

MONGOLIA
CENTRAL GEOLOGICAL LABORATORY



CERTIFICATE OF ANALYSIS

Certified Reference Materials "AHMH-1", "AHMH-2", "AHMH-3"

Gold-bearing complex ore "CGL 120"

Certified values (CV) and their confidence interval ($\pm\Delta_A$)

No.	Oxides/ Elements	Unit	CV	$\pm\Delta_A$	N
1.	SiO ₂	%	77.37	0.26	19
2.	TiO ₂	%	0.15	0.04	19
3.	Al ₂ O ₃	%	2.03	0.09	19
4.	Fe ₂ O ₃	%	14.71	0.24	23
5.	CaO	%	0.56	0.06	19
6.	MgO	%	1.01	0.07	20
7.	MnO	%	0.03	0.003	20
8.	Na ₂ O	%	0.17	0.02	16
9.	K ₂ O	%	0.64	0.03	16
10.	P ₂ O ₅	%	0.05	0.003	14
11.	Loss on ignition	%	2.59	0.11	16
12.	Au	mg/kg	31.28	1.30	15
13.	Zn	mg/kg	65.29	12.54	14
14.	Ni	mg/kg	28.27	6.68	11
15.	Mo	%	0.11	0.003	10
16.	Sr	mg/kg	88.71	4.09	7
17.	Cu	%	0.43	0.013	14
18.	Ba	%	0.02	0.002	7
19.	V	mg/kg	39.33	8.67	6
20.	W	%	0.01	0.001	6

Gold-bearing complex ore "CGL 121"

Certified values (CV) and their confidence interval ($\pm\Delta_A$)

No.	Elements	Unit	CV	$\pm\Delta_A$	N
1.	Au	mg/kg	10.92	0.45	19
2.	Ag	mg/kg	49.33	4.29	11

Gold-bearing complex ore "CGL 122"

Certified values (CV) and their confidence interval ($\pm\Delta_A$)

No.	Elements	Unit	CV	$\pm\Delta_A$	N
1.	Au	mg/kg	7.38	0.30	21
2.	Ag	mg/kg	27.06	1.99	8

Classification criteria

CV – certified value satisfying certification criteria

Description of the sample

The material is a reference material taken from the gold-bearing complex ore of the Tavit, Teshig deposit Bulgan in the area of Mongolia. The material consists of a homogeneous powder (particles have passed a sieve with apertures smaller than 63 μm).

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

Minerals	Percentage, % m/m
Chalcopyrite	0.6
Chalcosine	0.2
Covillite	0.05
Goethite	8.9
Quartz	76.2
Malachite	0.1
Molybdenite, powellite	0.1
Feldspar	12.4
Carbonatite	0.4
Muscovite	0.2
Epidote	0.1
Pyrite, magnetite, sphalerite, azurite, panabase, gold, bornite, zircon, apatite, biotite, anatase, sphen	0.7

Instructions for Storage and Use

The recommended minimum sample intake is 20 g for gold, 5 g for silver and 100 mg for other elements. If there is a need of sample intake below 100 mg for an analytical method (i.e. the optic emission spectrometry), weigh more than 100 mg and mix in an agate mortar. Then weigh necessary weight.

Taken portions should not be poured back in a bottle as it may contaminate the material.

The reference material is stored in a polyethylene bottle of 100 g. The bottle should be stored preferably in a dry place at the room temperature, protected from an effect of chemical reagents.

The reference material can be transported by any kind of transport means.

Validity of the Certificate

Duration of production is 2001-2005. Life time of the reference material is 20 years.

Availability of Material

These reference materials will be classified as "CGL 120", "CGL 121", "CGL 122" in the future in accordance with CGL CRM classification system.

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Participating Laboratories

Preparation, homogeneity and stability testing:

Central Geological laboratory

Certification analyses:

- Laboratory of Methodology, Control and Standardization of the Central Geological Laboratory, Ulaanbaatar, Mongolia
- Laboratory of Chemistry physical methods the Central Geological Laboratory, Ulaanbaatar, Mongolia
- Chemistry Laboratory of the Faculty of Natural Science, Mongolian State University, Ulaanbaatar, Mongolia
- Chemical and Technological Centre for New Materials, Mongolian State University, Ulaanbaatar, Mongolia
- Exploitation and Investigation Center of technology of mineral resources, Ulaanbaatar, Mongolia
- Research-Scientific Laboratory of the Institute for Medicine, Ulaanbaatar, Mongolia

- Food Biotechnology School, Mongolian University of Science and Technology, Mongolia
- Laboratory of fire assaying, Mongol Gazar company, Mongolia
- BGR, RFA-Laboratory, Hannover Germany
- "Analabs" Pty Ltd., Mongolia office, Ulaanbaatar
- Southern and Eastern African Mineral Centre Kunduchi Beach Area, Tanzania
- Geological Institute of Hungary, Hungary

Methods used

Methods of final determination were:

-Atomic absorption spectrometry	Fe ₂ O ₃ , MnO, MgO, CaO, Na ₂ O, K ₂ O, Au, Ag, Ba, Zn, Cu, Pb, Co, Ni, Cr, Mo, Sr, W, V
-X-ray fluorescence spectrometry	SiO ₂ , TiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ , CaO, MgO, MnO, Na ₂ O, K ₂ O, P ₂ O ₅ , CO ₂ , SO ₃ , Lol, Ba, Zn, Cu, Pb, Co, Ni, Cr, Mo, Sr, W, V
-photometry, spectral-photometry	SiO ₂ , TiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ , FeO, MnO, P ₂ O ₅ , Au, Ag, Cu, Co, Ni, Mo, V
-ICP-AES, ICP-MS spectrometry	SiO ₂ , TiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ , FeO, MnO, MgO, CaO, Na ₂ O, K ₂ O, P ₂ O ₅ , H ₂ O, SO ₃ , Ba, Zn, Cu, Pb, Co, Ni, Cr, Mo, Sr, W, V
-gravimetric	SiO ₂ , MgO, H ₂ O, SO ₃ , Lol, Au, Ba
-volumetric	Al ₂ O ₃ , Fe ₂ O ₃ , FeO, CaO, MgO, MnO
-flame photometry	Na ₂ O
-fire assaying-AAS	Au, Ag
-fire assaying	Au

Certification

The reference materials were confirmed and given a numbers a USZ 38-2005, USZ 39-2005, USZ 40-2005 by the National Center for Standardization and Metrology.

Note

A detailed technical report on the analysis procedure and the treatment of the analytical data is supplied with each sample.