Nuclear Magnetic Resonance analysis of biofuels in Mozambique

Lucílio dos Santos Matias[a,c], Katherine Dunne[a,b], Belarmino Matsinhe[a,c], Alexandre M. Maphossa[a,c]

[a]Department of Physics, Stockholm University, SE-106 91 Stockholm, Sweden
[b]CERN, European Organization for Nuclear Research
[c]Department of Physics, Eduardo Mondlane University, Maputo, Mozambique

Contact name: Lucílio dos Santos Matias, E-mail: lucilio.matias@fysik.su.se

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Nuclear Magnetic Resonance (NMR) is probably the spectroscopic method that offers in a single analysis a greater number of spectroscopic parameters. Since high resolution NMR spectrometers need cryogenic temperatures to function, they are manufactured with a certain complexity and require several liters of liquefied helium (LH) to reach cryogenic temperatures in the order of -269 ° C (about 4 K). The Magnetic Resonance Imaging (MRI) camera is an example of this type of complex and expensive apparatus and its main function is to produce images of delicate organs such as the brain, spine, or the pelvic region, helping doctors to produce very important medical diagnosis. Magnetic Resonance Spectroscopy is an elegant tool to study the constituents of matter and can also be used in the study of biofuel [1-3].

In order to protect the environment and promote global well-being the use of clean energy has received attention. The production of biofuels is an integral segment in the clean energy chain and has the potential to significantly reduce the amount of global emissions.

Jatropha and macadamia biodiesel are among the biofuels produced in mozambique and may be analysed with NMR [4-6] and other Nuclear Physics techniques. The low resolution NMR has inreased its applications in the analysis and quality control of

biofuels [1].

A typical low resolution (LR) NMR benchtop spectrometer is LH free, and presents itself as a viable tool for rapid introspection of samples with spin $\neq 0$. Modern LR-NMR spetrometers may be equiped with a simple software and can be easily mounted on a laboratory table. ISO certified NMR techniques are employed in industry and research. The aim of this project is to analyze the oil content of nuts and oleic content of biofuels produced in Mozambique using low resolution NMR and other Nuclear Physics spectroscopic methods. Acquisition of a Fourier 80 MHz NMR spectrometer would be required for the implementation of this project.

References

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