

CENTRAL GEOLOGICAL LABORATORY

CERTIFIED REFERENCE MATERIAL

CERTIFICATE OF ANALYSIS

| USZ 20-98 | | | |
|--------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------|
| Gold-quartz ore "ZB-1" | | | |
| Elements and compounds | Mass fraction (based on dry mass at 105 ^o C) | | Number of accepted sets of results p |
| | Certified value ⁽¹⁾ expressed as cg.g ⁻¹ | 95% confidence interval ⁽²⁾ expressed as cg.g ⁻¹ | |
| Au | 10.05 µg.g ⁻¹ | 0.81 µg.g ⁻¹ | 21 |
| Ag | 3.05 µg.g ⁻¹ | 0.29 µg.g ⁻¹ | 9 |
| SiO ₂ | 92.57 | 0.39 | 15 |
| Fe ₂ O ₃ | 1.92 | 0.12 | 10 |
| TiO ₂ | 0.08 | 0.01 | 10 |
| Al ₂ O ₃ | 1.70 | 0.13 | 15 |
| MnO | 0.025 | 0.011 | 8 |
| Na ₂ O | 0.07 | 0.01 | 9 |
| K ₂ O | 0.37 | 0.03 | 9 |
| CaO | 0.77 | 0.06 | 10 |
| P ₂ O ₅ | 0.037 | 0.007 | 8 |
| Loss on ignition | 0.95 | 0.06 | 8 |

⁽¹⁾ This value is the unweighted mean of p accepted sets of results.
⁽²⁾ The 95% confidence interval is a measure of the uncertainty and is acceptable when the reference material is used for calibration purposes.

DESCRIPTION OF THE SAMPLE

The material is a reference material taken from the gold basic deposit in the Zaamar-Bumbat area of Mongolia. The material consists of a homogeneous powder (particles have passed a sieve with apertures smaller than 63 µm). The material contains the following minerals expressed as cg.g⁻¹:

| | |
|------------------------|-------------------------|
| Quartz: 92.7 | Feldspar: 3.6 |
| Calcite, dolomite: 1.1 | Sericite-muscovite: 0.7 |
| Others: 1.3 | Gold: few particles |

Additional information is presented in the Annex.

INSTRUCTION FOR USE, STORAGE AND TRANSPORTATION

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.

Date of production is December, 1996. Duration of use is 20 years.

PARTICIPATING LABORATORIES

Preparation; homogeneity and stability testing:

- Central Geological Laboratory

Certification analyses:

- Chemistry sub-laboratory of the Central Geological Laboratory, Ministry of Agriculture and Industry, Ulaanbaatar, Mongolia
- Sub-laboratory of Technology and Experiment of the Central Geological Laboratory, Ministry of Agriculture and Industry, Ulaanbaatar, Mongolia
- Section of Methodology, Control and Standardization of the Central Geological Laboratory, Ministry of Agriculture and Industry, Ulaanbaatar, Mongolia
- Chemistry Laboratory of the Cement factory, Hutul, Mongolia
- Institute for Physics and Techniques of the Academy of Science, Ulaanbaatar, Mongolia
- Chemistry Institute of the Academy of Science, Ulaanbaatar, Mongolia
- National Institute for Standardization and Metrology, Ulaanbaatar, Mongolia
- Scientific-production Company "Erdes", Ulaanbaatar, Mongolia
- Chemistry Laboratory of the Mongolian-Russian joint-venture "Erdenet" Corporation, Erdenet, Mongolia
- Amdel Laboratories Ltd., Australia
- "Shimadzu" corporation, Analytical group, Kyoto, Japan
- Federal Institute for Geoscience and Natural Resources, Hannover, Germany
- Dunn Analytical-Mongolia Ltd.,
- "Ansto" firm, Australia
- Institute for Geochemistry SO RAN, Irkutsk, Russia
- Irkutsky State Institute for Rare Metals, Irkutsk, Russia

METHODS USED

Methods of final determination were:

- gravimetric (SiO₂)
- volumetric (Al₂O₃, Fe₂O₃, FeO, CaO)
- photometry (SiO₂, TiO₂, Al₂O₃, Fe₂O₃, P₂O₅, MgO)
- flame photometry (Na₂O, K₂O)
- Atomic Absorption Spectrometry (Au, Ag, SiO₂, Al₂O₃, CaO, K₂O, Na₂O, P₂O₅, MnO, MgO.)
- X-ray fluorescence spectrometry (Au, Ag, SiO₂, TiO₂, Al₂O₃, Fe₂O₃, CaO, K₂O)
- fire assaying (Au, Ag)
- fire assaying-AAS (Au)
- ICP spectrometry (TiO₂, CaO, K₂O)

LEGAL NOTICE

The reference material was confirmed and given a number a USZ 20-98 by the National Institute 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.

ANNEX

Additional information (not certified) on various contents is presented here. The data are mean values of various sets of results obtained by various techniques in various laboratories.

| Elements and compounds | Mass fraction expressed as cg.g ⁻¹ | | Number of individual sets |
|------------------------|-----------------------------------------------|--------------------|---------------------------|
| | Content | Standard deviation | |
| MgO | 0.18 | 0.05 | 10 |
| FeO | 0.84 | 0.11 | 10 |