CERTIFICATE OF ANALYSIS

ERM®-AE102

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

ausverkauft / out of stock

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Certified Values		
	Certified value [1]	Uncertainty [2]
Isotope amount ratio $n(^{10}B)/n(^{11}B)$	0.42485	± 0.00060
Isotope amount fraction $n(^{10}B)/n(B)$ x100	29.817	± 0.030
Isotope amount fraction $n(^{11}B)/n(B)$ x100	70.183	± 0.030
Isotope mass fraction $m(^{10}B)/m(B)$ x100	27.871	± 0.028
Isotope mass fraction $m(^{11}B)/m(B)$ x100	72.129	± 0.028
Molar mass in solution $M(B)$ in g·mol^{-1}	10.71222	± 0.00030

[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®-AE102 was originally certified as BAM-I002 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,

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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 taken 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 titrimetry 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 G. Riebe.
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 W. Birke 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®-AE102 is available on request.

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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

SAFETY DATA SHEET

Based on Directive 2001/58/EC of the Commission of the European Communities

ERM-AE101, 102, 102a, 103, 104, 104a, 120, 121, 122, 123 & 124

1. Identification of the substance / preparation and of the company / undertaking

1.1 Identification of the substance or preparation:

Product name: Boric acid in water, isotopic reference material
Synonyms: H_3BO_3, aqueous solution

CAS No. : 10043-35-3 **Reference number** : ERM-AE101, 102(a), 103, 104(a), 120 to 124
EC index No. : N.A. **NFPA code** : N.D.
EINECS No. : N.A. **Molecular weight** : N.A.
RTECS No. : N.A. **Formula** : N.A.

1.2 Use of the substance or the preparation:
Certified reference material for laboratory use only

1.3 Company/undertaking identification:
BAM Bundesanstalt für Materialforschung und -prüfung
Unter den Eichen 87
D - 12205 Berlin
Tel. : +49 30 8104 0
Fax : +49 30 811 2029

1.4 Telephone number for emergency:
+49 30 19240 (24h)
Giftnotruf Berlin, Institut für Toxikologie, Oranienburger Straße 285, D-13437 Berlin
Tel. +49-30-30686-711, FAX +49-30-30686-799, E-Mail: mail@giftnotruf.de

2. Composition / information on ingredients

Ingredients	CAS No. EINECS / ELINCS No.	Conc. in %	Hazard symbol	Risks (R-phrases)
H_2O		> 99.9		
H_3BO_3, boric acid varying isotopic composition for ERM-AE101, 102, 103 and 104, for details see certificates	10043-35-3	< 0.1		

(1) For R-phrases in full: see heading 16

3. Hazards identification

- No hazard classification in accordance with directives 67/548/EEC and 1999/45/EC

4. First aid measures

4.1 Eye contact:
- Consult a doctor/medical service if irritation persists
- Rinse immediately with water

4.2 Skin contact:
- Consult a doctor/medical service if irritation persists
- Rinse with water

4.3 After inhalation:
- Consult a doctor/medical service if breathing problems develop
- Remove the victim into fresh air
- Unconscious: maintain adequate airway and respiration

4.4 After ingestion:
- Consult a doctor/medical service if you feel unwell
- Never give water to an unconscious person Rinse mouth with water

5. Fire fighting measures

5.1 Suitable extinguishing media:
- Non combustible
- Fire extinguishing media: not applicable

5.2 Unsuitable extinguishing media:
- No data available

5.3 Special exposure hazards:
- No data available

5.4 Instructions:
- No specific firefighting instructions required

5.5 Special protective equipment for firefighters:
- Protective clothing for exposure to chemicals

6. Accidental release measures

6.1 Personal protection/precautions:
See heading 8.1/8.3/10.3

6.2 Environmental precautions:
- Contain leaking substance

6.3 Methods for cleaning up:
- Take up liquid spill with absorbent paper
- Clean contaminated surfaces with an excess of water
- Wash clothing and equipment after handling

7. Handling and storage

7.1 Handling:
- Observe normal hygiene standards

7.2 Storage:
- Keep container tightly closed
- Meet the legal requirements

Storage temperature : N.D. °C
Quantity limits : N.D. kg
Storage life : N.D. days
Materials for packaging :
- suitable : quartz
- to avoid : no data available

