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Spectrolaser Application

GYPSUM ANALYSIS

Material *Gypsum*

Gypsum is the naturally occurring form of calcium sulphate and is used extensively as an ingredient in building materials. It contains many common impurities found in naturally occurring materials including sodium, iron, magnesium, silica, aluminium, titanium and potassium.

Test Method

Five certified gypsum samples were obtained with a range of elemental compositions. Of these samples, four were used to calibrate the Spectrolaser 1000 M unit and the fifth presented as an unknown. Samples for analysis are prepared by placing approximately 4 g of the gypsum standards in the sample holder and pressing to 4 tonnes pressure – using a Labtech Essa press.

The analysis time is 20 seconds (all elements) for each sample analysed.

Detectable Elements

Detectable elements include the principal components Al, Ca, Fe, H, K, Na, O, Mg, Si, and Ti.

Detection Limits

Detection limits are determined from three times the standard deviation in multiple measurements of materials of samples with low analyte concentrations. The estimated detection limits for the principal impurities present in low-ash lignite are:

Element	Detection Limit*
Na	0.003 %
Ca	0.006 %
Mg	0.009 %
Fe	0.010 %
Al	0.009 %
K	0.003
Ti	0.003
Si	0.04 % est

*Detection limit expressed in % as-received (moist)

Multiple Analysis Test

All of the following results are expressed as % d.b. (dry basis).

Analysis	Al 394.4	Ca 423nm	Fe 293nm	K 769nm	Mg 293.6	Si 288nm	Na 589nm	Ti 335nm
1	0.61	19.8	0.28	0.20	2.0	1.7	0.009	0.034
2	0.65	21.1	0.29	0.21	2.0	2.0	0.010	0.037
3	0.65	21.0	0.30	0.20	1.9	2.0	0.010	0.042
4	0.66	20	0.28	0.19	2.0	1.9	0.009	0.028
5	0.66	20.3	0.30	0.21	2.0	2.0	0.010	0.035
Mean (SD)	**0.64 (0.02)**	**20.4 (0.5)**	**0.29 (0.01)**	**0.20 (0.01)**	**1.98 (0.04)**	**1.92 (0.1)**	**0.0096 (.0005)**	**0.035 (0.005)**
ICP	**0.60**	**21.6**	**0.27**	**0.19**	**1.92**	**1.94**	**0.010**	**0.035**

Example Calibration Curve