



Certificate of Analysis

AR-1711

SULFUR IN COAL REFERENCE STANDARD

LOT # 711218

LID ID # 711218

DRIED BASIS VALUE

WEIGHT PERCENT SULFUR = 5.13

EXPANDED UNCERTAINTY = ± 0.09

METHOD:

ASTM D 4239-17 AND ARI-035

This CRM is traced to N.I.S.T. SRM 2685b, 2685c, and NCS FC28143

Alpha- AR2782-821008, AR2782-782614, AR1711-711209, AR1732-321208, AR1712-712914

The intended use of this reference material is for the calibration and quality validation of sulfur by resistance furnace, infra-red detection analysis as specified by ASTM 4239 or other valid test methods. The analytical values were derived by a number of data points (n=40) and reported in mass fraction. The sample size used and minimum sample size is approximately 300-500mg. The precision value represents the expanded degree of uncertainty based on errors from analytical assay at a 95% confidence level (k=2) utilizing ISO Guide 35, ANOVA, and the Guide to Uncertainty Measurement. Formal testing procedures should be followed when using this standard; this includes using the *reproducibility* and *repeatability* factors of the method for establishing overall analytical uncertainty. When necessary, professional judgment is applied toward consideration of data and statistical information. The statistical analysis and the overall direction and coordination of the analytical measurements leading to certification were performed by K.E. Dyer, Chief Chemist, at Alpha Resources.

The material used in production of this reference standard was identified in accordance with ARI 041. The samples for round robin testing were selected in accordance with ARI 031. The above values relate only to the material used to produce this standard. The analytical samples were dried per the NMI used or corrected for moisture as per the test method. This reference was produced in accordance to ISO 17034 and ISO Guide 31.

Remedies for any claimed defect in this product will be limited to product replacement or refund of the purchase price. In no event shall Alpha Resources be liable for incidental or consequential damages. The above values relate only to the material used to produce this standard. This certificate cannot be reproduced except in full. This bottle contains 50g, minus 60 mesh (250 micron) coal powder. While unable to determine a definite shelf life, this reference standard should be reviewed 20 years from the date of certification. Once opened this certificate is valid for two years.

This is a Certified Reference Material (working reference standard) and is traceable to the above-mentioned standards. For good laboratory practice, it is recommended that all standards be verified fit for purpose prior to use. These test results are accredited under the Alpha Resources LLC laboratory's ISO/IEC 17025 and ISO Guide 34 accreditation (RMP) issued by ANSI-ASQ/ANAB. Refer to certificate and scope of accreditation(s) AT-1200 and AR-1920.

EXPIRATION DATE

THIS CRM IS VALID FOR TWO YEARS FROM THE DATE OF OPENING

Certified March 8, 2018

Chief Chemist