Approved by State Bureau of Quality and Technical Supervision
The People's Republic of China
GBW 07150—GBW 07151

Certificate of Certified Reference Material

Beryllium Ores

Sample Number

Date of Certification

Shenyang Geological Research Labratory

Chengdu China

Beryllium Ore CRMs are prepared to meet the needs of geological science, mineral process and laboratory research.

These CRMs can be used in Geology, Metallurgy, Mine. Enviromental Protection and Goods Inspection etc. for the quality appraisal of analytical method, monitoring of analytical quality, calibration of analytical instrument etc.

1. Preparation of Samples

Beryllium ore is sampled from Huiyang of Guangdong province. Each sample is crashed with jaw crasher to less than 3 mm.,It is filled into a ball mill and is ground until passing through 0. 074 mm. sieve. The weight of each beryllium ore CRM is about 200 Kg. GBW 07150 -200 mesh occupy 99.0%, GBW 07151 -200 mesh occupy 97.4%.

2. Analytical Methods

Elements	Analytical Methods	Elements	Analytical Methods
BeO	ICP－AES GF AAS POL COL	SC_2O_3	ICP－AES NAA COL
ΣRE×Or	ICP－AES ICP－MS O0L GR	W	POL COL NAA
La_2O_3	ICP－MBS ICP－MS NAA XRF	Mo	POL COL
CeO_2	ICP－AES HP－MS NAA XRF	SiO_2	XRF GR VOL
$PreO_{11}$	ICP－AES ICP－MS	Al_2O_3	XRF VOL
Nd_2O_3	ICP－AES ICP－MS NAA	Fe_2O_3 (T)	NAA XRF AAS COL VOL
Sm_2O_3	ICP－AES ICP－MS NAA	FeO	COL VOL
Eu_2O_3	ICP－AES ICP－MS NAA	CaO	ICP－AES XRF AAS VOL
Gd_2O_3	ICP－AES ICP－MS	MgO	ICP－AES XRF AAS VOL
Tb_4O_7	ICP－AES ICP－MS NAA	K_2O	NAA XRF AAS FP
Dy_2O_3	ICP－AES ICP－MS NAA	Na_2O	ICP－AES NAA XRF AAS FP
HO_2O_3	ICP－AES ICP－MS NAA	MnO	XRF AAS COL
Er_2O_3	ICP－AES ICP－MS	Ti_2O_2	ICP－AES XRF COL
Tm_2O_3	ICP－AES ICP－MS	P_2O_5	XRF COL VOL
Yb_2O_3	ICP－AES ICP－MS NAA	F^-	COL ISE
LU_2O_3	ICP－AES ICP－MS NAA	H_2O^-	GR
Y_2O_3	ICP－AES ICP－MS XRF	L.O. I	GR

3. Certified Values and Uncertainty

Samples No.	GBV 07150			GBW 07151		
Component	Certified Values	Standard Deviation	Number of data	Certified Values	Standard Deviation	Number of data
1 . Mass fractions of elements(10^{-8} on dry base)						
BeO	*0.060	0.006	14	*0.365	0.026	14
ΣRE_xO_y	75.6	4.7	9	78.6	4.2	9
La_2O_3	7.0	0.6	9	7.7	0.7	9
CeO_3	14.3	1.1	9	14.8	1.4	9
Pr_8O_{11}	1.7	0.1	6	2.0	0.2	7
Nd_2O_3	6.6	0.7	8	7.6	0.7	8

Sm_2O_3	2.5	0.3	9	2.7	0.2	9
EU_2O_3	0.14	0.01	8	△0.15	0.14-0.16	7
Gd_2O_3	3.6	0.4	7	3.8	0.4	7
Tb_4O_7	0.80	0.13	9	0.80	0.10	9
Dy_2O_3	4.5	0.7	7	4.6	0.5	7
Ho_2O_3	0.82	0.12	7	0.87	0.16	7
Er_2O_3	2.1	0.3	7	2.2	0.4	7
Tm_2O_3	0.32	0.04	7	0.36	0.06	7
Yb_2O_3	2.2	0.3	9	2.5	0.5	9
LU_2O_3	0.31	0.05	9	0.36	0.06	9
Y_2O_3	29.2	2.8	8	28.9	2.9	8
SC_2O_3	1.7	0.2	8	3.1	0.3	8
W	1.3	0.2	7	5.5	0.6	7
Ho	0.41	0.07	6	1.2	0.2	6
2. Mass fractions of major components(10^{-2} on dry base)						
SiO_2	73.97	0.56	7	73.99	0.51	7
AI_2O_3	14.86	0.08	7	Δ 14.86	14.72-14.91	7
Fe_2O_3 (T)	0.513	0.023	11	0.593	0.030	11
FeO	(0.18)		8	(0.18)		8
CaO	0.582	0.035	8	0.584	0.040	8
HgO	0.071	0.008	8	0.069	0.007	8
MnO	0.030	0.003	7	0.036	0.002	7
TiO_2	0.015	0.001	7	0.016	0.001	7
K_2O	4.10	0.08	8	3.89	0.10	8
Na_2O	4.79	0.06	8	4.67	0.07	8
P_2O_5	(0.012)		7	0.013	0.001	6
F	0.019	0.002	6	0.041	0.004	7
H_2O	0.60	0.05	8	0.59	0.05	8
L.O.I	0.68	0.05	8	0.73	0.06	8

note: 1. Data with * marks show in 10^{-2}.

2.certifled values are arithmetical Bean.

3.certified values with " Δ " narks are median values, its right side is confidence liiits.

4.Values in brackets are for reference.

4. Homogeneity and Stability

The homogeneity of beryllium ore CRMs are tested by using photometric method to determine major element BeO and by using ×RF method to determined minor elements Mn.Ti and trace elements, Nb, Zr, Y, Cu, Ni.The comprehensive judgements are made by four level variance analysis, F test and Population parameters - Range and RSO. Experimental results showed that the prepared samples are homogeneous.These CRMs were prepared in 1992 and its stability were tested up to 1998.The analytical data obtained showed that the prepared samples are stable.

When in use, the suitable sampling should be weighed according to the analytical method used and the content of different samples.

The minimum sampling in homogeneity test of major element BeO for these CRMs are 0.1 gr..

5. Usage and Storage

This CRMs are sealed up and stored in dry, shady and cool place. It is packed in glass bottles, 100 gr.for each bottle. When in use, please take out several gr. of CRMs from the glass bottle and put into dried weighing bottle. Then it is dried at 105 t for 1 hr..

6. The Research and Preparation Unite

Shenyang Geological Research Laboratory, Ministry of Geology and Mineral Resources Eight laboratories or institutes from the Ministry of Geology and Mineral Resources joined in this work. They are Institute of Rock and Mineral Analysis, Chengdu, Nanjing, Xian, Wuhan Geological Research Laboratories, Nuclear Institute of Chengdu Geological College and Anhui.Jilin Center Laboratories.