



Approved by General Administration of Quality Supervision,

Inspection and Quarantine of the People's Republic of China

GBW07302a-GBW07305a, GBW07307a-07308a,

GBW07358-07366

Certificate of Certified Reference Material

The Chemical Composition of Stream Sediment

Certificate No. :

Date of Certification:

Period of Validity:

Organization of appointments: Institute of Geophysical and Geochemical Exploration

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Certified Reference Material

Stream sediment

(GBW07302a~07305a, GBW07307a~07308a, GBW07358~07366)

These certified reference materials are intended primarily for calibrating instruments and evaluating the reliability of methods for the determination of major, minor and trace elements in stream sediment and soil.

Sample preparation: Stream sediments were collected from the typical geographical zones, different geological units and mineralization areas respectively. The sampling sites locate in Jiangxi, Anhui, Guangdong, Liaoning, Inner Mongolia, Heilongjiang, Qinghai, and Xinjiang.

The raw samples were dried under air, and crushed until they were less than 1mm. The <1mm materials were dried, sterilized at 120°C for 24 hours and then ball milled to pass a 200 mesh (0.074mm).

Certified Values and Uncertainties: The certified values are based on the results obtained either from definitive methods or by two or more independent, reliable analytical methods. The number of data sets taking part in the statistical analysis was not less than six sets. Proposed values are provided for information only because only one independent method was used, or because there was insufficient agreement between the methods. The uncertainty of certified values was estimated using the equation $U = 2\sqrt{U_a^2 + U_b^2}$, where U_a is uncertainty of type A and U_b of type B. U_a was calculated using the formula $U_a = s / \sqrt{N}$, where s is the standard deviation from the laboratory average data and N is the number of data sets used. $U_b \approx R / (2 \cdot \sqrt{3m})$, where R is the extreme difference of the method average data and m is the number of analytical methods.

Homogeneity and Stability Assessment: Prior to bottling, a preliminary evaluation of homogeneity was performed by IGGE using 24 samples obtained from various locations in the blender. These homogeneity measurements were made by wavelength dispersive X-ray fluorescence. The calculated F values from the variance test of analytical results indicated that the samples are homogeneous. Observations for a stability test were undertaken over 2 years. No significant statistical variations were observed, therefore the samples can be considered to be stable.

Use and storage: One unit of standard reference materials contains 70g of material. A minimum sample of 100mg of the dried material is required for any analytical determination that is to be related to a certified value of this certified. The material should be kept in its original bottle in a shady, cool and dry place.

Cooperative analyses for certification were performed in the following laboratories: National research centre of Geoanalysis, Anhui Institute of Geoanalysis, Geoanalysis laboratory of Hebei Province, Geoanalysis laboratory of Sichuan Province, Geoanalysis laboratory of Jilin Province, Geoanalysis laboratory of Henan Province, Geoanalysis laboratory of Fujian Province, China Institute of Atomic Energy, Thirtieth Institute of Nuclear Industry, Geoanalysis laboratory of Shaanxi Province, Geoanalysis laboratory of Hebei Province, Tianjin Institute of Geology and Mineral resources, Shanghai Institute of Ceramics, Chinese Academy of Sciences. Institute of Geophysical and Geochemical Exploration.