7.3 Specific uses:
- See information supplied by the manufacturer

8. Exposure controls / Personal protection

8.1 Exposure limit values:

TLV-TWA	:	not listed
TLV-STEL	:	not listed
TLV-Ceiling	:	not listed
WEL-LTEL	:	not listed
WEL-STEL	:	not listed
MAK	:	not listed
MAC-TGG 8 h	:	not listed
MAC-TGG 15 min.	:	not listed
MAC-Ceiling	:	not listed
VME-8 h	:	not listed
VLE-15 min.	:	not listed

GWBB-8 h : not listed
GWK-15 min. : not listed
Momentary value : not listed

EC : not listed
EC-STEL : not listed

Sampling methods:
- Boric acid

8.2 Exposure controls:

8.2.1 Occupational exposure controls:
- No data available

8.2.1.1 Respiratory protection:
- Respiratory protection not required in normal conditions

8.2.1.2 Hand protection:
- Gloves
  Suitable materials: Butyl rubber
  Chloroprene rubber
  Neoprene
  Nitrile rubber
  PVC
  Viton
- Breakthrough time: N.D.

8.2.1.3 Eye protection:
- No data available

8.2.1.4 Skin protection:
- Protective clothing
  Suitable materials: Butyl rubber
  Chloroprene rubber
  Neoprene
  Nitrile rubber
  PVC
  Viton
- Breakthrough time: N.D.

8.2.2 Environmental exposure controls: see heading 13

9. Physical and chemical properties

9.1 General information:

Appearance (at 20°C)	: Liquid	
Odour	: N.D.	
Colour	: Colourless	

9.2 Important health, safety and environmental information:

pH value	: N.D.	
Boiling point/boiling range	: N.D.	°C
Flashpoint	: N.A.	°C
Explosion limits	: N.A.	vol%
Vapour pressure (at 20°C)	: N.D.	hPa
Vapour pressure (at 50°C)	: N.D.	hPa
Relative density (at 20°C)	: N.D.	
Water solubility	: N.D.	
Soluble in	: N.D.	
Relative vapour density	: N.D.	
Viscosity (at 20°C)	: N.D.	Pa.s
Partition coefficient n-octanol/water	: N.D.	
Evaporation rate		
ratio to butyl acetate	: N.D.	
ratio to ether	: N.D.	

9.3 Other information:

Melting point/melting range	: N.D.	°C
Auto-ignition point	: N.A.	°C
Saturation concentration	: N.D.	g/m3

10. Stability and reactivity

10.1 Conditions to avoid:
- No data available

10.2 Materials to avoid:
- No data available

10.3 Hazardous decomposition products:
- No data available

11. Toxicological information

11.1 Acute toxicity:

LD50 oral rat	:	N.D.	mg/kg
LD50 dermal rat	:	N.D.	mg/kg
LD50 dermal rabbit	:	N.D.	mg/kg
LC50 inhalation rat	:	N.D.	mg/l/4 h
LC50 inhalation rat	:	N.D.	ppm/4 h

11.2 Chronic toxicity:

EC carc. cat.	:	not listed
EC muta. cat.	:	not listed
EC repr. cat.	:	not listed
Carcinogenicity (TLV)	:	not listed
Carcinogenicity (MAC)	:	not listed
Carcinogenicity (VME)	:	not listed
Carcinogenicity (GWBB)	:	not listed
Carcinogenicity (MAK)	:	not listed
Mutagenicity (MAK)	:	not listed
Teratogenicity (MAK)	:	not listed
IARC classification	:	not listed

11.3 Routes of exposure:
- ingestion
- inhalation
- eyes
- skin

11.4 Acute effects/symptoms:
- No data available

11.5 Chronic effects:
- Contains traces of a (possible) teratogenic substance (boric acid)
- Contains traces of a (possible) fertility impairing subst.(boric acid

12. Ecological information

12.1 Ecotoxicity:
- No data available)

12.2 Mobility:
- Volatile organic compounds (VOC): N.A.%
- No data available
- For other physicochemical properties see heading 9

12.3 Persistence and degradability:

- biodegradation BOD5:	N.A.	% ThOD
- water:	N.D.	
- soil T ½:	N.D.	days

12.4 Bioaccumulative potential:

- log Pow:	N.D.
- BCF:	N.D.

