



Geochemical Procedure

ME-MS61r

(REE Add-on package to ME-MS61)*

Ultra-Trace Level Method Using ICP-MS and ICP-AES

Sample Decomposition:

HF-HNO₃-HClO₄ acid digestion, HCl leach (GEO-4A01)

Analytical Method:

Inductively Coupled Plasma – Atomic Emission Spectroscopy (ICP – AES)

Inductively Coupled Plasma – Mass Spectrometry (ICP-MS)

A prepared sample (0.25 g) is digested with perchloric, nitric, hydrofluoric and hydrochloric acids. The residue is topped up with dilute hydrochloric acid and analyzed by inductively coupled plasma-atomic emission spectrometry. Following this analysis, the results are reviewed for high concentrations of bismuth, mercury, molybdenum, silver and tungsten and diluted accordingly. Samples meeting this criterion are then analyzed by inductively coupled plasma-mass spectrometry. Results are corrected for spectral interelement interferences.

NOTE: Four acid digestions are able to dissolve most minerals; however, although the term “*near-total*” is used, depending on the sample matrix, not all elements are quantitatively extracted.

Results for the additional rare earth elements will represent the acid leachable portion of the rare earth elements and as such, cannot be used, for instance to do a chondrite plot.

Element	Symbol	Units	Lower Limit	Upper Limit
Silver	Ag	ppm	0.01	100

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Element	Symbol	Units	Lower Limit	Upper Limit
Aluminum	Al	%	0.01	50
Arsenic	As	ppm	0.2	10 000
Barium	Ba	ppm	10	10 000
Beryllium	Be	ppm	0.05	1 000
Bismuth	Bi	ppm	0.01	10 000
Calcium	Ca	%	0.01	50
Cadmium	Cd	ppm	0.02	1 000
Cerium	Ce	ppm	0.01	500
Cobalt	Co	ppm	0.1	10 000
Chromium	Cr	ppm	1	10 000
Cesium	Cs	ppm	0.05	500
Copper	Cu	ppm	0.2	10 000
Iron	Fe	%	0.01	50
Gallium	Ga	ppm	0.05	10 000
Germanium	Ge	ppm	0.05	500
Hafnium	Hf	ppm	0.1	500
Indium	In	ppm	0.005	500
Potassium	K	%	0.01	10
Lanthanum	La	ppm	0.5	10 000
Lithium	Li	ppm	0.2	10 000
Magnesium	Mg	%	0.01	50
Manganese	Mn	ppm	5	100 000

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Element	Symbol	Units	Lower Limit	Upper Limit
Molybdenum	Mo	ppm	0.05	10 000
Sodium	Na	%	0.01	10
Niobium	Nb	ppm	0.1	500
Nickel	Ni	ppm	0.2	10 000
Phosphorous	P	ppm	10	10 000
Lead	Pb	ppm	0.5	10 000
Rubidium	Rb	ppm	0.1	10 000
Rhenium	Re	ppm	0.002	50
Sulphur	S	%	0.01	10
Antimony	Sb	ppm	0.05	10 000
Scandium	Sc	ppm	0.1	10 000
Selenium	Se	ppm	1	1 000
Tin	Sn	ppm	0.2	500
Strontium	Sr	ppm	0.2	10 000
Tantalum	Ta	ppm	0.05	100
Tellurium	Te	ppm	0.05	500
Thorium	Th	ppm	0.2	10 000
Titanium	Ti	%	0.005	10
Thallium	Tl	ppm	0.02	10 000
Uranium	U	ppm	0.1	10 000
Vanadium	V	ppm	1	10 000
Tungsten	W	ppm	0.1	10 000

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Element	Symbol	Units	Lower Limit	Upper Limit
Yttrium	Y	ppm	0.1	500
Zinc	Zn	ppm	2	10 000
Zirconium	Zr	ppm	0.5	500
Dysprosium	Dy	ppm	0.05	1 000
Erbium	Er	ppm	0.03	1 000
Europium	Eu	ppm	0.03	1 000
Gadolinium	Gd	ppm	0.05	1 000
Holmium	Ho	ppm	0.01	1 000
Lutetium	Lu	ppm	0.01	1 000
Neodymium	Nd	ppm	0.1	1 000
Praseodymium	Pr	ppm	0.03	1 000
Samarium	Sm	ppm	0.03	1 000
Terbium	Tb	ppm	0.01	1 000
Thulium	Tm	ppm	0.01	1 000
Ytterbium	Yb	ppm	0.03	1 000