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CERTIFICATE OF ANALYSIS

ERM®-AE104

Boric acid (enriched in ^{10}B) in water, isotopic reference material

Certified Values		
	Certified value [1]	Uncertainty [2]
Isotope amount ratio $n(^{10}B)/n(^{11}B)$	0.45966	± 0.00062
Isotope amount fraction $n(^{10}B)/n(B)$ x100	31.491	± 0.029
Isotope amount fraction $n(^{11}B)/n(B)$ x100	68.509	± 0.029
Isotope mass fraction $m(^{10}B)/m(B)$ x100	29.481	± 0.028
Isotope mass fraction $m(^{11}B)/m(B)$ x100	70.519	± 0.028
Molar mass in solution $M(B)$ in $g \cdot mol^{-1}$	10.69554	± 0.00029

[1] This Isotopic Reference Material is traceable to the international SI-unit for amount of substance – the mole – in the shortest possible way. Measurements calibrated against this Isotopic Reference Material will, therefore, also be traceable to the SI.

[2] Estimated expanded uncertainty U with a coverage factor of k=2, corresponding to a level of confidence of about 95 %, as defined in the Guide to the expression of uncertainty in measurement, ISO, 1993. The uncertainty includes the repeatability of the measurement, the repeatability of the determination of correction factors for systematic errors as well as contributions from certified values.

This certificate is valid one year after seal affixation; this validity is checked by an ongoing stability monitoring, which includes yearly analysis.

The minimum sample size for wet chemical analysis is 30 mL of the solution.

NOTE

European Reference Material ERM®-AE104 was originally certified as BAM-I004 It 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. Information on these guidelines is available on the Internet (http://www.erm-crm.org).

Accepted as an ERM®, Berlin, 2004-04-14.

Berlin,

BAM Berlin
Department I
Analytical Chemistry;
Reference Materials
12200 Berlin, Germany

Prof. Dr. I. Nehls
(Head of Department)

BAM Berlin
Laboratory I.42
Isotope Dilution and Nuclear Fuel Analysis

12200 Berlin, Germany

Dr. J. Vogl
(Head of Laboratory)

Indicative Values[3)]

	Indicative value [4)]	Uncertainty [5)]
Mass fraction in solution w(B) in mg·kg^{-1}	999	± 20

[3)] Values were not certified, but given as indicative values only, because no special effort was to check the stability of the boron in solution in very detail. – The isotopic composition is not affected by possible alteration of the mass fraction in the solution.

[4)] The boron mass fraction was determined by isotope dilution mass spectrometry and gravimetry and is considered as Indicative value only. It is in no case a Certified Value.

[5)] Estimated expanded uncertainty U with a coverage factor of about k=2, corresponding to a level of confidence of 95 %, as defined in the Guide to the expression of uncertainty in measurement, ISO, 1993.

DESCRIPTION OF THE SAMPLE

This isotopic reference material is composed of an aqueous boric acid solution and is filled in PFA-bottles of approximately 30 mL. It is designed for calibration of boron isotope ratio measurements applied mainly by Inductively Coupled Plasma Mass Spectrometry (ICP-MS).
The molar masses used in the calculation, are the following ones:
^{10}B: 10.01293690 (30) g·mol^{-1}
^{11}B: 11.00930540 (40) g·mol^{-1}
The preparation of this Isotopic Reference Material by mixing natural boric acid with boric acid enriched in ^{10}B as well as the determination of the boron mass fraction in the solution were performed by D. Becker, N. Janisch and M. Ostermann .
The development of a procedure for the accurate determination of boron isotope amount ratios by Thermal Ionization Mass Spectrometry, the measurements itself as well as the calculation and the uncertainty budgets were performed by M. Ostermann and W. Pritzkow.

ANALYTICAL METHOD USED FOR CERTIFICATION

The certified values are determined by Thermal Ionization Mass Spectrometry (TIMS). The measurements were calibrated by using a primary boron isotopic reference material. More details can be taken from the certification report, which can be requested from BAM laboratory I.42.

PARTICIPANTS

BAM laboratory I.42

INSTRUCTIONS FOR USE

The solution never should be withdrawn by pipettes and the like, but by pouring in another bottle or container. Every contamination will result in a bias of the isotope amount ratio, as it is an Isotopic Reference Material with a non-natural isotopic composition.

STORAGE

This Isotopic Reference Material should be stored under cool (< 20°C) and dark conditions to reduce evaporation effects.

TECHNICAL REPORT

A detailed technical report (in German) describing the analysis procedures and the treatment of the analytical data used to certify ERM®-AE104 is available on request.

Supply of Reference Materials by Bundesanstalt für Materialforschung und –prüfung:

Richard-Willstätter-Straße 11, 12489 Berlin, Germany

Phone: +49 30 8104 2061 e-mail: sales.crm@bam.de

Fax: +49 30 8104 1117 internet: www.bam.de