# Method 29 – Microwave Digestion

**Sample Weight: 1 g**

## Summary

This method describes the rapid sample preparation of rocks, minerals and soils using a microwave digestion system. Water and polar compounds readily absorb microwave (infrared) energy rapidly, resulting in a quick and efficient digestion. The resulting solution is analyzed by ICP-OES and ICP-MS.

## Method 29 Elements and Reporting Limits

|  |  |  |
| --- | --- | --- |
| Element | Concentration (low) | Concentration (high) |
| Ag, Silver | 0.01 ppm | 100 ppm |
| Al, Aluminum | 0.01% | 25% |
| As, Arsenic | 0.1 ppm | 1% |
| Au, Gold | 0.005 ppm | 10 ppm |
| B, Boron | 5 ppm | 0.1% |
| Ba, Barium | 1 ppm | 1% |
| Be, Beryllium | 0.05 ppm | 0.1% |
| Bi, Bismuth | 0.01 ppm | 0.1% |
| Ca, Calcium | 0.01% | 25% |
| Cd, Cadmium | 0.01 ppm | 0.1% |
| Ce, Cerium | 0.01 ppm | 0.1% |
| Co, Cobalt | 0.1 ppm | 1% |
| Cr, Chromium | 0.5 ppm | 1% |
| Cs, Cesium | 0.05 ppm | 0.1% |
| Cu, Copper | 0.5 ppm | 1% |
| Fe, Iron | 0.01% | 30% |
| Ga, Gallium | 0.05 ppm | 0.1% |
| Ge, Germanium | 0.05 ppm | 0.1% |
| Hf, Hafnium | 0.02 ppm | 0.1% |
| Hg, Mercury | 0.01 ppm | 100 ppm |
| In, Indium | 0.005 ppm | 0.1% |
| K, Potassium | 0.01% | 25% |
| La, Lanthanum | 0.1 ppm | 0.1% |
| Li, Lithium | 0.1 ppm | 1% |
| Mg, Magnesium | 0.01% | 25% |
| Mn, Manganese | 1 ppm | 1% |
| Mo, Molybdenum | 0.05 ppm | 1% |
| Na, Sodium | 0.01% | 25% |
| Nb, Niobium | 0.05 ppm | 0.1% |
| Ni, Nickel | 0.5 ppm | 1% |
| P, Phosphorous | 10 ppm | 25% |
| Pb, Lead | 0.1 ppm | 1% |
| Rb, Rubidium | 0.1 ppm | 0.1% |
| Re, Rhenium | 0.001 ppm | 0.1% |
| S, Sulfur | 0.01% | 30% |
| Sb, Antimony | 0.05 ppm | 0.1% |
| Sc, Scandium | 0.1 ppm | 0.1% |
| Se, Selenium | 0.2 ppm | 0.1 % |
| Sn, Tin | 0.2 ppm | 0.1% |
| Sr, Strontium | 0.2 ppm | 0.1% |
| Ta, Tantalum | 0.01 ppm | 0.1% |
| Te, Tellurium | 0.01 ppm | 0.1% |
| Th, Thorium | 0.1 ppm | 0.1% |
| Ti, Titanium | 0.01% | 25% |
| Tl, Thallium | 0.01 ppm | 0.1% |
| U, Uranium | 0.05 ppm | 0.1% |
| V, Vanadium | 0.5 ppm | 0.1% |
| W, Tungsten | 0.05 ppm | 0.1% |
| Y, Yttrium | 0.05 ppm | 0.1% |
| Zn, Zinc | 0.5 ppm | 1% |
| Zr, Zirconium | 0.5 ppm | 0.1% |

## Analytical Performance

Data is deemed acceptable if recovery for all 51 elements is ±15% at five times the Lower Limit of Determination (LOD) and the calculated Relative Standard Deviation (RSD) of duplicate samples is no greater than 15%.