Certified values of chemical composition for stream sediment CRMs

(10 ⁻⁶)	GBW07302a	GBW07303a	GBW07304a	GBW07305a	GBW07307a	GBW07308a	GBW07358	GBW07359
Ag	0.040±0.011	0.20±0.02	0.22±0.03	0.63±0.06	1.20±0.08	0.12±0.02	0.14±0.01	0.050±0.007
As	6.6±0.5	16.7±1.3	21±2	74±4	11.3±1.0	7.3±0.5	14.3±0.9	3.6±0.4
B	9.7±2.0	57±7	91±5	96±8	195±32	5.3±1.1	53±7	48±6
Ba	113±7	550±15	369±11	681±16	437±12	620±17	455±9	600±20
Be	6.7±0.6	2.7±0.1	2.0±0.1	2.5±0.1	1.6±0.1	3.5±0.3	2.2±0.1	3.6±0.4
Bi	0.33±0.03	0.68±0.03	0.70±0.03	3.0±0.2	0.18±0.05	0.18±0.02	0.51±0.03	0.48±0.03
Br	1.6±0.2	1.4±0.2	1.9±0.3	1.7±0.3	(1.3)	1.1±0.2	0.8±0.2	0.61±0.13
Cd	0.108±0.009	0.50±0.06	0.90±0.05	1.37±0.10	5.6±0.6	0.16±0.01	0.34±0.02	0.093±0.009
Ce	106±5	86±4	90±3	82±2	54±2	88±3	47±2	24±2
Cl	67±11	(39)	60±6	(36)	51±10	(29)	53±5	33±3
Co	2.3±0.3	13.6±0.5	16.0±0.4	15.3±0.5	15.2±0.7	6.8±0.6	10.2±0.4	4.4±0.2
Cr	25±4	48±2	70±3	68±2	43±1	11.6±1.6	61±4	21±3
Cs	10.5±0.3	9.4±0.3	7.3±0.3	10.4±0.2	3.5±0.3	9.7±0.3	5.8±0.3	7.2±0.2
Cu	4.2±0.8	202±7	33±1	118±4	22.5±1.0	5.8±1.4	132±5	7.2±0.5
Dy	4.7±0.3	5.2±0.2	5.3±0.4	5.1±0.2	2.9±0.2	5.4±0.4	4.1±0.3	1.7±0.1
Er	3.1±0.3	3.1±0.2	3.0±0.3	3.0±0.2	1.7±0.2	3.1±0.5	2.5±0.2	0.93±0.09
Eu	0.28±0.02	1.17±0.02	1.30±0.03	1.23±0.03	0.93±0.04	1.03±0.03	1.20±0.06	0.62±0.03
F	1300±100	578±25	482±17	582±17	460±14	646±13	550±21	279±8
Ga	18.8±0.4	17.0±0.5	15.2±0.4	18.7±0.6	14.4±1.1	18.5±0.4	14.6±0.6	12.4±0.5
Gd	4.8±0.4	5.5±0.2	5.9±0.2	5.5±0.2	3.4±0.2	5.6±0.2	4.1±0.2	1.7±0.1
Ge	1.41±0.26	1.41±0.10	1.48±0.13	1.59±0.11	1.15±0.13	1.15±0.12	1.87±0.14	1.64±0.14
Hf	(5.8)	7.6±1.3	9.7±1.0	8.2±0.6	5.3±0.4	6.7±0.8	3.8±0.8	2.1±0.4
Hg	0.018±0.005	0.067±0.004	0.078±0.006	0.29±0.03	1.68±0.27	0.024±0.005	0.018±0.006	(0.007)
Ho	0.96±0.08	1.04±0.05	1.05±0.06	1.03±0.08	0.59±0.05	1.06±0.04	0.83±0.08	0.33±0.02
I	0.64±0.12	1.7±0.2	1.6±0.2	2.4±0.4	0.54±0.12	1.2±0.2	0.47±0.08	0.27±0.08
In	(0.036)	0.068±0.007	0.061±0.006	0.117±0.010	0.038±0.006	0.070±0.006	0.14±0.01	0.018±0.004
La	55±2	43±1	44±1	41±1	27±2	45±2	24±1	13.9±1.0
Li	63±4	35±3	39±2	42±2	37±3	22±2	20.7±2.0	40±2
Lu	0.57±0.05	0.51±0.03	0.50±0.03	0.49±0.03	0.27±0.03	0.54±0.05	0.42±0.04	0.16±0.02
Mn	218±10	792±25	1010±38	917±25	886±25	645±22	0.142±0.004*	290±7
Mo	1.1±0.1	48±2	1.6±0.2	1.64±0.09	0.82±0.05	1.3±0.1	0.94±0.04	0.33±0.04
N	227±26	588±32	1100±90	640±54	358±39	(119)	(150)	(79)
Nb	40±5	21±1	20±1	17.3±0.7	11.3±0.5	27±3	9.4±0.7	5.1±0.7
Nd	37±2	34±1	36±2	34±1	22.1±0.5	33±1	22±1	9.8±0.4
Ni	4.7±0.7	20±1	28±1	31±1	22.0±0.6	3.0±0.6	18.9±0.7	7.0±0.6

