Supplementary information: Certified reference materials

Certified Reference Material	Sample description	Extraction method	Analytical method	I μg g^{-1} (Certified value)	Ref
Canadian Certified Reference Materials Project SO-1	Regosolic clay soil	Not reported (N.R)	N.R	12.00	1
Canadian Certified Reference Materials Project SO-1		Pyrohydrolytic extraction	Coulometry	5.39	2
Canadian Certified Reference Materials Project SO-2	Podzalic B horizon soil	N.R	N.R	15.00	1
Canadian Certified Reference Materials Project SO-2		Pyrohydrolytic extraction	Coulometry	9.85	2
Canadian Certified Reference Materials Project SO-3	Calcareous C horizon soil	N.R	N.R	1.00	1
Canadian Certified Reference Materials Project SO-3		Pyrohydrolytic extraction	Coulometry	0.56	2
Canadian Certified Reference Materials Project SO-4	Chermozemic A horizon soil	N.R	N.R	3.00	1
Canadian Certified Reference Materials Project SO-4		Pyrohydrolytic extraction	Coulometry	2.07	2
Canadian Certified Reference Materials Project SO-4	Chermozemic A horizon soil	Pyrohydrolytic extraction	ICP-MS	2.06	3
GBW07401: GSS-1	Podzolitic soil	N.R	N.R	1.90 (1.90 ± 0.4)	1
GBW07401: GSS-1		Pyrohydrolytic extraction	ICP-MS	1.90	4
GBW07401: GSS-1		TMAH extraction	ICP-MS	1.80	5
GBW07401: GSS-1		Catalytic reaction during the oxidation of Pyrocatechol Violet by hydrogen peroxide in strongly acid solution	Flow injection analysis	1.82	6
GBW07401: GSS-1		Sintering extraction	ICP-MS	1.95	7
GBW07402: GSS-2	Chestnut soil, semi-desert, vicinity of a copper deposit	Ammonium extraction	ICP-MS	1.55	8
GBW07402: GSS-2		TMAH extraction	ICP-MS	1.60	5
GBW07402: GSS-2		Pressurized acid-digestion	ICP-MS	1.80	9
GBW07402: GSS-2		N.R	N.R	1.80 (1.80 ± 0.2)	1
GBW07402: GSS-2		Pyrohydrolytic extraction	ICP-MS	1.70	4
GBW07402: GSS-2		Catalytic reaction during the oxidation of Pyrocatechol Violet by hydrogen peroxide in strongly acid solution	Flow injection analysis	1.79	6
GBW07402: GSS-2		Sintering extraction	ICP-MS	1.56	7
GBW07403: GSS-3	Yellow-brown soil, temperate climate, vicinity of a gold mine	Ammonium extraction	ICP-MS	1.33 (1.30 ± 0.3)	8
GBW07403: GSS-3		TMAH extraction	ICP-MS	1.30	5
GBW07403: GSS-3		Pyrohydrolysis	Photometry	1.32	10
GBW07403: GSS-3		Pressurized acid-digestion	ICP-MS	1.30	9
GBW07403: GSS-3		N.R	N.R	1.30	1
GBW07403: GSS-3		Pyrohydrolytic extraction	ICP-MS	1.50	4
GBW07403: GSS-3		Catalytic reaction during the oxidation of Pyrocatechol Violet by hydrogen peroxide in strongly acid solution	Flow injection analysis	1.32	6
GBW07403: GSS-3		Sintering extraction	ICP-MS	1.29	7
GBW07404: GSS-4	Limy-yellow soil, subtropical climate	Ammonium extraction	ICP-MS	9.37 (9.40 ± 1.2)	8
GBW07404: GSS-4		TMAH extraction	ICP-MS	9.0	5
GBW07404: GSS-4		Fusion pretreatment Na_2O_2	ICP-AES	9.71	11
GBW07404: GSS-4		Pressurized acid-digestion	ICP-MS	9.40	9
GBW07404: GSS-4		N.R	N.R	9.40	1
GBW07404: GSS-4			X-ray fluorescence	9.00	12
GBW07404: GSS-4		Pyrohydrolytic extraction	ICP-MS	8.90	4
GBW07404: GSS-4		Catalytic reaction during the oxidation of Pyrocatechol Violet by hydrogen peroxide in strongly acid solution	Flow injection analysis	8.80	6
GBW07404: GSS-4		Sintering extraction	ICP-MS	9.14	7
GBW07405: GSS-5	Yellow-red soil, humid climate	Ammonium extraction	ICP-MS	3.60 (3.80 ± 0.5)	8

