

**GE ICP14B: The Determination of 34 Elements by a Aqua Regia Digest and ICP-OES.**

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

Silver (Ag); Aluminum (Al); Arsenic (As); Barium (Ba); Beryllium (Be); Bismuth (Bi); Calcium (Ca); Cadmium (Cd); Chromium (Cr); Cobalt (Co); Copper (Cu); Iron (Fe); Potassium (K); Lanthanum (La); Lithium (Li); Magnesium (Mg); Manganese (Mn); Molybdenum (Mo); Sodium (Na); Nickel (Ni); Phosphorus (P); Lead (Pb); Antimony (Sb); Scandium (Sc); Sulfur (S); Tin (Sn); Strontium (Sr); Titanium (Ti); Vanadium (V); Tungsten (W); Yttrium (Y); Zinc (Zn); Zirconium (Zr); (Mercury (Hg) can be added on) : ppm and %

**2. Typical sample size:**

0.25 g

**3. Type of sample applicable (media):**

Crushed and Pulverized rocks, soils and sediments

**4. Sample preparation technique used:**

Crushed and pulverized rock, soil and /or sediment samples are digested using 3:1 HCl and HNO<sub>3</sub>.

**5. Method of analysis used:**

The digested sample solution is analyzed by inductively coupled plasma Optical Emission Spectrometer (ICP-OES). Samples are analyzed against known calibration materials to provide quantitative analysis of the original sample.

**6. Data reduction by:**

The results are exported via computer, on line, data fed to the SGS Laboratory Information Management System (SLIM) with secure audit trail.

**7. Figures of Merit:**

(\*Mercury can be added on)

Element	Reporting Limit (ppm)	Upper Limit	Element	Reporting Limit (ppm)	Upper Limit	Element	Reporting Limit (ppm)	Upper Limit	Element	Reporting Limit (ppm)	Upper Limit
<b>Ag</b>	2.0	100ppm	<b>Cu</b>	0.5	1.0%	<b>P</b>	0.01(%)	15%	<b>Y</b>	0.5	1.0%
<b>Al</b>	0.01 (%)	15%	<b>Fe</b>	0.01(%)	15%	<b>Pb</b>	2.0	1.0%	<b>Zn</b>	1.0	1.0%
<b>As</b>	3.0	1.0%	<b>K</b>	0.01(%)	15%	<b>S</b>	0.01%	5.0%	<b>Zr</b>	0.5	1.0%
<b>Ba</b>	5.0	1.0%	<b>La</b>	0.5	1.0%	<b>Sb</b>	5.0	1.0%			
<b>Be</b>	0.5	0.25%	<b>Li</b>	1.0	1.0%	<b>Sc</b>	0.5	1.0%	<b>*Hg</b>	1.0	1.0%
<b>Bi</b>	5.0	1.0%	<b>Mg</b>	0.01(%)	15%	<b>Sn</b>	10	1.0%			
<b>Ca</b>	0.01(%)	15%	<b>Mn</b>	2.0	1.0%	<b>Sr</b>	5	1.0%			
<b>Cd</b>	1.0	1.0%	<b>Mo</b>	1.0	1.0%	<b>Ti</b>	0.01(%)	15%			
<b>Cr</b>	1.0	1.0%	<b>Na</b>	0.01(%)	15%	<b>V</b>	1.0	1.0%			
<b>Co</b>	1.0	1.0%	<b>Ni</b>	1.0	1.0%	<b>W</b>	10	1.0%			

**8. Quality control:**

Instrument calibration is performed for each batch or work order and calibration checks are analyzed within each analytical run. Quality control materials include method blanks, replicates and reference materials and are randomly inserted with the frequency set according to method protocols at ~14%.

Quality assurance measures of precision and accuracy are verified statistically using SLIM control charts with set criteria for data acceptance. Data that fails is subject to investigation and repeated as necessary.