



PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

Perry Johnson Laboratory Accreditation, Inc. has assessed the Laboratory of:

BETA Analytic, Inc.

4985 Southwest 74th Court, Miami, FL 33155 USA

(Hereinafter called the Organization) and hereby declares that Organization is accredited in accordance with the recognized International Standard:

ISO/IEC 17025:2017

This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (as outlined by the joint ISO-ILAC-IAF Communiqué dated April 2017):

Measurement of Natural Levels of Radiocarbon by Accelerator Mass Spectrometry (AMS), Stable Isotope Ratios of Carbon ($\delta^{13}C$), Deuterium (δD aka δ^2H), Nitrogen ($\delta^{15}N$) and Oxygen ($\delta^{18}O$, $\delta^{17}O$) by Isotope Ratio Mass Spectrometry (IRMS) or Cavity Ring-down Spectroscopy (CRDS), and C:N Ratios, %C, %N by Elemental Analysis (As detailed in the supplement)

Accreditation claims for such testing and/or calibration services shall only be made from addresses referenced within this certificate. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation body's duty to observe and comply with the said rules.

For PJLA:

Tracy Szerszen
President

Initial Accreditation Date:

November 1, 2008

Issue Date:

July 17, 2020

Expiration Date:

October 31, 2022

Accreditation No.:

59423

Certificate No.:

L20-412

Perry Johnson Laboratory
Accreditation, Inc. (PJLA)
755 W. Big Beaver, Suite 1325
Troy, Michigan 48084

The validity of this certificate is maintained through ongoing assessments based on a continuous accreditation cycle. The validity of this certificate should be confirmed through the PJLA website: www.pjllabs.com



Certificate of Accreditation: Supplement

BETA Analytic, Inc.

4985 Southwest 74th Court, Miami, FL 33155 USA
 Contact Name: Ron Hatfield Phone: (01) 305.667.5167

Accreditation is granted to the facility to perform the following testing:

| FIELD OF TEST | ITEMS, MATERIALS OR PRODUCTS TESTED | SPECIFIC TESTS OR PROPERTIES MEASURED | SPECIFICATION, STANDARD METHOD OR TECHNIQUE USED | RANGE (WHERE APPROPRIATE) AND DETECTION LIMIT |
|-----------------------|--|--|--|--|
| Chemical ^F | Archaeological / Geological Materials and Water | Determination of Radiocarbon Age / Activity: Measurement of ¹⁴ / ₁₃ C, ¹⁴ / ₁₂ C, ¹³ / ₁₂ C | Determination of Radiocarbon Content by Accelerator Mass Spectrometry (AMS) | Range: From 43,500 years B.P. through present day (0.44 pMC to 198 pMC) Detection Limit: 43,500 years B.P. (0.44 pMC) |
| | Organic and Carbonate Materials and Water | Determination of Stable Isotope Ratios - Measurement of: δ13C, δ15N, δ18O, δ17O, δD C:N Ratios, %C, %N | Stable Isotope Ratios By Isotope Ratio Mass Spectrometry (IRMS) and Cavity Ring-down Spectroscopy (CRDS) by Elemental Analysis | Range: - 200 o/oo (per mil) to + 100 o/oo (per mil) Detection Limit: δ13C is 250 to 35 000 mV δ15N, δ18O, δ17O, δD is 1 000 to 35 000 mV |
| | Any Carbon Containing Material; Solid, Liquid or Gaseous Forms | Determination of the Biobased Carbon Content of Natural Range Materials: ¹⁴ / ₁₃ C, ¹⁴ / ₁₂ C and ¹³ / ₁₂ C | ASTM D6866 - Method B CEN/TS 16137: Annex D – Method D EN 16640: Annex E – Method B ISO 13833:Annex A ISO 16620-2: Annex D – Method C ISO 19984-2: Annex A – Method A | Range: 0.44 pMC to 198 pMC Detection Limit: 0.44 pMC |
| | Any Carbon-Containing Material; Solid, Liquid or Gaseous Forms And specifically for (SRF) Solid Recovered Fuels or (RDF) Refuse Derived Fuels | Determination of the Biobased Carbon Content of Natural Range Materials – Measurement of: ¹⁴ / ₁₃ C, ¹⁴ / ₁₂ C and ¹³ / ₁₂ C Determination of Bio-Carbon Content - Measurement of: ¹⁴ / ₁₃ C, ¹⁴ / ₁₂ C and ¹³ / ₁₂ C | ASTM D6866 - Method B CEN/TS 16137: Annex D – Method D EN 15440: Annex C EN 16640: Annex E – Method B ISO 13833: Annex A ISO16620-2: Annex D – Method C | Range: 0.44 pMC to 198 pMC Detection Limit: 0.44 pMC |



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|-----------------------|-------------------------------------|---|--|--|
| Chemical ^F | Water | Determination of Stable Isotope Ratios – Measurement of: $\delta^{15}\text{N}$ and $\delta^{18}\text{O}$ of Dissolved Nitrate | Isotope Ratio Mass Spectrometry (IRMS) | Range: 4 to 400 μM NO_3 in water Detection Limit: 10 nmol NO_3 |

1. The presence of a superscript F means that the laboratory performs testing of the indicated parameter at its fixed location. Example: Outside Micrometer^F would mean that the laboratory performs this testing at its fixed location.

