

**Certificate of Analysis
Part No. B2383
Carbon & Sulphur in Limestone
Standard**

Certificate Number 519E
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**% Carbon
Mean = 7.15
Expanded Uncertainty = ± 0.47
(k=2, 95% confidence) (n=57)**

**%Sulphur
Mean = 0.052
Expanded Uncertainty = ± 0.014
(k=2, 95% confidence) (n=41)**

The intended use is for Carbon and Sulphur determination in limestone or other similar materials using induction and resistance type oxygen combustion furnaces with infrared detection. Accelerants like Tungsten Tri-oxide (WO₃) were used in the resistance furnace. Tungsten metal and iron chip accelerators were used in the induction analysis.

Method of analysis ASTM E1915-13 and ARI-033

Standards Employed for traceability:

NIST	1d
NCS	DC28009, DC28234b, DC14019, DC28011
ECRM	701-1, 702-1

ALPHA - AR4012-52199, AR4019-61499, AR4014-42899, AR4022-101102, AR4023-100902

The mean analytical values were derived by data sets showing traceability to the above-mentioned reference standards and reported in mass fraction. The precision values are derived using ISO Guide 35, the Guide to Uncertainty Measurement, and ANOVA. Metrological traceability is to the SI derived unit of mass fraction expressed as percent. Refer to your test method or instrument manufacturer for the expanded method derived uncertainty if needed. When necessary, professional judgment is applied toward consideration of data and statistical information.

Sample size and minimum sample size for this data was 150-300mg nominal. Refer to your instrument manufacturer for typical sample analysis size. This bottle contains 25g of fine powder to be used directly from the bottle without preparation. Keep sealed and store under normal laboratory conditions. While unable to determine a definite shelf life this reference should be reviewed 20 years from certification.

The material used in production of this standard was sampled in accordance with ARI 032. The samples for round robin testing were selected in accordance with ARI 014. The above values relate only to the material used to produce this standard. Remedies for any claimed defect in this product will be limited to product replacement or refund of the purchase price. In no event, shall Elemental Microanalysis Ltd be liable for incidental or consequential damages. This certificate cannot be reproduced except in its entirety.

This Reference Material is traceable to the above-mentioned standards. For good laboratory practice, it is recommended that all standards be verified as fit for purpose prior to use.

Certified October 17, 2019

Elemental Microanalysis Ltd.