, method or process disclosed in this document does not infringe any privately-owned intellectual property rights; or
- (b) assume any liability with respect to, or for damages resulting from, the use of any information, material, apparatus, method or process disclosed in this document save for loss or damage arising solely and directly from the negligence of BAM.

TECHNICAL REPORT

A detailed technical report describing the production, characterisation as well as the analytical procedures applied and the treatment of the analytical data used to certify ERM®-AE125 is available on request or can be downloaded from BAM website (www.bam.de).

Supply of this Reference Material by:


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<p>BAM holds an accreditation as a reference material producer according to ISO 17034. This accreditation is valid only for the scope as specified in the certificate D-RM-11075-01-00.</p>	 <p>DAkkS Deutsche Akkreditierungsstelle D-RM-11075-01-00</p>
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DAkkS is a signatory of the multilateral agreement (MLA) between EA, ILAC and IAF for mutual acceptance.

