

CERTIFICATE OF ANALYSIS

ERM[®]-EB104

PbCaSn			
	Certified value ¹⁾	Uncertainty ²⁾	
Element	Mass fraction in %		
Ca	0.0530	±	0.0018
Sn	1.27	±	0.07

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 of measurement. The values are traceable to the SI (Système International d'Unités) via calibration using pure metals or substances of known stoichiometry.

²⁾ Estimated expanded uncertainty U with a coverage factor of $k=2$, corresponding to a level of confidence of approx. 95 %, as defined in the Guide to the expression of uncertainty in measurement, (GUM, ISO/IEC Guide 98-3:2008).

This certificate is valid until 08/2061.

DESCRIPTION OF THE SAMPLE

The Reference Material is available in the form of discs (40 mm diameter and 40 mm height).

NOTE

European Reference Material ERM[®]-EB104 was produced and certified under the responsibility of BAM Federal Institute for Materials Research and Testing in cooperation with the Committee of Chemists of the GDMB, Society for Mining, Metallurgy, Resource and Environmental Technology 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, 2011-11-10.

BAM Department 1
Analytical Chemistry;
Reference Materials

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Inorganic Chemical Analysis;
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ADDITIONAL MATERIAL INFORMATION

Two laboratories determined Ag and Bi using ICP-OES. The mean values are given below

Element	Ag	Bi
Mass fraction in mg/kg	29.3	126

MEANS OF ACCEPTED DATA SETS

Certified values
Mass fraction in %

Line no.	Ca	Sn
1	0.0511	1.253
2	0.0520	1.258
3	0.0522	1.267
4	0.0528	1.274
5	0.0529	1.276
6	0.0530	1.277
7	0.0531	1.283
8	0.0532	1.283
9	0.0544	1.283
10	0.0552	1.287
11	---	---
<i>M</i>	0.0530	1.274
<i>s_M</i>	0.0012	0.012
\overline{s}_i	0.0009	0.008

The laboratory mean values have been examined statistically to eliminate outlying values. Each laboratory mean consists of at least 4 but usually 6 single values.

Where " --- " appears in the table it indicates that an outlying value has been omitted (Grubbs 95 %).

M : mean of means of data sets

\overline{s}_i : square root of mean of variances of data sets under repeatability conditions

s_M : standard deviation of means of data sets

INTENDED USE

The CRM is intended for establishing and checking the calibration of optical emission and X-ray spectrometers (excluding micro-analysis) for the analysis of samples of similar materials. The minimum sample size for wet chemical analysis is 0.5 g.

INSTRUCTIONS FOR USE

Before use, the surface of the material must be prepared by milling or turning on a lathe. For wet chemical analysis chips have to be prepared by turning or milling of the sample surface.

STORAGE

The material should be stored in a dry and clean environment at room temperature (20 °C).

ANALYTICAL METHOD USED FOR CERTIFICATION

Element	Line no.	Method
Ca	1	FAAS, dissolution with HNO ₃ /HF
	2, 3, 5, 7, 8, 9, 10	ICP-OES, dissolution with tartaric acid/HNO ₃
	4	FAAS, dissolution with tartaric acid/HNO ₃
	6	ICP-OES, dissolution with HNO ₃ /fusion with Na-tetraborate
Sn	1, 3, 4, 7, 8, 9	ICP-OES, dissolution with tartaric acid/HNO ₃
	2, 6	FAAS, dissolution with tartaric acid/HNO ₃
	5	ICP-OES, dissolution with HNO ₃ /fusion with Na-tetraborate
	10	FAAS, dissolution with HNO ₃ /HF

Abbreviations:

ICP-OES: Inductively coupled plasma - optical emission spectrometry

FAAS: Flame atomic absorption spectrometry

PARTICIPANTS

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TECHNICAL REPORT

A detailed technical report describing the analysis procedures and the treatment of the analytical data used to certify ERM[®]-EB104 is available on request or can be downloaded from BAM website (www.bam.de/en/fachthemen/referenzmaterialien/index.htm).

Supply of this Reference Material by: BAM Federal Institute for Materials Research and Testing

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