Note: Unit is % data with “*”. Data with ** are calculated values, Data enclosed in brackets are proposed values

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(10 ⁻⁶)	GBW07302a	GBW07303a	GBW07304a	GBW07305a	GBW07307a	GBW07308a	GBW07358	GBW07359
P	(120)	426±33	459±18	575±23	633±14	221±10	568±17	335±15
Pb	35±2	45±2	68±3	102±4	555±19	37±2	210±6	31±2
Pr	11.2±0.4	9.4±0.2	9.9±0.2	9.3±0.2	6.1±0.4	9.4±0.3	5.9±0.4	2.9±0.3
Rb	414±10	153±3	89±3	129±4	63±3	232±4	96±4	118±3
S	76±14	(0.27) *	361±38	0.24±0.03*	325±54	(66)	432±60	87±10
Sb	0.80±0.06	3.8±0.2	2.8±0.3	8.9±0.7	2.1±0.2	0.38±0.05	1.18±0.07	0.16±0.03
Sc	3.0±0.2	10.6±0.4	11.0±0.4	12.1±0.5	7.2±0.4	9.0±0.7	11.4±0.3	4.9±0.4
Se	0.10±0.02	0.57±0.05	0.43±0.04	0.37±0.04	(0.26)	0.14±0.02	0.47±0.10	0.053±0.013
Sm	6.1±0.2	6.3±0.2	6.6±0.2	6.1±0.1	3.9±0.2	6.3±0.1	4.5±0.2	1.9±0.1
Sn	8.6±1.0	4.1±0.4	4.0±0.5	5.0±0.5	2.5±0.4	3.8±0.4	2.5±0.4	2.3±0.2
Sr	20±3	85±4	143±5	78±2	236±6	52±2	171±5	253±13
Ta	4.9±0.6	1.58±0.12	1.38±0.12	1.3±0.1	0.71±0.06	1.88±0.18	0.65±0.07	0.72±0.10
Tb	0.80±0.07	0.90±0.04	0.92±0.04	0.90±0.06	0.52±0.06	0.90±0.02	0.68±0.05	0.29±0.02
Te	(0.03)	(0.09)	(0.09)	(0.3)	(0.04)	(0.03)	(0.05)	(0.02)
Th	38±3	16.3±0.8	13.6±0.7	14.8±0.7	6.7±0.4	20.5±1.1	8.3±0.9	4.1±0.6
Ti%	0.106±0.010	0.43±0.04	0.54±0.03	0.46±0.02	0.41±0.02	0.29±0.01	0.32±0.01	0.146±0.011
Tl	1.85±0.19	1.25±0.04	1.28±0.08	0.84±0.06	0.45±0.07	1.60±0.16	0.91±0.07	0.83±0.08
