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The sources and the range of renewable content in biofuels: implications to the precision and accuracy of certification

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The need for alternative sources of fuel has motivated the search for production routes based on renewable materials that may equal the fossil options in efficiency and which are economically viable. For the fuel industry to adapt to this reality, it is necessary to size up the investment in new production plants and in the development of new technologies. Regulatory bodies are supposed to guide this process, defining parameters for the products and means for certification, especially during the transition period we have been living, in which mixtures of fossil and renewable fuels are the possible options to be marketed. In such context, it is important to review and evaluate aspects such as the different sources of biofuel, from an economical point of view, and the viability of aiming for large biofraction contents in different types of fuels. Brazil is a very relevant country in the use of cleaner energy because, as recently pointed out by Montoya et al. (2021), among several other authors, Brazilian energy matrix is three times cleaner than the global average, with renewable energy representing about 50% of the total energy in the country. Realistic biofraction values for the current fuel industry are in the average order of 10% bio, maximum 20%. Oliveira and Coelho (2017), for example, mention the difficulties that the Brazilian biodiesel program has had to reach viable 15%. Although the ASTM 6866 regulates the certification of renewable fractions in fuels and that Accelerator Mass Spectrometry is recognized by the scientific community as the gold standard for such measurements, there remains reluctance within the productivity sector to implement the 14C AMS technique for such purpose. This is due, on one hand to of the high costs of the method, and on the other hand to the lack of full understanding of the radiocarbon technique. Due to variations in 14C concentration in the atmosphere during the unknown year of the crops and a wide range of delta 13C in the unknown sources, for the sake of accuracy the ASTM 6866 standard foresee 3 percentage absolute uncertainty in the bio fraction determination. From the regulatory bodies' point of view, it is necessary to keep in mind the real purpose of encouraging the use of renewable sources, contributing to the environment effectively and responsibly. For example, a 2% biofuel can theoretically be introduced in a market situation in which 5%bio is proposed, considering the large error margin suggested by the ASTM standard. As shown by Norton and Devlin (2006) there is an important implication in the analysis of samples formed by different carbon sources related to the correction for mass fractionation. This is in particular relevant for carbon sources having large differences in terms of isotopic composition. Despite the importance of considering the significant variability of the biofraction results when there is no information about the origin of the analyzed compound, in the interests of accuracy, studying particular cases that represent the context of the biofuels market can be extremely useful. Considering the great demand for certification of partially biogenic products, it is possible to use alternative standards to different scenarios to ensure greater precision.

Montoya et al. 2021 https://doi.org/10.1016/j.jclepro.2021.127700
Norton and Devlin 2006 https://doi.org/10.1016/j.biortech.2005.08.017
Oliveira and Coelho 2017 https://doi.org/10.1016/j.rser.2016.10.060

Student Submission

No

Primary author: Prof. MACARIO, Kita (LAC-UFF (Radiocarbon Laboratory of the Fluminense Federal University), Physics Institute)

Co-authors: Prof. QUARTA, Gianluca (CEDAD (Centre of Applied Physics, Dating and Diagnostics), Department of Mathematics and Physics "Ennio de Giorgi" , University of Salento); Prof. CALCAGNILE, Lucio (CEDAD (Centre of Applied Physics, Dating and Diagnostics), Department of Mathematics and Physics "Ennio de Giorgi" , University of Salento); Ms ROCHA, Suellen (LAC-UFF (Radiocarbon Laboratory of the Fluminense Federal University), Physics Institute); Prof. TEIXEIRA, Marco Antonio (Department of Analytical Chemistry, Chemistry Institute, Fluminense Federal University)

Presenter: Prof. MACARIO, Kita (LAC-UFF (Radiocarbon Laboratory of the Fluminense Federal University), Physics Institute)

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