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CRB Analyse Service GmbH

RFA Ringversuch Central Geological Laboratory of Mongolia - CGL-133 - Iron Ore

Veranstalter des Ringversuchs: Central Geological Laboratory of Mongolia (CGL)

Ringversuchsmaterial: CGL 133 (MBTH, Iron Ore)

RV geschlossen: 2017 - 3

Literatur: Reference Material Certificate CGL

Hauptelemente [MA%]

	CRB	RV	1sRV	Z-Score
SiO_2	9,430	9,290	0,220	0,610
TiO_2	0,110	0,100	0,010	2,930
Al_2O_3	1,760	1,690	0,090	0,790
Fe-total	39,500	39,320	0,400	0,440
MnO	0,140	0,130	0,020	0,770
MgO	8,120	8,040	0,460	0,170
CaO	9,440	9,340	0,190	0,510
K_2O	0,350	0,350	0,020	-0,170
P_2O5	0,070	0,060	0,010	0,850

Spurenelemente [µg/g]

	CRB	RV	1sRV	Z-Score
As*	41,00	37,00		
Ba*	36,00	42,00		
Co	67,00	72,00	5,00	-1,05
Cr	25,00	27,00	5,00	-0,45
Cu	458,00	397,00	31,00	1,97
Ni	71,00	81,00	5,00	-1,92
Pb*	27,00	21,00		
Sr*	32,00	35,00		
V	55,00	54,00	5,00	0,20
Zn	253,00	234,00	16,00	1,16

Legende

CRB: Ergebnisse CRB – **RV:** Ergebnisse Ringversuch -- **1s-RV:** Standardabweichung Ringversuch
Z-Score: Differenz des Messwertes vom Mittelwert des Ringversuchs -- * Wert nicht zertifiziert

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

MONGOLIA
CENTRAL GEOLOGICAL LABORATORY

CRM FROM MONGOLIA

REFERENCE MATERIAL CERTIFICATE
(Certified reference material)

CGL 133
MBTH (IRON ORE)

Certified values

№	Oxide/element	Unit	CV[1]	U_{CRM}[2]	N[3]
1	SiO_2	% m/m	9.29	0.22	12
2	TiO_2	% m/m	0.095	0.005	12
3	Al_2O_3	% m/m	1.69	0.09	12
4	Fe_{total}	% m/m	39.32	0.40	12
5	MnO	% m/m	0.133	0.015	12
6	MgO	% m/m	8.04	0.46	11
7	CaO	% m/m	9.34	0.19	11
8	K_2O	% m/m	0.35	0.02	10
9	P_2O_5	% m/m	0.063	0.005	10
10	Co	mg/kg	72	5	10
11	Cr	mg/kg	27	5	10
12	Cu	mg/kg	397	25	12
13	Ni	mg/kg	81	5	12
14	V	mg/kg	54	5	11
15	Zn	mg/kg	234	16	14

[1] Certified value (CV) – based on a minimum of 10 results with a minimum of 2 independent methods
[2] Estimated expanded uncertainty (U_{CRM}) - with a coverage factor k=2, corresponding to a level of confidence of about 95 %, as defined in ISO/IEC GUIDE 98-3:2008 "Uncertainty of measurement Part 3: Guide to the Expression of Uncertainty in Measurement (GUM:1995)"
[3] Number of datasets (N)

Additional Information

№	Oxide/element	Unit	IV[4]	N[3]
1	Na_2O	% m/m	0.162	7
2	S_{total}	% m/m	2.727	6
3	LOI*	% m/m	10.22	7

№	Oxide/element	Unit	IV[4]	N[3]
4	As	mg/kg	36.51	9
5	Ba	mg/kg	42.385	7
6	Ce	mg/kg	9.932	4
7	La	mg/kg	3.696	5
8	Pb	mg/kg	21.418	9
9	Rb	mg/kg	22.66	4
10	Sc	mg/kg	2.655	4
11	Sn	mg/kg	164.85	6
12	Sr	mg/kg	34.59	9
13	Y	mg/kg	4.861	4

[4] Indicative value (IV) – one certification criteria is not fulfilled
*LOI - Loss on Ignition (analysed by 1000°C)

Intended uses of this Certified Reference Material (CRM)

Based on defined metrological characteristics-metrological traceability of assigned property values and associated measurement uncertainties also physical characteristics – homogeneity and small particle size, this CRM is suitable for method development, calibration, validation and quality assurance, quality control purposes when analyzing samples that are matrix- matched to this material.

Description of sample

The starting material, a bulk of iron ore was collected from the "Bayangol" deposit, at Eruu sum, Selenge province, Mongolia.

The mineral composition of the material has been determined to be:

№	Minerals	Percentage (% m/m)	№	Minerals	Percentage (% m/m)
1	Magnetite	50	9	Serpentenit	1
2	Dolomite	20	10	Plagioclase	
3	Hornblende	8	11	Talc	
4	Clinopyroxene	9	12	Chalcopyrite	
5	Epidote	4	13	Pyrite	
6	Biotite	4	14	Pyrrhotite	
7	Quartz	3	15	Sphalerite	
8	Olivine	1	16	Sphene	

Sample preparation

The preparation, homogeneity and stability testing were performed by the CGL laboratories in 2013 – 2015.
After crushing and pulverization, the entire batch of selected bulk material passed a sieve with an opening of 0.075 mm of an ultrasonic sieving machine.

The pulverized bulk material was homogenized by a high performance intensive mixer.

After testing the homogeneity, portions of 100 g reference material each were bottled by rotary splitting from this batch to polyethylene bottles and labeled.

Homogeneity of material

Within and between bottles homogeneity testing was performed under repeatability condition, using 10 samples randomly selected. Homogeneity test result confirmed that material is sufficiently homogeneous.

