Alpha Resources, Inc.
Certificate Of Analysis

AP 668, AR 208, AR 208C, AR 208V, AR 209, AR 209C, AR 209V, AR 502, AR 1790, AR 1790C, AR 1790V, AR 2134, AR 2134C, AR 2134V, AR 3403, AR 3414, AR 3414M, AR 3414V

BENZOIC ACID CALORIMETRIC STANDARD

LOT # 09117

The quantity of energy evolved by combustion of Alpha Resources, Inc. benzoic acid, when burned using an IKA C 7000 [1] calorimeter is given below, where the mass is against brass weights in air [2]

26456 J/g ± 65 J/g
6319 I.T. cal/g ± 16 I.T. cal/g
11374 Btu/lb ± 28 Btu/lb

This value is the average of the combustion of 33 benzoic acid samples (Lot 09117). The precision value represents the 95% confidence limit (k=2) derived from analysis. The calorimeter was calibrated with NIST Standard Reference Material (SRM) 39j benzoic acid. The results of the tests indicated no significant difference between the heat of combustion values of NIST SRM 39j and Alpha Resources Inc. benzoic acid (Lot 09117).

Handling and Storage: Benzoic acid will not adsorb moisture from the atmosphere if the relative humidity does not exceed 90%. The heat of combustion of the sample will not change with time if adequate precautions are taken to avoid the introduction of impurities.

Expiration of Certification: This material has an indefinite expiration date.

[1] Bomb Conditions

- Measuring mode double dry (ISO 1928)
- Oxygen operating pressure 30 bar
- Combustion reaction is referred to 25 ˚C
- Approximately 1 gram sample of benzoic acid is combusted

[2] The reduction of weight in air to weight in vacuum results in a heat of combustion value of 26431 J/g for benzoic acid. This value uses the following assumptions:

- The density of benzoic acid at 25 ˚C is 1.320 g/cc.
- The density of dry air (1 atm and 20 ˚C) is 0.0012 g/cc.
- The density of brass is 8.4 g/cc.

In routine fuel testing with the bomb calorimeter, where an accuracy of not better than 0.1% is required, this buoyancy correction is generally not used.

This calibration standard is accredited and meets the requirements of ISO/IEC17025 as verified by the ANSI-ASQ National Accreditation Board. Contact Alpha Resources for details of our certification and scope of accreditation. 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.

Kent Dyer, Technical Manager, October 2010

P.O Box 199 3090 Johnson Road Stevensville, MI 49127 Phone (269) 465-5559 Fax (269) 465-3629
www.alpharesources.com