

Oat Flour Certified Reference Material

Product No: AR2026**Lot No: 240726**

Material and Intended Use

AR2026 is an oat flour certified reference material (CRM). The intended use of this CRM is for the verification and calibration of combustion and other appropriate analysis methods for the determination of carbon, nitrogen, and sulfur. This CRM can also be used to validate value assignment of in-house reference materials. A unit consists of one bottle containing 30 g of reference material as a fine powder. All reference materials should be verified as fit for purpose prior to use.

Instructions for Use

This product should be dried prior to use in a manner consistent with the analytical methods referenced below. The minimum sample size for analysis is dependent upon the test method and instrumentation used. Bottles of powder should be kept sealed tight and stored in a cool, dry location. Certified values are valid for 5 years from the initial date of certification if handling and storage instructions are followed. Certification is rendered null and void if the CRM is in any way modified or damaged.

Reported Values

Certified values indicate the amount of each element present in the overall material matrix and are metrologically traceable to the International System of Units (SI) derived unit of mass fraction expressed as a percent (%). Certified values are reported as the mean property value with an expanded uncertainty ($U_{95\%}$). The true value of the measurand is believed to lie within the expanded uncertainty coverage interval with 95% confidence. Expanded uncertainty is calculated by application of a coverage factor (k) to the combined standard uncertainty (u_c). For laboratory uncertainty budgets, the combined standard uncertainty can be calculated as $u_c = U_{95\%}/k$, where k is approximately equal to 2. The estimation of combined standard uncertainty (u_c) includes contributions from material homogeneity, primary calibrants, characterization, and other factors. Sampling and calculation of reported values for each measurand are performed using practices consistent with ISO 17034:2016 and ISO Guide 35. Certified values are accredited under Alpha Resources, LLC ISO/IEC 17025 and ISO 17034 certificates issued by ANSI National Accreditation Board (ANAB), AT-1200 and AR1920.

Table 1. Certified values for AR2026, Lot 240726.

Element	Certified Value	$U_{95\%}$	Method & Detection	n
%Carbon	46.2	1.9	Combustion/IR	30
%Nitrogen	2.14	0.21	Combustion/TC	30
%Sulfur	0.18	0.08	Combustion/IR or IC	30

Homogeneity

This product was manufactured using pulverizing, grinding, and mixing to minimize overall heterogeneity. Samples were randomly selected using practices consistent with ISO Guide 35 Section 7. Homogeneity was evaluated by replicate analysis. Within- and between-sample variance was evaluated using Analysis of Variance (ANOVA).

Methods and References

ISO 16948:2015 – Solid biofuels – Determination of total content of carbon, hydrogen and nitrogen

ISO 16994:2016 – Solid biofuels – Determination of total content of sulfur and chlorine

ASTM D5373-21 – Standard Test Methods for Determination of Carbon, Hydrogen and Nitrogen in Analysis Samples of Coal and Coke

ASTM D4239-18 – Standard Test Method for Sulfur in the Analysis Sample of Coal and Coke Using High-Temperature Tube Furnace Combustion

ISO/IEC 17025:2017 – General requirements for the competence of testing and calibration laboratories

ISO 17034:2016 – General requirements for the competence of reference material producers

ISO 33401:2024 – Reference materials – Contents of certificates, labels, and accompanying documentation

ISO Guide 30:2015 – Terms and definitions used in connection with reference materials

ISO Guide 35:2017 – Reference materials – General and statistical principles for certification

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