Tm	0.55±0.05	0.51±0.03	0.50±0.03	0.48±0.03	0.27±0.02	0.53±0.04	0.40±0.04	0.16±0.02
U	6.6±0.4	3.8±0.1	3.2±0.2	3.9±0.2	1.7±0.1	4.7±0.3	2.2±0.2	1.9±0.1
V	10.5±1.3	74±2	99±3	99±3	77±4	31±3	77±3	31±1
W	6.1±0.4	3.9±0.3	2.6±0.3	5.5±0.3	1.11±0.06	3.3±0.2	2.0±0.1	0.66±0.08
Y	25±3	29±1	29±2	29±2	16.0±0.7	29±3	23±2	9.7±0.7
Yb	3.6±0.3	3.3±0.2	3.2±0.3	3.1±0.3	1.7±0.2	3.4±0.4	2.6±0.3	1.0±0.1
Zn	39±3	102±2	139±4	263±5	780±19	80±2	209±6	27±2
Zr	142±16	283±13	351±15	275±17	184±5	228±10	132±4	71±7
%								
SiO ₂	78.12±0.25	72.45±0.22	73.85±0.35	69.33±0.20	68.30±0.24	73.58±0.27	69.40±0.29	74.33±0.23
Al ₂ O ₃	11.06±0.10	12.45±0.07	10.94±0.06	13.40±0.09	11.02±0.08	13.25±0.07	11.06±0.13	11.65±0.13
TFe ₂ O ₃	1.53±0.04	4.72±0.07	4.55±0.10	5.27±0.07	4.18±0.05	3.70±0.05	7.00±0.10	1.79±0.05
FeO	(0.56)	(0.72)	(0.85)	(0.78)	(0.78)	(0.43)	(1.83)	(0.57)
MgO	0.15±0.02	0.72±0.02	0.60±0.02	1.29±0.03	2.50±0.05	0.47±0.04	1.70±0.03	0.71±0.04
CaO	0.13±0.01	0.44±0.02	0.82±0.03	0.77±0.02	2.96±0.05	0.17±0.02	2.96±0.04	2.85±0.08
Na ₂ O	1.49±0.04	0.39±0.02	0.34±0.02	0.64±0.03	2.27±0.05	0.38±0.02	1.40±0.02	2.85±0.04
K ₂ O	5.34±0.11	2.87±0.04	1.51±0.03	2.59±0.05	1.83±0.05	4.31±0.07	2.35±0.03	2.96±0.05
H ₂ O ⁺	(1.26)	3.78±0.30	(4.3)	3.97±0.26	2.38±0.14	2.98±0.30	2.31±0.09	0.98±0.13
CO ₂	(0.15)	(0.25)	(0.4)	(0.45)	(2.8)	(0.16)	(0.76)	(1.34)
Corg	0.26±0.02	(0.54) **	1.00±0.05	(0.51) **	0.48±0.04	(0.11)	0.28±0.03	(0.08)
TC	(0.3)	(0.6)	1.10±0.05	(0.7)	(1.28)	(0.18)	(0.48)	(0.46)

