

# CERTIFICATE OF ANALYSIS

## ERM<sup>®</sup>-AE144

Mg in nitric acid (2 %, w/w)			
Certified quantity	Unit	Certified value <sup>1)</sup>	Uncertainty <sup>2)</sup>
Isotope amount ratio $n(^{25}\text{Mg})/n(^{24}\text{Mg})$	mol/mol	0.126 486	0.000 022
Isotope amount ratio $n(^{26}\text{Mg})/n(^{24}\text{Mg})$	mol/mol	0.139 138	0.000 039
Isotope amount fraction $n(^{24}\text{Mg})/n(\text{Mg})$	mol/mol	0.790 124	0.000 039
Isotope amount fraction $n(^{25}\text{Mg})/n(\text{Mg})$	mol/mol	0.099 939	0.000 013
Isotope amount fraction $n(^{26}\text{Mg})/n(\text{Mg})$	mol/mol	0.109 936	0.000 025
Molar mass of Mg in solution $M(\text{Mg})$	g/mol	24.304 664	0.000 063

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 SI-traceable calibrators. The certified values of this European Reference Material<sup>®</sup> (ERM<sup>®</sup>) are traceable to "The International System of Units (SI)" in the most direct way, without using any reference material.

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).

This certificate is valid for 10 years after certification 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<sup>®</sup>-AE144 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<sup>®</sup> 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<sup>®</sup>, Berlin, Germany, January 2018

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## Indicative Values

Quantity	Unit	Indicative value <sup>1)</sup>	Uncertainty <sup>2)</sup>
Mg mass fraction	mg/kg	50.0	1.0

1) The indicative value of this European Reference Material<sup>®</sup> (ERM<sup>®</sup>) was obtained by gravimetric preparation and is traceable to "The International System of Units (SI)", by calibrating all instruments against SI-traceable calibrators.

2) The uncertainty of the indicative 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). This uncertainty also accounts for small losses of solvent by evaporation through the container walls and the screw cap, when properly stored.

### DESCRIPTION OF THE SAMPLE

This primary isotope reference material ERM<sup>®</sup>-AE144 is a solution of natural pure Mg in nitric acid (2 %, w/w) with a Mg mass fraction of 50 mg/kg. Approximately 20 mL of this solution each is filled in perfluoralkoxy alkane bottles.

### INTENDED USE

This material is designed for calibration of all procedures (e.g. thermal ionization mass spectrometry, inductively coupled plasma mass spectrometry) being used for the determination of Mg isotope amount ratios and Mg delta values, once the delta scale has been established.

### ANALYTICAL METHOD USED FOR CERTIFICATION

The certified values were determined by multi-collector inductively coupled plasma mass spectrometry. The mass fractionation or discrimination was corrected by an *ab initio* calibration approach. This calibration approach uses synthetic isotope mixtures without any *a priori* assumptions. More details can be found in the certification report, which can be requested from BAM, and in *Vogl et al., J. Anal. At. Spectrom., 2016, 31, 1440*.

### PARTICIPANTS

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### 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 Mg mass fraction in the solution and not the certified Mg isotope amount ratios.

The introduction of any contaminant to this solution may change the Mg isotope ratios, and will therefore render these certified values null and void.

The minimum amount of sample to be used is 100  $\mu$ L.

### SAFETY INFORMATION

The usual laboratory safety precautions apply.

ERM<sup>®</sup>-AE144 is an acidic solution filled in perfluoralkoxy alkane bottles, which contains 2 % (w/w) nitric acid. All appropriate safety precautions, including the use of gloves and safety glasses, should be taken.

### STORAGE

ERM<sup>®</sup>-AE144 should be stored under normal laboratory conditions (between 5 °C and 25 °C), preferably in the dark.

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

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## NOTE

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®-AE144 is available on request from BAM (<https://www.bam.de>).

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