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## Comparison of the density of Lio oil, biodiesel and diesel

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### ABSTRACT

*In our study, we report the measurement of the density of a vegetable oil: Lio, its biodiesel and diesel depending on the temperature, this measures were made between 20 and 60 °C. This study showed that the density of the biodiesel of the Lio oil decreases very remarkably compared to the density of the Lio oil before and after heating when the temperature increases. This decrease in the density of the biodiesel of the Lio oil allowed us to consider that it can be used as a biofuel instead of Diesel.*

**Keywords:** density, Lio oil, biodiesel, Diesel, temperature.

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### INTRODUCTION

The research for alternative fuels to replace petroleum-based fuels is currently a highly studied topic. Biofuel such as biodiesel and bioethanol are considered as suitable alternative to the traditional fuels.

Transesterification is the standard biodiesel production technique. It is a process in which vegetables oils, animals fats and microalgae based oils are cold-mixed with an alcohol (ethanol or methanol) in the presence of a catalyst (sodium or potassium hydroxide). The conversion of oils or fats into ethyl or methyl esters reduces the molecular weight to third of that of the oil, the viscosity of a factor of eight and the viscosity, and increases the volatility.

Vegetable oils are increasingly used in pharmacy, cosmetics etc ... Therefore, several studies have been conducted to assess the quality of the oil on the basis of their physical properties: viscosity, refractive index, electrical resistivity etc...Pace, Risman, Bengtsson and El-Shami [1] suggested that the electrical properties can be used as indicators of the state and quality of vegetable oils. Several researchers have worked on the chemical and physical properties of vegetable oils [2-9].

### MATERIALS AND METHODS

Vegetable oils have very low toxicity and excellent biodegradability. These qualities are due to the low of oxidation resistance and hydrolysis. These two characteristics have favorable eco-toxicological

### 1. Density variation

Density or volumetric mass provides information about the establishment, the oxidation state or polymerization. The hydrometers are cylindrical tubes of glass, hollow, graduated, weighted with lead shot, and immersed in liquids.

They are penetrated more or less deeply vertically, depending on the forces (downward due to its weight, and upward, due to buoyancy) opposed. The weight of the displaced fluid is equivalent to the volume of the displaced liquid (submerged volume of the hydrometer) that multiple density of the liquid.

The submerged volume of the hydrometer varies inversely to the density of the liquid. This means that the lower the density, the more the hydrometer will sink in the liquid sample.

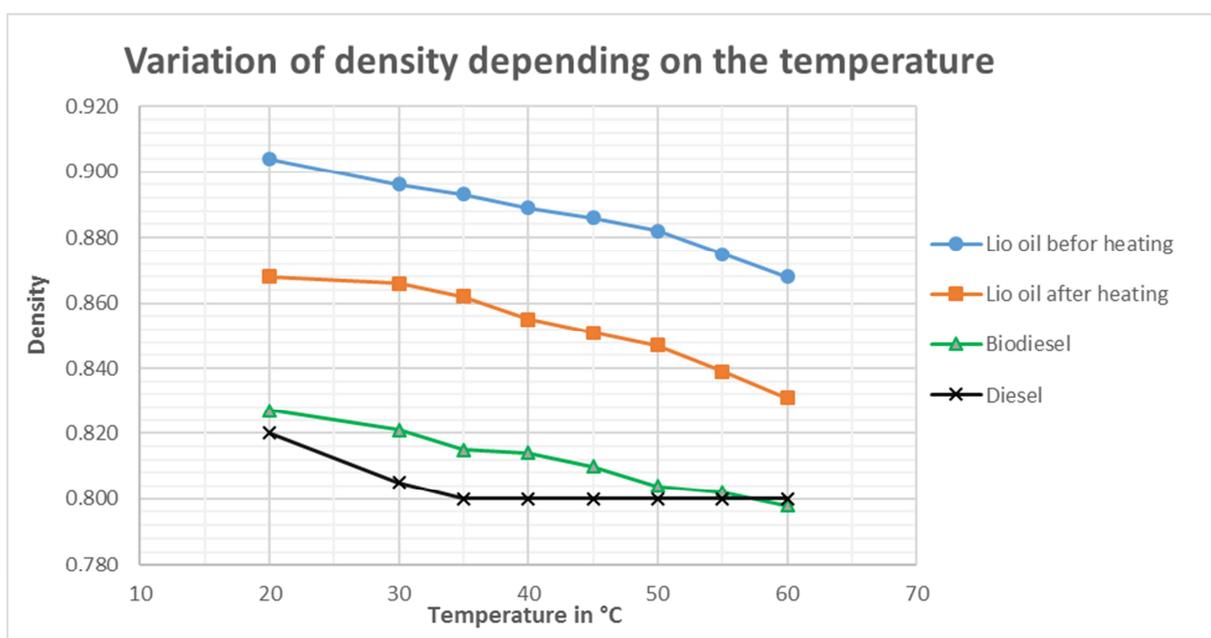


Figure 1: standard glass hydrometer weighted with lead

## RESULTS

The variation of the density of diesel, Lio oil and its biodiesel depending on the temperature were studied. The results obtained are shown in the figure 2.

Figure 2: Variation of density depending on the temperature of diesel, Lio oil and its biodiesel



The density of the oils decreases when the temperature increases, this diminution can be explained by:

- The various chemical changes that the oil undergoes during its heating.
- The orientation of the molecules, when the temperature increases, which promotes the passage of the current in the oil.

**CONCLUSION**

The study of the density of the diesel, Lio oil and its biodiesel, can be useful for an application in the technological field. This study allowed us to compare our results on the behavior of density depending on the temperature with those of other researchers working on the same research field.

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