Certified values of chemical composition for stream sediment CRMs

(10 ⁻⁶)	GBW07360	GBW07361	GBW07362	GBW07363	GBW07364	GBW07365	GBW07366
Ag	0.74±0.14	0.044±0.014	0.092±0.005	0.082±0.008	0.14±0.01	0.068±0.010	2.1±0.3
As	43±4	4.4±0.3	3.0±0.4	51±3	19.2±1.9	10.5±0.6	304±20
B	62±6	5.5±1.2	14±3	28±2	35±6	46±10	70±8
Ba	623±18	1054±17	567±11	360±8	727±15	584±14	590±10
Be	2.9±0.3	1.6±0.1	1.9±0.1	1.3±0.2	1.5±0.1	1.5±0.1	2.4±0.1
Bi	1.25±0.04	0.33±0.04	0.22±0.01	0.17±0.02	0.20±0.01	0.25±0.02	13.1±0.6
Br	3.7±0.5	1.0±0.2	1.0±0.2	1.1±0.4	(0.9)	1.3±0.2	1.4±0.2
Cd	4.3±0.5	0.095±0.010	0.12±0.01	0.22±0.01	0.76±0.03	0.165±0.010	4.8±0.5
Ce	63±2	32±2	90±4	39±2	44±2	47±1	79±2
Cl	133±9	(30)	62±5	38±6	0.28±0.02*	298±39	46±8
Co	9.4±0.2	12.5±0.9	19.5±0.6	29±2	8.8±0.4	10.0±0.5	14.4±0.5
Cr	35±2	8.4±1.2	79±3	220±16	32±4	48±3	72±3
Cs	6.0±0.3	1.5±0.2	4.6±0.3	2.9±0.2	2.2±0.6	5.4±0.3	10.3±0.4
Cu	26.5±1.0	3.9±0.6	43±1	45±1	296±10	22.6±0.8	483±20
Dy	4.7±0.3	1.3±0.1	6.5±0.3	3.4±0.2	4.5±0.2	4.5±0.4	5.2±0.2
Er	3.0±0.3	0.8±0.1	3.7±0.2	2.0±0.2	2.7±0.2	2.6±0.3	3.0±0.2
Eu	0.98±0.04	0.54±0.05	1.4±0.1	1.12±0.04	1.11±0.06	1.08±0.05	1.36±0.06
F	460±37	131±20	664±22	390±21	535±22	506±28	603±29
Ga	17.7±0.6	12.0±0.6	16.5±0.4	15.5±0.5	15.7±0.5	13.4±0.4	21.5±1.0
Gd	4.8±0.2	1.4±0.1	7.0±0.5	3.6±0.6	4.3±0.4	4.5±0.3	5.5±0.2
Ge	1.15±0.07	1.21±0.07	1.45±0.08	1.15±0.08	1.06±0.08	1.05±0.04	1.74±0.16
Hf	6.7±0.8	2.7±0.5	7.8±0.7	(3.3)	4.8±0.4	4.1±0.3	7.4±1.3
Hg	0.108±0.011	0.016±0.005	(0.014)	0.089±0.009	0.025±0.005	0.019±0.004	0.115±0.023
Ho	0.99±0.08	0.26±0.03	1.27±0.05	0.70±0.07	0.93±0.08	0.92±0.10	1.04±0.08
I	2.0±0.2	0.46±0.10	0.4±0.1	0.36±0.07	1.6±0.2	1.7±0.3	1.8±0.2
In	0.104±0.009	(0.014)	0.068±0.008	0.050±0.007	0.11±0.01	0.046±0.006	0.36±0.03
La	35±1	11.8±0.6	45±2	20±1	21±1	24±1	40±1
Li	23.6±1.6	8.1±0.8	43±2	19.4±0.5	16.2±0.8	28±1	38±2
Lu	0.52±0.03	0.14±0.03	0.60±0.08	0.31±0.03	0.47±0.05	0.42±0.04	0.48±0.02
Mn	0.149±0.004*	0.122±0.004*	798±31	0.113±0.003*	829±9	675±19	0.103±0.003*
Mo	1.6±0.2	0.64±0.05	0.84±0.08	0.81±0.11	1.7±0.1	1.1±0.1	1.56±0.20
N	0.276±0.027*	218±27	291±36	204±37	(140)	312±35	711±62
Nb	13.6±0.8	9.5±0.7	15.3±0.8	12.3±1.4	9.2±0.8	9.2±0.4	16.4±0.7
Nd	28±1	8.9±1.0	40±2	17.9±0.7	22±1	23±1	33±1
Ni	14.4±0.7	4.7±0.5	70±2	102±3	13.4±0.9	26±2	29±1

