



Certificate of Analysis

AR-2719

SULFUR IN CALCINED PETROLEUM COKE CRM

LOT # 240207

LID ID # 240207

DRIED BASIS VALUE

WEIGHT PERCENT SULFUR = 2.30

EXPANDED UNCERTAINTY = 0.10

(k=2, @ 95% confidence limit, n=32)

METHOD:

ASTM D 4239-18 AND ARI-LAB-616

This CRM is traced to NCS CRM FC93005, FC28014

Alpha - AR2717-717102, AR2719-719904, AR744-744809, AR2716-716703, AR2717-7171096

The intended use of this reference material is for the calibration and quality validation of sulfur in calcined coke by oxygen combustion using resistance furnace and 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 and reported in mass fraction. Metrological traceability is to the SI derived unit of mass fraction expressed as percent. The sample size used and minimum sample size is approximately 300-500mg. The precision value represents the expanded degree of uncertainty at a 95% confidence level (k=2), utilizing ANOVA, ISO Guide 35, 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 method 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-LAB-603. The samples for round robin testing were selected in accordance with ARI-LAB-625. 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 with 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) calcined coke. Values are valid for 15 years from the date of certification.

This is a Certified Reference Material and 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. These test results are accredited under the Alpha Resources LLC laboratory's ISO/IEC 17025 and ISO 17034 accreditation (RMP) issued by ANSI National Accreditation Board. Refer to certificate and scope of accreditation(s) AT-1200 and AR-1920.

Certified March 25, 2024

Updated February 13, 2025

Kent Dyer
Chief Chemist