

SPECTROLASER APPLICATION

IRON ANALYSIS in WOLLASTONITE

MATERIAL

A suite of eight Wollastonite standards and a Wollastonite sample of unknown composition were received for analysis with the *Spectrolaser* elemental analysis system.

ANALYSIS METHOD

Each of the samples was pressed, as received, in 40mm sample cups using the LAT 40T hydraulic press to a pressure of 30 tonnes and for a dwell time of 30 seconds. Each pellet was analysed 3 times using 50 laser pulses corresponding to a 20 second analysis time for each measurement.

DETECTABLE ELEMENTS

Detectable elements in the materials include Ca, Si, Mg, Na, Fe, Al , K. plus various trace components.

Calibration Curves

The *Spectrolaser* uses a technique known as Laser Induced Breakdown Spectroscopy (LIBS) to perform the elemental analysis of materials. Calibration involves the use of certified reference materials, the selection of an appropriate elemental optical emission line, and, in most cases, selection of a normalisation emission line. The *Spectrolaser* software automatically constructs calibration curves of the normalised peak area vs elemental concentration present in the reference materials. The concentration is determined in samples of unknown composition by comparison with this calibration reference.

A detailed investigation has been undertaken to determine the optimum experimental conditions and instrument settings for the determination of Ca and Fe levels in the Wollastonite sample.

Fe₂O₃ Calibration

Fe emission lines considered for the Fe₂O₃ calibration included the 237.927nm, 274.5nm, 349.057nm, 358.119nm and 371.993nm optical emission. When there is a dominant matrix component, in this case Ca, normalisation is best performed against a nearby line corresponding to optical emission from that element. In this case, good results were obtained using the 274.5nm Fe line, normalised to the Ca emission at 315.886nm. This calibration curve is shown in Figure 1 below.

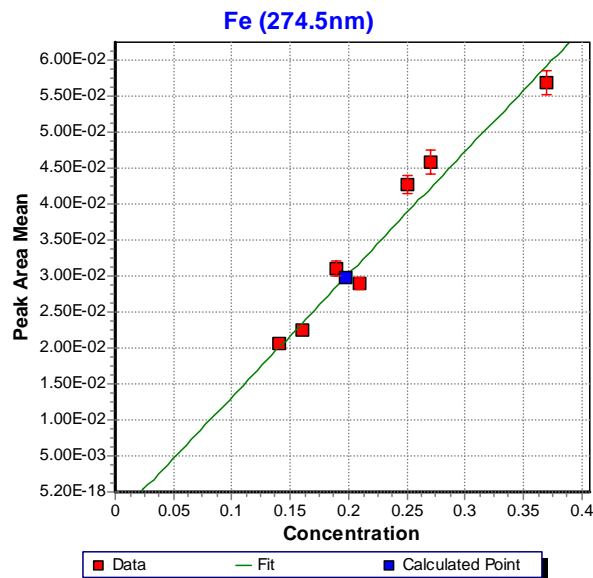


Figure 1: Calibration Curve for Fe₂O₃

Detection Limits – Calcium matrices

Element	Detection Limit*
Na	0.001 %
Ca	0.001 %
Mg	0.001 %
Fe	0.003 %
Al	0.003 %
K	0.002
Ti	0.002
Si	0.004%

Sample Spectra