continue

(10 ⁻⁶)	GBW07360	GBW07361	GBW07362	GBW07363	GBW07364	GBW07365	GBW07366
P	0.107±0.005*	234±13	459±15	850±36	608±16	571±14	589±39
Pb	341±15	22±1	19±1	24±2	26±1	17±1	126±5
Pr	7.7±0.6	2.5±0.4	11.0±0.8	4.6±0.3	5.5±0.4	5.9±0.3	8.9±0.6
Rb	139±3	81±2	121±4	39±2	53±4	77±2	130±4
S	532±84	66±10	110±18	(350)	0.67±0.06*	(0.62)*	1.17±0.09*
Sb	2.0±0.2	0.29±0.03	0.15±0.04	1.9±0.6	1.00±0.07	0.90±0.06	25±4
Sc	7.2±0.3	2.1±0.2	16.9±0.4	23±1	12.4±0.4	10.3±0.4	13.8±0.3
Se	0.32±0.09	0.072±0.009	0.24±0.02	0.18±0.01	1.55±0.34	0.21±0.01	0.69±0.08
Sm	5.4±0.2	1.6±0.1	7.5±0.2	3.7±0.2	4.7±0.2	4.7±0.2	6.2±0.2
Sn	7.2±1.0	(1.0)	1.9±0.3	1.9±0.4	2.0±0.4	2.0±0.4	6.7±0.6
Sr	156±5	167±10	117±3	251±8	355±13	273±11	111±4
Ta	1.1±0.1	0.81±0.14	1.04±0.08	0.80±0.13	0.59±0.06	0.63±0.07	1.23±0.08
Tb	0.8±0.1	0.22±0.02	1.14±0.08	0.58±0.04	0.74±0.02	0.77±0.04	0.91±0.05
Te	(0.05)	(0.03)	(0.05)	(0.05)	(0.25)	(0.05)	(1.4)
Th	10.9±0.4	5.4±0.6	15.4±1.0	5.4±0.9	5.5±0.8	7.8±0.5	14.0±1.3
Ti%	0.293±0.010	0.151±0.014	0.53±0.01	0.53±0.02	0.328±0.020	0.285±0.020	0.45±0.02
Tl	1.38±0.17	0.44±0.06	0.77±0.07	0.31±0.07	0.32±0.02	0.48±0.03	1.05±0.08
Tm	0.49±0.04	0.13±0.02	0.59±0.05	0.31±0.03	0.46±0.03	0.43±0.05	0.49±0.03
U	4.8±0.3	1.1±0.1	3.5±0.2	1.54±0.10	2.1±0.2	2.3±0.3	3.7±0.3
V	49±3	28±2	120±4	160±10	83±4	69±3	101±3
W	3.0±0.2	0.58±0.06	1.7±0.2	1.1±0.2	0.97±0.11	1.3±0.1	15.5±0.8
Y	29±2	7.0±0.6	34±2	19±2	26±2	25±3	28±2
Yb	3.2±0.3	0.83±0.04	3.8±0.3	2.0±0.2	3.0±0.3	2.7±0.3	3.1±0.1
Zn	579±17	19±2	74±3	97±3	289±6	59±2	874±19
Zr	219±6	100±11	275±13	122±8	179±13	150±11	241±30
%							
SiO ₂	61.96±0.31	77.42±0.22	66.02±0.23	54.17±0.30	63.12±0.34	51.43±0.20	64.35±0.45
Al ₂ O ₃	12.94±0.12	11.44±0.13	11.25±0.08	13.94±0.11	13.08±0.10	10.73±0.08	13.61±0.12
TFe ₂ O ₃	3.80±0.05	1.86±0.05	6.31±0.07	7.84±0.09	4.80±0.05	3.81±0.04	7.05±0.11
FeO	(2.55)	(0.2)	(2.1)	(2.0)	(0.73)	(0.66)	(1.1)
MgO	1.29±0.02	0.18±0.03	2.34±0.04	4.66±0.08	2.01±0.04	1.83±0.04	1.25±0.05
CaO	2.08±0.05	0.85±0.06	3.82±0.06	5.36±0.12	4.09±0.08	13.12±0.31	1.64±0.05
Na ₂ O	2.09±0.05	2.53±0.04	0.83±0.02	2.35±0.05	3.15±0.05	1.68±0.03	0.41±0.04
K ₂ O	3.17±0.04	3.89±0.06	2.41±0.03	1.33±0.02	2.44±0.04	2.17±0.04	2.76±0.07
H ₂ O ⁺	(4.0)	(1.0)	3.23±0.25	(4.6)	(3.1)	(3.5)	(4.4)
CO ₂	(0.98)	(0.11)	2.57±0.28	4.18±0.30	1.36±0.17	8.60±0.28	(1.36)
Corg	4.43±0.26	0.20±0.02	0.34±0.05	0.32±0.04	0.11±0.02	0.18±0.02	(0.56) **
TC	4.76±0.30	(0.25)	1.01±0.09	1.46±0.08	(0.48)	2.6±0.1	0.93±0.10

