

Reference number: 100/209/2000

CERTIFICATE

OF REFERENCE MATERIAL No. 003

ZEOLITE 1

Type of material: natural zeolite

Certified values:

Component	Content %	u_c^*
Al ₂ O ₃	12.21	0.16
CaO	4.51	0.08
Fe ₂ O ₃ Total	1.75	0.03
K ₂ O	2.19	0.04
MgO	1.41	0.02
MnO	0.045	0.001
Na ₂ O	0.612	0.011
P ₂ O ₅	0.055	0.003
SiO ₂	67.11	0.31
TiO ₂	0.190	0.003

Component	Content µg/g	u_c^*
As	1.96	0.09
Ba	779	13
Be	1.96	0.08
Ce	52.3	2.6
Cs	3.88	0.13
Cu	5.12	0.25
Ga	13.9	0.2
Hg	0.329	0.008
La	32.6	1.2
Pb	20.8	0.4
Rb	95.7	1.9
Sb	0.379	0.025
Sr	617	6
V	12.6	0.4
Y	21.8	0.7
Zn	38.2	1.2
Zr	158	3

*combined standard uncertainty

Traceability: Traceability of certified values of reference material compounds - Zeolite 1 were assured through the single-element certified reference materials and certified reference materials with similar mineralogical and chemical composition, which were applied in all participating laboratories to the calibration of the measuring equipment.

Valid until: February 28, 2020

Packing: 50g ± 1g of the powdered material with particle size < 0,09 mm

Minimal weight for analysis: 150 mg

Lot: 0399

Bratislava, June 26, 2000




Peter Knepp
director



Producer: *Geological Survey of Slovak Republic, Geoanalytical Laboratories, Accredited Testing Laboratory, Reference Laboratory of the Ministry of the Environment of Slovak Republic, Markušovská cesta 1, 052 40 Spišská Nová Ves, Slovakia*

CERTIFICATE OF REFERENCE MATERIAL *BENTONIT 1*

In accordance with § 7 of the Slovak Act No. 142/2000, coll.

registration number: 183/02

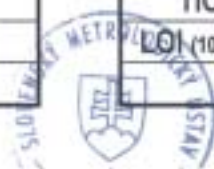
Type of material: *natural bentonite*

Code:

Certified value: *component name, certified value and uncertainty (expanded uncertainty (U) with a coverage factor (k) equal to 2)*

Component	Content µg/g	U
As	62,1	4,8
Ba	650	34
Be	3,80	0,40
Ce	96,8	7,2
Cs	67,1	5,4
Dy	3,42	0,30
Er	2,11	0,20
Eu	0,643	0,080
Ga	20,42	1,40
Gd	3,63	0,42
Hf	4,28	0,70
Hg	0,370	0,060
Ho	0,694	0,080
La	63,1	5,6
Li	235	24
Lu	0,382	0,062
Nb	50,4	3,4
Nd	25,9	2,8
Pb	32,7	3,6
Pr	8,45	0,88
Rb	62,1	5,0
Sb	18,5	1,4

Component	Content µg/g	U
Sm	4,15	0,46
Sn	4,09	0,70
Sr	168	6
Th	46,3	4,0
Tm	0,350	0,062
U	9,06	1,36
Y	22,01	1,70
Yb	2,40	0,30
Zn	50,3	3,8
Zr	142	8
Al ₂ O ₃ (%)	19,12	0,40
CaO (%)	1,94	0,10
Fe ₂ O ₃ total (%)	2,17	0,06
K ₂ O (%)	1,01	0,04
MgO (%)	3,74	0,14
MnO (%)	0,092	0,004
Na ₂ O (%)	0,747	0,052
P ₂ O ₅ (%)	0,030	0,006
SiO ₂ (%)	62,85	0,60
TiO ₂ (%)	0,142	0,010
LOI (1000°C) (%)	7,36	0,52





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CERTIFICATE OF REFERENCE MATERIAL *EVO 1*

In accordance with § 7 of the Slovak Act No. 142/2000, coll.

Registration number: 089/04

Type of material: *Black coal fly ash*

Code:

Certified value: *component name, certified value and uncertainty (expanded uncertainty (U) with a coverage factor (k) equal to 2)*

Component	Certified value µg/g	U µg/g
As	33.8	4.4
Ba	1178	84
Ce	147	14
Co	21.6	2.4
Cr	70.5	10.2
Cs	9.62	1.28
Cu	50.8	5.4
Ga	29.9	3.4
La	71.2	6.4
Mo	8.30	2.00
Nb	43.0	3.4
Nd	59.4	11.4
Ni	64.5	8.6
Pb	54.1	4.4
Rb	74.7	4.8
Sm	11.0	1.6
Sn	5.46	0.90

