

Alpha Resources, LLC

Certificate Of Analysis

AR 148
COPPER PIN STANDARD
OXYGEN & SULFUR
LOT #517E

WEIGHT% OXYGEN
MEAN = 0.049%
Standard Deviation = $\pm 0.001\%$
Expanded Uncertainty = $\pm 0.002\%$
(k=2, 95% confidence) (n=57)

WEIGHT% SULFUR
MEAN = 0.0012%
Standard Deviation = $\pm 0.0002\%$
Expanded Uncertainty = $\pm 0.0004\%$
(k=2, 95% confidence) (n=40)

Oxygen	Inert Gas Fusion IR Detection
Sulfur	Combustion - IR Detection
ASTM	E2575-08, E1019-11

Standard Reference Materials employed:

NIST	885, 495, 457
INFM	Cu-S-20, Cu-300, Cu-600/1
BCR	CRM058, CRM017b

Alpha – AR148-715b, AR149-534985106, AR149-1116C, AR148-9163192, AR148-9163192205

The intended use is for the calibration and quality validation of Oxygen and Sulfur in Copper by the test methods listed above. The precision values represent the standard deviation, and expanded uncertainty obtained from analysis. Minimum and normal sample size used for testing is 1g or 1 pin. 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, Technical Manager at Alpha Resources.

The methodology follows ASTM E1019, E2575, ARI 033, and ARI 034. The material used in production of this standard was identified in accordance with ARI 032. The samples for analytical testing were selected in accordance with ARI 014. The above values relate only to the material used to produce this standard. This standard consists of 100g, 1g nominal pins, to be used with no preparation, and has no expiration date. 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. This reference was produced in accordance to ISO 17034 and Guide 31.

This is a Certified Reference Material (Working Standard), and is traceable to the above-mentioned standards. For good laboratory practice, it is recommended that all standards be verified prior to use. This certificate cannot be reproduced except in full.

These test results and the production of this reference standard is 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.

Certified August 15, 2017



Kent Dyer - Technical Manager