# Method 19 - High Concentration Rare Earth Elements by Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS), Sodium Peroxide Fusion

**Sample Weight: 0.5 g**

## Summary

The rare earth elements plus lanthanum, thorium, uranium, yttrium, barium and strontium are determined in geological materials using Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). The sample is decomposed using a sodium peroxide-sodium hydroxide fusion to ensure complete dissolution of the elements. The digested sample is aspirated into a radio frequency plasma and the resultant ions for each element are separated on a mass to charge ratio and measured using an electron multiplier detector.

**Note: This method is designed for high-concentration rare earth element samples only. Typically, samples must contain at least 1000 ppm total rare earth elements. Low concentration rare earth element samples are measured by the Sixty Element ICP-OES-MS Sodium Peroxide Fusion method.**

## Method 19 Elements and Reporting Limits

(There are no upper limits for this method)

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| Element | Lower Reporting Limits |
| Cerium, Ce | 0.5 ppm |
| Dysprosium, Dy | 0.5 ppm |
| Erbium, Er | 0.03 ppm |
| Europium, Eu | 0.03 ppm |
| Gadolinium, Gd | 0.05 ppm |
| Holmium, Ho | 0.01 ppm |
| Lanthanum, La | 0.5 ppm |
| Lutetium, Lu | 0.01 ppm |
| Neodymium, N | 0.1 ppm |
| Praseodymium, Pr | 0.03 ppm |
| Samarium, Sm | 0.03 ppm |
| Terbium, Tb | 0.01 ppm |
| Uranium, U | 0.05 ppm |
| Yttrium, Y | 0.5 ppm |
| Ytterbium, Yb | 0.03 ppm |

**Note:** For samples containing high levels of barium and sulfur, there will be precipitation of barium sulphate. Samples should be allowed to settle, before the aliquot is extracted for measurement. A note will be attached to the analytical report to indicate that Ba results are low due to precipitation of BaSO4.

## Analytical Performance

Data will be deemed acceptable if recovery of each element 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%.