Component	Certified value µg/g	U µg/g
Sr	440	28
Th	24.1	3.2
V	97.5	12.0
Y	49.9	4.4
Zn	87.2	6.6
Zr	447	34
Al ₂ O ₃	20.48 × 10 ⁴	0.76 × 10 ⁴
CaO	2.40 × 10 ⁴	0.10 × 10 ⁴
Fe ₂ O ₃ total	6.84 × 10 ⁴	0.22 × 10 ⁴
K ₂ O	1.68 × 10 ⁴	0.08 × 10 ⁴
MgO	1.07 × 10 ⁴	0.10 × 10 ⁴
MnO	0.095 × 10 ⁴	0.008 × 10 ⁴
Na ₂ O	0.922 × 10 ⁴	0.072 × 10 ⁴
P ₂ O ₅	0.189 × 10 ⁴	0.020 × 10 ⁴
SiO ₂	46.15 × 10 ⁴	1.28 × 10 ⁴
TiO ₂	0.751 × 10 ⁴	0.048 × 10 ⁴
LOI (1000 °C)	18.72 × 10 ⁴	0.58 × 10 ⁴

Note: LOI = loss on ignition at specified temperature





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CERTIFICATE OF REFERENCE MATERIAL SKO 1

In accordance with § 7 of the Slovak Act No. 142/2000, coll.

Registration number: 090/04

Type of material: *City Waste Incineration Ash*

Code:

Certified value: *component name, certified value and uncertainty (expanded uncertainty (U) with a coverage factor (k) equal to 2)*

Component	Certified value µg/g	U µg/g
As	55.7	6.4
Ba	1718	108
Cd	266	18
Co	22.0	1.8
Cr	430	42
Cu	993	52
Hg	40.9	10.0
Mo	18.7	2.8
Nb	14.9	2.0
Ni	68.7	6.0
Pb	8199	530
Rb	122	14
Sb	519	56
Se	14.6	2.8
Sn	1301	208
Sr	312	22

Component	Certified value µg/g	U µg/g
V	48.1	6.2
Zn	17033	1028
Zr	137	16
Al ₂ O ₃	9.26 x10 ⁴	0.44 x10 ⁴
CaO	22.13 x10 ⁴	0.92 x10 ⁴
Fe ₂ O ₃ total	3.23 x10 ⁴	0.14 x10 ⁴
K ₂ O	7.13 x10 ⁴	0.40 x10 ⁴
MgO	2.59 x10 ⁴	0.26 x10 ⁴
MnO	0.194 x10 ⁴	0.010x10 ⁴
Na ₂ O	5.33 x10 ⁴	0.98 x10 ⁴
P ₂ O ₅	1.52 x10 ⁴	0.10 x10 ⁴
SiO ₂	18.90 x10 ⁴	0.62 x10 ⁴
TiO ₂	1.58 x10 ⁴	0.08 x10 ⁴
S total	3.04 x10 ⁴	0.60 x10 ⁴
LOI (1000 °C)	22.49 x10 ⁴	2.96 x10 ⁴

Note: LOI = loss on ignition at specified temperature





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CERTIFICATE OF REFERENCE MATERIAL KZ 1

In accordance with § 7 of the Slovak Act No. 142/2000, coll.

Registration number: 074 /05

Type of material: *Contaminated soil*

Code:

Certified value : *component name, certified value and uncertainty (expanded uncertainty (U) with a coverage factor (k) equal to 2)*

after the total decomposition:

Component	Certified value mg/kg dry mass	U mg/kg dry mass
Ag	99.1	15.6
Al	21.9 x 10 ³	1.5 x 10 ³
As	9.34 x 10 ³	0.81 x 10 ³
Ba	145	28
Cd	21.9	2.3
Co	12.8	2.2
Cu	1.69 x 10 ³	0.14 x 10 ³
Fe	137 x 10 ³	10 x 10 ³
Hg	169	20
K	8.09 x 10 ³	0.50 x 10 ³

Component	Certified value mg/kg dry mass	U mg/kg dry mass
Mg	4.76 x 10 ³	0.34 x 10 ³
Mn	2.14 x 10 ³	0.16 x 10 ³
Na	4.06 x 10 ³	0.36 x 10 ³
Ni	20.1	3.6
P	407	60
Pb	25.9 x 10 ³	1.8 x 10 ³
Sb	10.9 x 10 ³	2.0 x 10 ³
Si	290 x 10 ³	12 x 10 ³
Ti	0.92 x 10 ³	0.15 x 10 ³
Zn	11.4 x 10 ³	1.0 x 10 ³

Certified value from aqua regia extract according to recommended procedure EN 13346, method A:

Component	Certified value mg/kg dry mass	U mg/kg dry mass
As	9.02 x 10 ³	0.76 x 10 ³
Ca	1168	164
Cd	20.6	3.8
Cu	1721	116
Fe	130 x 10 ³	12 x 10 ³
K	1944	294
Mg	3642	332

Component	Certified value mg/kg dry mass	U mg/kg dry mass
Mn	2040	144
Na	1897	170
Ni	19.4	3.6
Pb	26029	1864
Sb	5314	1032
Zn	11.3 x 10 ³	1.2 x 10 ³