12.5 Other adverse effects:
- WGK: 3 (Classification in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) of 27 July 2005)
- Effect on the ozone layer: Not dangerous for the ozone layer (1999/45/EC)
- Greenhouse effect: no data available
- Effect on waste water purification: no data available

13. Disposal considerations

13.1 Provisions relating to waste:

- Waste material code (75/442/EEC, Council Decision 2001/118/EC, O.J. L47 of 16/2/2001): 16 05 09 (discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08)

13.2 Disposal methods:

- Treat using the best available techniques before discharge into drains or the aquatic environment

13.3 Packaging/Container:

- Waste material code packaging (75/442/EEC, Council Decision 2001/118/EC, O.J. L47 of 16/2/2001): 15 01 07 (glass packaging)

14. Transport information

14.1 Classification of the substance in compliance with UN Recommendations

UN number	:	-
CLASS	:	-
SUB RISKS	:	-
PACKING	:	-
PROPER SHIPPING NAME	:	-

14.2 ADR (transport by road)

CLASS	:	Not subject
PACKING	:	
CLASSIFICATION CODE	:	
DANGER LABEL TANKS	:	
DANGER LABEL PACKAGES	:	

14.3 RID (transport by rail)

CLASS	:	Not subject
PACKING	:	
CLASSIFICATION CODE	:	
DANGER LABEL TANKS	:	
DANGER LABEL PACKAGES	:	

14.4 ADNR (transport by inland waterways)

CLASS	:	Not subject
PACKING	:	
CLASSIFICATION CODE	:	
DANGER LABEL TANKS	:	
DANGER LABEL PACKAGES	:	

14.5 IMDG (maritime transport)

CLASS	:	Not subject
SUB RISKS	:	
PACKING	:	
MFAG	:	
EMS	:	
MARINE POLLUTANT	:	

14.6 ICAO (air transport)

CLASS	:	Not subject
SUB RISKS	:	
PACKING	:	
PACKING INSTRUCTIONS PASSENGER AIRCRAFT	:	
PACKING INSTRUCTIONS CARGO AIRCRAFT	:	

14.7 Special precautions in connection with transport:

not restricted for any mode of international transport

15. Regulatory information

Classification according to directives 67/548/EEC and 1999/45/EC

NOT REQUIRED ACCORDING TO AVAILABLE INFORMATION

16. Other information

The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

N.A. = NOT APPLICABLE
N.D. = NOT DETERMINED
(*) = INTERNAL CLASSIFICATION (NFPA)

Exposure limits:
- TLV : Threshold Limit Value - ACGIH USA
- WEL : Workplace Exposure Limits - United Kingdom
- MAK : Maximale Arbeitsplatzkonzentrationen - Germany
- MAC : Maximale aanvaarde concentratie - The Netherlands
- VME : Valeurs limites de Moyenne d'Exposition - France
- VLE : Valeurs limites d'Exposition à court terme - France
- GWBB : Grenswaarde beroepsmatige blootstelling - Belgium
- GWK : Grenswaarde kortstondige blootstelling - Belgium
- EC : Indicative occupational exposure limit values - directive 2000/39/EC
- I : Inhalable fraction = T: Total dust = E: Einatembarer Aerosolanteil
- R : Respirable fraction = A: Alveolengängiger Aerosolanteil/Alveolar dust
- C : Ceiling limit

a:	aerosol		r:	rook/Rauch	(fume)
d:	damp	(vapour)	st:	stof/Staub	(dust)
du:	dust		ve:	vezel	(fibre)
fa:	Faser	(fibre)	va:	vapour	
fi:	fibre		om:	oil mist	
fu:	fume		on:	olienevel/Ölnebel	(oil mist)
p:	poussière	(dust)	part:	particles	

Chronic toxicity:
- **K** : List of the carcinogenic substances and processes - The Netherlands