in cooperation with the WG 'Lead'
of the Committee of Chemists of GDMB

ausverkauft / out of stock

CERTIFICATE OF ANALYSIS

ERM®-EB102

PbCaSn

SPECIMEN

Certified Values		
	Certified value [1]	Uncertainty [2]
Element	Mass fraction in %	
Ca	0.0705	± 0.0011
Sn	0.895	± 0.011
Element	Mass fraction in mg/kg	
Ag	24.8	± 0.7
Al	124	± 4
Bi	148	± 5
Cu	10.9	± 0.7

[1] Unweighted mean value of the means of accepted sets of data, each set being obtained in a different laboratory and/or a different method of measurement. The values are traceable to the SI (Système International d'Unités) via calibration using sufficiently pure substances of known stoichiometry.

[2] 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.

This certificate is valid until 09/2053; this validity may be extended as further evidence of stability becomes available.

The minimum sample size for wet chemical analysis is 0.5 g.

NOTE

European Reference Material ERM®-EB102 was originally certified as BAM-102. It was produced and certified under the responsibility of Bundesanstalt für Materialforschung und –prüfung (BAM) in cooperation with the Committee of Chemists of the GDMB, Gesellschaft für Bergbau, Metallurgie, Rohstoff- und Umwelttechnik 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
Division I.1
Inorganic Chemical Analysis;
Reference Materials
12200 Berlin, Germany

Dr. R. Matschat
(Head of Division)

DESCRIPTION OF THE SAMPLE

The Reference Material is available in the form of discs (50 mm diameter, 30 mm thickness). It is intended for establishing and checking the calibration of optical emission and X-ray spectrometers for the analysis of samples of similar materials.

MEANS OF ACCEPTED DATA SETS

(for one method at one laboratory, respectively)

mass fraction in %

Line no.	Ca	Sn
1	-	0.8667
2	0.0692	0.8700
3	0.0692	0.8836
4	0.0694	0.8915
5	0.0697	0.8933
6	0.0702	0.8942
7	0.0705	0.8956
8	0.0705	0.9012
9	0.0709	0.9113
10	0.0718	0.9150
11	0.0740	0.9227
M :	0.0705	0.895
s_M :	0.0015	0.017
$\overline{s}$:	0.0011	0.008

mass fraction in mg/kg

Line no.	Ag	Al	Bi	Cu
1	23.5	113	140	10.0
2	24.0	114	145	10.2
3	24.3	121	147	10.6
4	25.0	121	150	11.0
5	25.2	122	151	11.0
6	25.3	122	152	11.2
7	25.5	125	155	12.4
8	25.7	128	-	
9		129		
10		132		
11		-		
M :	24.8	124	148	10.9
s_M :	0.8	6	5	0.8
$\overline{s}$:	0.4	3	2	0.4

The laboratory mean values have been examined statistically to eliminate outlying values. Where a " - " appears in the table it indicates that an outlying value has been omitted.

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M : mean of means of data sets
s_M : standard deviation of means of data sets*
$\bar{s}$: mean of standard deviations of data sets

*calculated of at least 5 but usually 6 single values

ANALYTICAL METHOD USED FOR CERTIFICATION

Element	Line no.	Method
Ca	1, 5, 8, 11	FAAS, without separation
	4	FAAS, separation of Pb as nitrate
	2, 3, 6, 7, 9, 10	ICP OES, without separation
Sn	1, 2, 5, 8, 10	FAAS, without separation
	3, 4, 6, 7, 9, 11	ICP OES, without separation
Al	1, 8, 9, 10	FAAS, without separation
	4	FAAS, separation of Pb as nitrate
	2, 3, 5, 6, 7, 11	ICP OES, without separation
Ag	1, 5, 6	FAAS, without separation
	4	FAAS, separation of Pb as nitrate
	2, 3, 7, 8	ICP OES, without separation
Bi	3, 4, 6	FAAS, without separation
	5	FAAS, separation of Pb as nitrate
	1, 2, 7, 8	ICP OES, without separation
Cu	2, 3, 6	FAAS, without separation
	1	FAAS, separation of Pb as nitrate
	4, 5, 7, 8	ICP OES, without separation

Abbreviations:
ET AAS: Electrothermal Atomic Absorption Spectrometry
FAAS: Flame Atomic Absorption Spectrometry
ICP OES: Inductively Coupled Plasma – Optical Emission Spectrometry
DDC: Diethyldithiocarbamate

PARTICIPANTS

Berzelius Stolberg GmbH, Stolberg (D)
Boliden Bergsöe AB, Landskrona (S)
Britannia Refined Metals, Bredhurst (UK)
BSB Recycling GmbH, Braubach (D)
Bundesanstalt für Materialforschung und -prüfung, Berlin (D)
Compagnie Française d'Electro-Chimie, Outarville (F)
Metaleurop Recherche, Trappes (F)
Metaleurop Weserblei GmbH, Nordenham (D)
Muldenhütten Recycling und Umwelttechnik GmbH, Freiberg (D)
VB Autobatterie GmbH, Hannover (D)

INSTRUCTIONS FOR USE

Before use, the surface of the material must be cleaned by turning on a lathe.

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STORAGE

The material should be stored at ambient conditions in a dry and clean environment.

TECHNICAL REPORT

A detailed technical report (in German) describing the analysis procedures and the treatment of the analytical data used to certify ERM®-EB102 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

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