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Development of laboratory protocols for the analysis of biodiesel quality parameters

Luís M. Silva¹, Helder T. Gomes¹, António E. Ribeiro¹, Paulo Brito^{1*}

¹ Department of Chemical and Biological Technology, School of Technology and Management, Polytechnic Institute of Bragança, Campus de Santa Apolónia, PO Box 1134, 5301-857 Bragança, Portugal
*paulo@ipb.pt

The increasing population associated with the rising energy consumption and the limited fossil resources lead to the need to investigate sustainable energetic alternatives. Biofuels emerge this way as a key response to this necessity. Specifically, biodiesel is a suitable replacement for the conventional diesel, since it is a renewable fuel obtained via a transesterification process from raw materials such as vegetable oils, animal fats, waste cooking oils and algae oils. The use of this biofuel, besides bringing potential environmental benefits, also carries with it a wide range of technical and safety benefits, which present advantages over the conventional diesel cycle. However, the control of quality of the final biodiesel is fundamental and inevitable, since failure to comply with the parameters required by the standard norms may cause problems not only to the engine but also to any other car system component.

The production of biodiesel is an activity well established in a large number of higher education experimental courses. However, the characterization of the final product in those courses is not done routinely. Seeking to surpass this limitation, in this work we intended to develop reliable laboratory protocols focused in the implementation of selected characterization procedures of the European standard EN14214. In this standard, the quality parameters and respective methods of analysis are established to allow biodiesel commercialization without any risks to the final consumer. Therefore, in this work, biodiesel was produced from vegetable oils and selected quality parameters based on the European standard EN14214 were evaluated, namely the quantification of the content of methyl esters of fatty acids by gas chromatography (Figure 1), determination of density at 15°C, viscosity at 40°C, water content, acid value and iodine value. In addition, Fourier Transform Infrared Spectroscopy (FT-IR) analytical protocols were also developed to compare the produced biodiesel spectrum fingerprint with data found in the literature.

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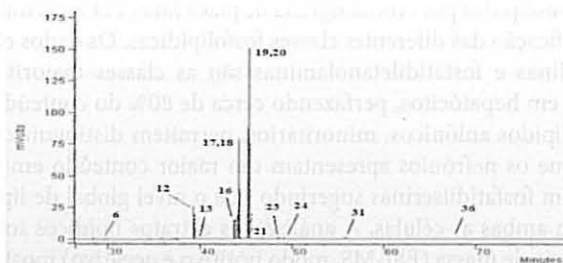


Figure 1: Example of a biodiesel analysis by GC-FID for sunflower biodiesel.

REFERENCES

- [1] Silva, L. *Processo de produção de biodiesel e análise de parâmetros de qualidade*, Dissertação de Mestrado; ESTiG-IPB: Bragança, 2014.