

Alpha Resources, Inc.

Certificate Of Analysis

AR 147
COPPER PIN STANDARD
OXYGEN & SULFUR
LOT # 5921198

PPM OXYGEN
MEAN = 10 PPM
ONE SIGMA = +/- 1.5 PPM
TWO SIGMA = +/- 3.0 PPM
RANGE = 7 - 13 PPM

PPM SULFUR
MEAN = 18 PPM
ONE SIGMA = +/- 2
TWO SIGMA = +/- 4
RANGE = 14 - 22 PPM

PPM CARBON = 6 PPM (REFERENCE ONLY)
PPM NITROGEN = <1 PPM (REFERENCE ONLY)
PPM HYDROGEN = 0.6 PPM +/- 0.1 (REFERENCE ONLY)

Methods of Analysis

Oxygen	Inert Gas Fusion IR Detection
Sulfur	Combustion - Iodate Titration / IR Detection
Carbon	Combustion - IR Detection
Nitrogen	Inert Gas Fusion TC Detection
Hydrogen	Inert Gas Fusion TC Detection (Gas dose)

Standard Reference Materials employed were
NIST SRM 1091, 1098, 1093, 396, 496

Notes:

The mean analytical values were derived by a number of data sets obtained by the above methods.

The precision value is based on the standard deviation, two times the standard deviation, and complete range of analysis obtained by the data sets. Carbon and Nitrogen are given for reference only.

The statistical analysis of the certification was performed by K.E. Dyer at Alpha Resources.

The overall direction and coordination of the analytical measurements leading to certification were performed by K.E. Dyer at Alpha Resources. Revised 05/30/2001 for Hydrogen content.

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.

Certified December, 1998



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