

	Geochemistry Lakefield Laboratory	Doc Type Method Summary Method Code GC_ICM28V Service Testing Issued Date April 2022
Natural Resources	Multi-element Determination in Control Grade Samples by Microwave Digestion/Sodium Peroxide Fusion and a combination of Inductively Coupled Plasma Emission Spectrometry and Inductively Coupled Plasma Mass Spectrometry	 Approved by S. Meyers

1. Parameter(s) measured, unit(s):

Silver (Ag), Aluminum (Al), Arsenic (As), Barium (Ba), Beryllium (Be), Bismuth (Bi), Cadmium (Cd), Calcium (Ca), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Potassium (K), Lithium (Li), Magnesium (Mg), Manganese (Mn), Molybdenum (Mo), Nickel (Ni), Phosphorous (P), Lead (Pb), Antimony (Sb), Selenium (Se), Tin (Sn), Strontium (Sr), Thallium (Tl), Titanium (Ti), Uranium (U), Vanadium (V), Yttrium (Y), Zinc (Zn) in g/t

Boron (B), Gallium (Ga), Indium (In), Rhenium (Re), Tellurium (Te) and Tungsten (W) in g/t can be reported as additional.

2. Typical sample size:

0.25 g

3. Type of sample applicable (media):

Ores, Geochemical Samples, Mill Products, and Concentrates

4. Sample preparation technique used:

Pulp samples are digested using a 3 acid microwave method. The microwave uses high temperature and pressure to aid the digestion of the sample and push the sample into solution. The complexing power of the chloride ion and the catalytic effect of molecular Cl₂ and NOCl during reaction oxidize acid extractable metals. If there is precipitate remaining after microwave digestion then the sample is filtered, and the residue fused with sodium peroxide. The two portions are both analyzed, and the results summed together to report a total.

5. Method of analysis used:

The digested sample solution is analyzed by inductively coupled plasma Mass Spectrometer (ICP-MS) and inductively coupled plasma Optical Emission Spectrometer (ICP-OES). These samples are analyzed as prepared and/or diluted within the linear range of the instrument calibration. Results from the acid portion and fusion portion are combined after analysis to give a total.

6. Data reduction by:

Computer, on line, data fed to the Laboratory Information Management System with secure

audit trail.

7. Figures of Merit:

This method has been fully validated for the range of samples typically analyzed. Method validation includes the use of reference materials, replicates, duplicates and blanks to calculate accuracy, precision, linearity, range, limit of detection, reporting limit, specificity and measurement uncertainty.

The Reporting Limit has been determined according to the following:

Element	RL (g/t)	Element	RL (g/t)	Element	RL (g/t)
Ag	0.8	Mn	4	B	4
Al	10	Mo	6	Ga	0.2
As	10	Ni	10	In	0.2
Ba	0.2	P	50	Re	0.2
Be	0.04	Pb	2	Te	4
Bi	0.6	Sb	0.8	W	20
Ca	9	Se	10		
Cd	0.2	Sn	20		
Co	3	Sr	0.4		
Cr	4	Ti	8		
Cu	0.7	Tl	0.4		
Fe	10	U	0.4		
K	10	V	2		
Li	20	Y	0.4		
Mg	40	Zn	7		

Note: Report limits may be elevated for difficult matrices
Elements in bold are from ICP-OES

8. Quality control:

Quality control materials include method blanks, replicates and reference materials and are randomly inserted with the frequency set according to method protocols at ~18%. Quality control materials will also include BRM (Barren reference materials, or preparations blanks) and preparation duplicates if samples have been taken through the sample reduction process. Instrument calibration is performed for each batch or work order and calibration checks are analyzed within each analytical run. Instrument calibration is performed for each batch or work order and calibration checks are analyzed within each analytical run.

9. Accreditation:

SGS Natural Resources conforms to the requirements of ISO/IEC 17025. Scopes of Accredited tests are site specific, please visit <https://www.scc.ca/en/search/laboratories>