



Certificate of Analysis

AR-1684

ULTRA LOW SULFUR COAL CRM

LOT # 841019

LID ID # 841019

DRIED BASIS VALUE

WEIGHT PERCENT SULFUR = 0.102

EXPANDED UNCERTAINTY = ± 0.007

METHOD: ARI-035

Combustion under Oxygen by Resistance Furnace with IR Detection *ASTM 4239 (below method scope range)

This Reference Material is traced to NCS FC28003f, FC28113, AR1685-685610, AR1684-684610, AR1685-685414, AR1684-684414

The intended use of this reference material is for the calibration and quality validation of sulfur by resistance furnace combustion, infra-red detection analysis as specified by ASTM D4239 or other valid test methods. This Certified Reference Material (CRM) was prepared by gravimetric blending and verified by analysis. The analytical value was calculated from a number of data points ($n=42$) obtained on instrumentation using combustion by resistance furnace with IR detection similar to ASTM D4239. The typical sample size used and minimum sample size for analysis 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. Metrological traceability is to the SI derived unit of mass fraction expressed as percent. 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 at Alpha Resources. This CRM is below actual test method limits and no known SRM/NMI references at this concentration are available.

The material used for this standard was identified by AR 041. The samples for 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 under a nitrogen atmosphere for a minimum of 30 minutes at $107^{\circ} \text{C} \pm 3^{\circ} \text{C}$, or until a steady mass is achieved. This bottle contains 50g fine powder to be used per your test method. Kept sealed this bottle has an indefinite shelf life. Once opened this certificate is valid for 2 years. Keep sealed and store under normal laboratory conditions.

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 is a CRM, and is traceable to the above-mentioned reference material(s). For good laboratory practice, it is recommended that all standards be verified prior to use. This reference was produced in accordance to ISO 17034 see certificate and scope AR-1920.

EXPIRATION DATE

THIS CRM SHOULD BE REVIEWED 20 YEARS FROM DATE OF CERTIFICATION

Certified November 18, 2019