



Whole Rock Analysis by ICP-OES

Florin Analytical
Services

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WHOLE ROCK ANALYSIS

The analysis is completed utilizing a lithium metaborate fusion process on a small portion of pulverized solid material. The “whole rock analysis” is actually not a complete analysis of the rock, but describes a specific method of ore preparation followed by analysis for eleven (11) common rock-forming elements. The values for the rock-forming elements are then expressed as their more common oxide compound. It is noted that the calculation of the assumed compound does not necessarily mean that the oxides are actually or entirely present as such compounds. The procedure for the Whole Rock Analysis is as follows:

Whole Rock Analysis – Utilizing standard geochemical procedures, the sample is assayed for a series of 11 elements. The procedure utilized for the analysis is a lithium metaborate fusion followed by digestion of the melt utilizing dilute nitric acid. The solution produced is then aspirated into an Inductively Coupled Plasma – Optical Emission Spectrophotometer (ICP-OES) or a Flame Atomic Absorption Spectrophotometer (FAAS) for elemental analyses. The lithium metaborate fusion breaks down the sample matrix completely, thus allowing for a “total” analysis of the elements present.

The raw elemental analyses are transferred to a spreadsheet from which the “oxide” equivalent is then calculated. In addition to the elemental analyses, a loss-on-ignition (LOI) value is also determined. The LOI is conducted at a temperature of 2,000°F for one (1) hour.

Included in the LOI of an oxide material would be any change in weight due to the presence of organic carbon, the presence of non-sulfate sulfur, the evolution of carbon dioxide from carbonates that are present and any additional loss from structural waters (waters of hydration) that may be present in the sample. In a whole rock analysis on oxide material, the sum of the calculated oxides plus the LOI typically is around 100% ± 2.

Element	Units	Oxide	Oxide factor	Limit of Detection (Oxide)
Al	%	Al ₂ O ₃	1.889	0.01
Ca	%	CaO	1.399	0.01
Cr	%	Cr ₂ O ₃	1.462	0.01
Fe	%	Fe ₂ O ₃	1.430	0.01
K	%	K ₂ O	1.205	0.10
Mg	%	MgO	1.658	0.01
Mn	%	MnO	1.291	0.01
Na	%	Na ₂ O	1.348	0.05
P	%	P ₂ O ₅	2.291	0.03
Si	%	SiO ₂	2.139	0.02
Ti	%	TiO ₂	1.668	0.01
LOI _{2000°F}	%			0.20

**Whole Rock Analysis - Lithium Metaborate Fusion
Followed by ICAP-OES or FAAS**