GBW07405: GSS-5		TMAH extraction	ICP-MS	3.5	[5]
GBW07405: GSS-5		Pyrohydrolysis	Photometry	3.99	[10]
GBW07405: GSS-5		Fusion pretreatment Na_2O_2	ICP-AES	4.63	[11]
GBW07405: GSS-5		Pressurized acid-digestion	ICP-MS	3.80	[9]
GBW07405: GSS-5		N.R	N.R	3.80	[1]
GBW07405: GSS-5		Pyrohydrolytic extraction	ICP-MS	4.60	[4]
GBW07405: GSS-5		Catalytic reaction during the oxidation of Pyrocatechol Violet by hydrogen peroxide in strongly acid solution	Flow injection analysis	5.10	[6]
GBW07405: GSS-5		Sintering extraction	ICP-MS	4.43	[7]
GBW07406: GSS-6	Subtropical climate	Ammonium extraction	ICP-MS	21.00 (19.40 ± 1.0)	[8]
GBW07406: GSS-6		TMAH extraction	ICP-MS	20.6	[5]
GBW07406: GSS-6		Microwave digestion	ICP-MS	17.10	[13]
GBW07406: GSS-6		Pressurized acid-digestion	ICP-MS	19.40	[9]
GBW07406: GSS-6		Pyrohydrolytic extraction	ICP-MS	21.00	[4]
GBW07406: GSS-6		Catalytic reaction during the oxidation of Pyrocatechol Violet by hydrogen peroxide in strongly acid solution	Flow injection analysis	23.36	[6]
GBW07406: GSS-6		Sintering extraction	ICP-MS	20.90	[7]
GBW07407: GSS-7	Tropical climate	N.R	N.R	19.30 (19.30 ± 1.1)	[1]
GBW07407: GSS-7		TMAH extraction	ICP-MS	17.3	[5]
GBW07407: GSS-7		Pyrohydrolytic extraction	ICP-MS	20.00	[4]
GBW07407: GSS-7		Catalytic reaction during the oxidation of Pyrocatechol Violet by hydrogen peroxide in strongly acid solution	Flow injection analysis	22.22	[6]
GBW07407: GSS-7		Sintering extraction	ICP-MS	19.40	[7]
GBW0708: GSS-8	Loess	Pyrohydrolytic extraction	ICP-MS	2.00	[4]
GBW0708: GSS-8		TMAH extraction	ICP-MS	1.1 (1.60 ± 0.5)	[5]
GBW0708: GSS-8		Catalytic reaction during the oxidation of Pyrocatechol Violet by hydrogen peroxide in strongly acid solution	Flow injection analysis	1.86	[6]
GBW0708: GSS-8		Sintering extraction	ICP-MS	1.96	[7]
GBW07409: ESSM-1	No description provided	Pressurized acid-digestion	ICP-MS	0.44	[9]
GBW07410: ESSM-2	Black soil	Pressurized acid-digestion	ICP-MS	2.60	[9]
GBW07411: ESSM-3	Dark brown soil	Pressurized acid-digestion	ICP-MS	2.60	[9]
GBW07418: ESSM-9	Brown soil	Pressurized acid-digestion	ICP-MS	3.10	[9]
GBW07424: GSS-10	A dark brown podzolitic soil prepared as a composite sample from the cold-temperate and moderate rainfall region in the Songhuajiang-Nenjiang Plain, Heilongjiang Province. This sample is rich in organic matter.	Fusion pretreatment Na_2O_2	ICP-AES	2.94	[11]
GBW07424: GSS-10		Aqua regia	ICP-AES, ICP-MS, XRF, NAA, AAS, atomic fluorescence spectrometry, volumetric, colourimetric	3.20	[14]
GBW07424: GSS-10		Catalytic reaction during the oxidation of Pyrocatechol Violet by hydrogen peroxide in strongly acid solution	Flow injection analysis	2.22	[6]
GBW07424: GSS-10		Sintering extraction	ICP-MS	1.87	[7]
GBW07425: GSS-11	A moist-brown soil prepared as a composite sample from the temperate and moist region in the Liaohe River Plain, Liaoning Province	Fusion pretreatment Na_2O_2	ICP-AES	1.56	[11]