Certification

An interlaboratory approach with 13 participating laboratories was selected to obtain a reliable base of data for assignment of the certified values. A nested design was chosen for maximum information output.

The traceability was established to the existing CRM – Iron ore NCS DC11010 produced at China National Analysis Center for Iron and Steel.

Production and evaluation procedures for compliance with the valid ISO – Guides were assessed and certified by a Scientific and Technical Council of CGL.

Instructions for Storage and Use

The CRM should be stored at room temperature and tightly sealed to protect it from absorption of atmospheric moisture, direct sun reflection and laboratory chemicals. The material can be transported by any kind of transport means.
To overcome segregation effect due to storage or transportation, the material should be shaken appropriately before opening the bottle.

No material that had once been removed from the original sample bottle should be returned to it, as that might cause contamination of the remaining sample.

Certified values and information values are reported on a dry weight basis (105°C, 2 h).

The recommended minimum sample test portion mass is 150 mg. If a test method requires a test portion less than 150 mg, it is recommended that an excess of the CRM (>150 mg) is further pulverized in an agate mortar, before weighing out the needed mass.

Material safety data sheet for this CRM is attached to this certificate.

Period of validity

This material is considered to be stable. Therefore, this certificate shall remain valid through 2026, unless users are otherwise notified.
The stability of the material will be monitored regularly for duration of an inventory.

Availability of Material

This certified reference material will be classified as **CGL 133** in accordance with CGL CRM classification system. It is available from the Producer:

Central Geological Laboratory
CGL-building
Trade Union Street
Songinokhairkhan District
P.O.Box - 437
18080 Ulaanbaatar
MONGOLIA

Tel.: + (976) 70180101, 70182914
Fax: + (976) 70184212, 70182564
E-mail: info@cengeolab.com
cengeolab@mbox.mn
Web: www.cengeolab.com

Customer Feedback

Customers, using this CRM are kindly requested to register at the Central Geological Laboratory. This opens the opportunity to notify the user community on any new development with regard to this CRM. Customer feedback with respect to any information included in this certificate is highly appreciated.

Test methods applied for this certification

Al_2O_3	XRF (9), ICP- OES/AES (3)	Ni	XRF (5), ICP-MS (1), ICP- OES/AES (6)
As	XRF (3), ICP- OES/AES (3)	P_2O_5	XRF (9), SPM(1)
Ba	XRF (2), ICP-MS (1), ICP-OES/AES (4)	Pb	XRF (3), ICP-MS (1), ICP- OES/AES (5)
CaO	XRF (10), ICP- OES/AES (1)	Rb	XRF (1), ICP-MS (1), ICP- OES/AES (2)
Ce	ICP-MS (1), ICP- OES/AES (3)	S_{total}	XRF (4), GRAV (2), IR (1)
Co	XRF (4), ICP-MS (1), ICP-OES/AES (5)	Sc	ICP-MS (1), ICP- OES/AES (3)
Cr	XRF (5), ICP-MS (1), ICP-OES/AES (4)	SiO_2	XRF (10), SPM (2)
Cu	XRF (6), ICP-MS (1), ICP-OES/AES (5)	Sn	XRF (4), ICP- OES/AES (2)
Fe_{total}	XRF (9), ICP- OES/AES (1), TITR (2)	Sr	XRF (3), ICP-MS (1), ICP- OES/AES (5)
K_2O	XRF (8), ICP- OES/AES (1), AAS (1)	TiO_2	XRF (7), ICP-MS (1), ICP- OES/AES (3), SPM(1)
La	ICP-MS (1), ICP- OES/AES (4)	V	XRF (6), ICP-MS (1), ICP- OES/AES (4)
MgO	XRF (9), ICP- OES/AES (1), TITR (1)	Y	ICP-MS (1), ICP- OES/AES (3)
MnO	XRF (10), ICP- OES/AES (2)	Zn	XRF (5), ICP-MS (1), ICP- OES/AES (8)
Na_2O	XRF (5), ICP- OES/AES (2)	LOI	GRAV (7)

Abbreviations:

- XRF - energy/wavelength dispersive x-ray fluorescence spectroscopy
- ICP- MS - inductively coupled plasma - mass spectrometry
- ICP-OES/AES - inductively coupled plasma-optic/atomic emission spectroscopy

- AAS - atomic absorption spectroscopy
- SPM - spectrophotometry
- TITR - titrimetry
- IR - Infrared spectroscopy
- GRAV - gravimetry

Participating Laboratories

1	Central Geological Laboratory, Ulaanbaatar, Mongolia
2	ALS Group LLC, Ulaanbaatar, Mongolia
3	ALS Loughrea, Ireland
4	ALS Minerals-Vancouver, Canada
5	Geoscience Laboratories, Ontario, Canada
6	Eurotest Control EAD, Sofia, Bulgaria
7	Institute de Technologia Ceramica (ITC), Castelló, Spain
8	Irgiredmet OAO – Irkutsk research institute of precious and rare metals and diamonds, Irkutsk, Russia
9	BGR-Federal Institute for Geosciences and Natural Resources, Hannover, Germany
10	Dillinger Hütte GTS The chemical laboratories of Dillinger Hüttenwerke, Germany
11	CRB Analyse Service GmbH, Germany
12	Geochemistry-Metallogeny, France
13	KhanLab LLC, Ulaanbaatar, Mongolia

Legal notice

Based on the decision of Scientific and Technical Council of Central Geological Laboratory on 26 July 2016, by a resolution No 197 of director of CGL, this material had been approved as a Certified Reference Material with a code number CGL 133 Iron ore.

DIRECTOR OF CENTRAL GEOLOGICAL LABORATORY **N.TEGSHBAYAR**