



Certificate of Analysis

AR-1908

CARBON, HYDROGEN, NITROGEN, MERCURY AND CHLORINE IN COAL REFERENCE STANDARD

LOT # 908318

LID ID # 908318

| | Mean Value | Expanded Uncertainty k=2, @ 95% | ASTM Method(s) | Traceability |
|---------------|------------|------------------------------------|----------------|--|
| % CARBON | 69.00 | ± 1.37 | D5373 | High Purity Organic Analytical Standards |
| % HYDROGEN | 4.64 | ± 0.10 | D5373 | High Purity Organic Analytical Standards |
| % NITROGEN | 1.49 | ± 0.22 | D5373 | High Purity Organic Analytical Standards |
| µg/g MERCURY | 0.13 | ± 0.02 µg/g | D6722 | NIST:1632d, 2693, 2691, 2682c, 2685c, 2684c, 2683c, 2692c, 2709 SARM 20, CRM 7 |
| µg/g CHLORINE | 91 | ± 8 µg/g | D6721 | NIST: 2692c, 2693, 2682c |

NOTE: all are Dried Basis Values - () Indicates reference only values

The intended use of this reference material is for the quality validation of Carbon, Hydrogen, Nitrogen, Mercury and Chlorine, in coal by ASTM or other valid test methods. The analytical values were derived by a consensus of analytical testing and reported in mass fraction. The sample size used and minimum sample size is dependent upon your test method or instrument manufacturer recommendations. The precision value represents the expanded degree of uncertainty based on errors from analytical assay at a 95% confidence level (k=2) and may not fit within your testing capabilities. 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 (non-Scope) 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 25g, minus 60 mesh (250 micron) coal powder. While unable to determine a definite shelf life this reference should be reverified twenty 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.

EXPIRATION DATE

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

Certified March 13, 2018

Chief Chemist