GBW07425: GSS-11		Aqua regia	ICP-AES, ICP-MS, XRF, NAA, AAS, atomic fluorescence spectrometry, volumetric, colourimetric	1.60	14
GBW07425: GSS-11		Catalytic reaction during the oxidation of Pyrocatechol Violet by hydrogen peroxide in strongly acid solution	Flow injection analysis	2.46	6
GBW07425: GSS-11		Sintering extraction	ICP-MS	2.29	7
GBW07426: GSS-12	A brown calcareous soil prepared as a composite sample from the dry and cold agricultural district on the southern fringe of the Zhungaer Basin, Xinjiang. This sample contains obvious calcareous deposits.	Fusion pretreatment Na_2O_2	ICP-AES	0.74	11
GBW07426: GSS-12		Aqua regia	ICP-AES, ICP-MS, XRF, NAA, AAS, atomic fluorescence spectrometry, volumetric, colourimetric	1.40	14
GBW07426: GSS-12		Catalytic reaction during the oxidation of Pyrocatechol Violet by hydrogen peroxide in strongly acid solution	Flow injection analysis	2.22	6
GBW07426: GSS-12		Sintering extraction	ICP-MS	1.98	7
GBW07427: GSS-13	A powdery sandy yellow-moist soil prepared as a composite sample from the south temperate and sub-moist alluvial region in the North China Plain derived from the Yellow and Haihe River.	Aqua regia	ICP-AES, ICP-MS, XRF, NAA, AAS, atomic fluorescence spectrometry, volumetric, colourimetric	2.40	14
GBW07428: GSS-14	A purple soil prepared as a composite sample from the subtropical and high rainfall hilly country region in the Sichuan Basin. The underlying bedrock was Mesozoic sandy shale.	Aqua regia	ICP-AES, ICP-MS, XRF, NAA, AAS, atomic fluorescence spectrometry, volumetric, colourimetric	0.90	14
GBW07429: GSS-15	Red soil, rich in selenium	Aqua regia	ICP-AES, ICP-MS, XRF, NAA, AAS, atomic fluorescence spectrometry, volumetric, colourimetric	2.30	14
GBW07429: GSS-15		Pressurized acid-digestion	ICP-MS	0.44	9
Geological Survey of Japan JSo-1	Kuroboku soils (Andosol) originated from volcanic ash and rich in organic materials	Pyrohydrolytic extraction	ICP-MS	26.90	3
Geological Survey of Japan JSo-2	31 elements artificially added	Pyrohydrolytic extraction	ICP-MS	54.00	3
International Atomic Energy Agency IAEA-375	Maybe contaminated with hot particles" resulting from the Chernobyl accident"	Pyrohydrolytic extraction	ICP-MS	1.60	3
International Atomic Energy Agency IAEA-375		Microwave digestion	ICP-MS	1.75	15
International Atomic Energy Agency IAEA-375		N.R	N.R	35.00	1
JSSSPN NDG-1	Andosol, plow layer	Pyrohydrolytic extraction	ICP-MS	34.00	3
NCS NCS DC 73312		Thermal extraction	Photometry	3.09	16
NCS NCS DC 73312		Thermal extraction	ICP-MS	3.22	17
NIST NIST SRM 2709	San Joaquin Soil			5.00	1

NIST NIST SRM 2709		Liquid extraction or chemical/heat-facilitated volatilization.	ICP-MS	4.55	[18]
NIST NIST SRM 2709		Thermal decomposition	ICP-MS	5.09	[19]
NIST NIST SRM 2711	Montana soil	N.R	N.R	3.00	[1]
NIST NIST SRM 2711		Thermal extraction	Photometry	2.90	[16]
NIST NIST SRM 2711		Microwave digestion	ICP-MS	2.77	[15]
USGS GXR-2		Pyrohydrolytic extraction	Coulometry	2.29	[2]
USGS GXR-5		N.R	N.R	3.10	[1]
USGS GXR-5		Pyrohydrolytic extraction	Coulometry	11.40	[2]
USGS GXR-6		Pyrohydrolytic extraction	Coulometry	10.84	[2]

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