Analytical methods used for the analysis of GSS17~GSS28

Element	Decomposition method	Determined method	Element	Decomposition method	Determined method
Ag	DP8 DA1 DMA1 DF1 DFI1	AES8 GFAAS2 ICPMS1 AAS1	Pb	DF7 DP5 DFC1	XRF5 ICPMS5 ICPE2 AAS1
As	DA8 DF2 DP2	AFS7 ICPMS3 XRF1 INAA1	Pr	FU3 DF3 DFI1 DMA1 DFC1	ICPMS8 ICPE1
B	DP7 DFC1	AES7 ICPE1	Rb	DP7 DF6	XRF6 ICPMS4 ICPE1 AAS1 INAA1
Ba	DF6 DP6 FU2 DFC1	ICPMS9 XRF5 INAA1	S	DP5 FU1 COB1 DH1	XRF4 VOL3 COL1
Be	DF9 DFC1 DMA1	ICPE6 ICPMS5	Sb	DA8 DF2	AFS7 ICPMS3
Bi	DA6 DF4 DFC1	ICPMS6 AFS5	Sc	DF9 DMA2 DP2	ICPMS7 ICPE4 XRF1 INAA1
Br	DP4 FU3	XRF4 ICPMS2 IC1	Se	DA5 DMA1 FU1 DF1	AFS8
Cd	DF6 DMA3 DFC1 DFI1	GFAAS4 ICPMS6 ICPE1 AAS1	Sm	DF3 FU3 DFC1 DFI1 DP1	ICPMS8 ICPE1 INAA1
Ce	FU6 DP2 DF1 DFC1 DMA1 DFI1	ICPMS6 ICPE4 XRF1 INAA1	Sn	DP7 DFC1	AES7 ICPMS1
Cl	DP5 FU2 DF1	XRF5 ICPMS1 VOL1 IC1	Sr	DF7 DP6 FU2	XRF6 ICPMS5 ICPE4
Co	DF8 DP3 FU2 DMA1 DFC1	ICPMS8 ICPE4 XRF2 INAA1	Ta	DF3 FU2 DFC1 DP1	ICPMS6 INAA1
Cr	DF6 DP5 DFC1 FU1	ICPMS4 ICPE4 XRF4 INAA1	Tb	FU3 DF3 DFC1 DFI1 DP1	ICPMS8 ICPE1 INAA1
Cs	DF6 DP2 DFC1	ICPMS6 INAA1 XRF1 AAS1	Te	DMA2 DF1	ICPMS3
Cu	DF10 DP4 DMA1	ICPE7 XRF4 ICPMS3 AAS1	Th	DF8 DP3 FU1	ICPMS8 XRF2 INAA1 ICPE1
Dy	DF3 FU3 DFC1 DMA1 DFI1	ICPMS8 ICPE1	Ti	DP4 DF3 FUS3 FU2	XRF7 ICPE2 COL2 ICPMS1
Er	DF3 FU3 DFC1 DMA1 DFI1	ICPMS8 ICPE1	Tl	DF7 DA1 DFC1 FU1	ICPMS9 GFAAS1
Eu	DF3 FU3 DFC1 DP1 DMA1 DFI1	ICPMS8 ICPE1 INAA1	Tm	DF4 FU3 DFI1 DFC1	ICPMS8 ICPE1
F	FU8	ISE8	U	DF7 FU2 DFC1 DP1 DA1	ICPMS9 POL1 INAA1 LF1
Ga	DP6 DF5 FU1 DFC1	ICPMS7 XRF6	V	DF7 DP3 FU1	ICPE6 XRF3 ICPMS2
Gd	DF3 FU3 DFC1 DMA1 DFI1	ICPMS9	W	DF4 FU4 DFC1 DP1	ICPMS6 POL3 INAA1
Ge	DA3 DMA2 DF2 FU1 DFC1	AFS7 ICPMS2	Y	DP5 DF4 FU3 DFC1 DFI1	ICPMS8 XRF5 ICPE2
Hf	DF3 DP2 FU1 DFC1	ICPMS4 ICPE1 XRF1 INAA1	Yb	DF3 FU3 DFI1 DMA1 DP1	ICPMS8 ICPE1 INAA1
Hg	DA8	AFS8	Zn	DF11 DP6	ICPE6 XRF5 ICPMS4 INAA1
Ho	DF3 FU3 DFC1 DMA1 DFI1	ICPMS8 ICPE1	Zr	DP5 DF3 FU1 DFC1	XRF5 ICPMS4 ICPE1
I	FU7 DMA1	COL5 ICPMS3	SiO ₂	FU8 FUS3	GR6 XRF3 VOL2
In	DF5 FU2 DA1 DFC1	ICPMS9	Al ₂ O ₃	FU8 DF4 FUS2	VOL8 ICPE3 XRF2 ICPMS1
La	DF4 FU3 DP3 DMA2 DFI1 DFC1	ICPMS7 ICPE4 XRF2 INAA1	TFe ₂ O ₃	FU6 DF4 FUS3 DMA1 DP1	ICPE5 COL4 XRF3 VOL2 INAA1
Li	DF9 DMA1	ICPE5 ICPMS4 AAS1	FeO	DF3	VOL3
Lu	DF3 FU3 DFI1 DMA1 DFC1	ICPMS8 ICPE1 INAA1	MgO	DF7 FU3 FUS2 DMA1	ICPE5 VOL3 XRF2 AAS2 ICPMS1
Mn	DF6 DP5 FUS2 DMA1 DA1	ICPE6 XRF6 ICPMS1 AAS1	CaO	DF7 FU3 FUS3 DMA1	ICPE6 XRF3 VOL3 AAS2
Mo	DF5 FU3 DP2 DFC1	ICPMS6 POL2 ICPE1 AES1 XRF1	Na ₂ O	DF8 FUS3 DMA1 DP1	ICPE6 AAS3 XRF3 INAA1
N	DA7 DMA1 FU1	VOL9	K ₂ O	DF8 FUS3 DMA1 DP1	ICPE6 AAS3 XRF3 INAA1
Nb	DP6 DF4 FU2 DFC1	XRF6 ICPMS6 ICPE1	H ₂ O ⁺	DH6 DP1	GR7
Nd	DF5 FU2 DFI1 DFC1 DP1	ICPMS8 ICPE1 INAA1	CO ₂	DA4 FU1 DH1	VOL6
Ni	DF9 DP4 DFC1 DMA1	ICPE6 ICPMS5 XRF4	Corg	DH6 FU1 DA1 DMA1	VOL9
P	DF5 DP4 FU3 FUS2	XRF6 ICPE4 COL3 ICPMS1	C	DH4 DA1 DP1	VOL5 XRF1

Notes: **Decomposition method:** DF Digestion with aqua regia and HF, DA Digestion with aqua regia, FU Alkaline fusion or fusion with Eschka mixture, DP Direct powdered sample determination, DMA Digestion with acid mixture of HNO₃ and HClO₄, DFC Digestion with aqua regia and HF in a closed system under pressure, DFI Digestion with aqua regia and Hfand ion exchange resin preconcentration, COB Combustion, DH Pyrolysis; **Determined mehtod:** ICPMS Inductively coupled plasma mass spectrometry, ICPE Inductively couple plasma atomic emission spectrometry, XRF X-ray fluorescence spectrometry, AES Atomic emission spectrometry, AFS Atomic fluorescence spectrometry, VOL Volumetry, GR Gravimetry, AAS Atomic absorption spectrometry, GFAASGraphite furnace atomic absorption spectrometry, INAA Instrumental neutron activation analysis, COL Colorimetry, IC Ionic chromatograph, POL Catalytic polarography, ISE Selective ionic electrode method, LF Laser fluorescence.