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## Study of the density of Rapeseed, Lio and Nigella oils before and after heating.

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### ABSTRACT

In our study, we report measurements of the density of vegetable oils (Lio, Rapeseed, Nigél) and diesel fuel depending on the temperature. These measurements were made between 20 and 80 ° C. These measurements show that rapeseed oil decreases very remarkable as compared to other oils as the temperature increases.

**Keywords:** Density, Lio, Rapeseed, Nigél, diesel fuel, temperature.

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## INTRODUCTION

The density is an important feature, especially for biofuels, as it determines the design and technological features of feeders (pumps, injectors); more on a system installed, the use of different density of biofuels would result changes in a combustion setting with implication for maximum power, efficiency and emissions of pollutant.

Vegetable oils are aromatic organic substances liquid found naturally in various parts of trees, plants, spices, etc. They are highly concentrated, volatile, non-oily and susceptible to decomposition under the effect of heat. So vegetable oil is a product obtained from the transformation of organic plant matter, for example rapeseed oil. They 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, density, refractive index, electrical resistivity, etc. Pace, Risman, Bengtsson et al [1] suggested that the electrical properties can be used as indicators of the status and quality of vegetable oils. Several researchers have worked on the chemical and physical properties of vegetable oils [2-5].

Vegetable oils are generally very low toxic substances and have excellent biodegradability, these oils can also be seen as alternatives to mineral oils.

## MATERIAL 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 profile.

### 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 and vertically, depending on the opposed forces (downward due to its weight, and upward due to the buoyancy). 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 AND DISCUSSIONS

We studied the variation in density depending on the temperature of vegetable oils: Rapeseed, Lio and Nigella before and after heating. The results obtained are shown in Fig 2.

Density measurement

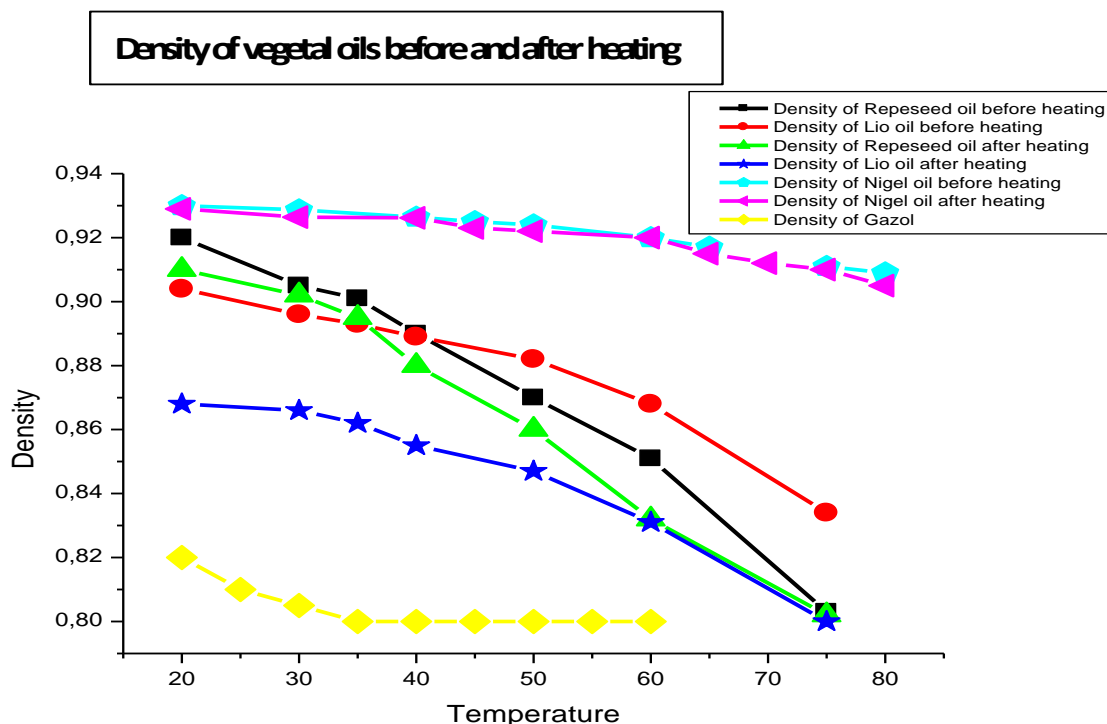


Figure 2: Density variation depending on the temperature of the oils before and after heating

The density of oils decreases with the increasing of the temperature, it can be explained:

- The various chemical changes experienced by the oil upon heating.
- The orientation of the molecules, as the temperature increases, which promotes the passage of current in the oil.

CONCLUSION

The study of the density of rapeseed oils; Nigella, Lio and diesel, can be useful for application in technology (insulation, transformer.). This study allowed us to compare our results on the behavior of the density depending on the temperature with those of other researchers working on the same research topic.

REFERENCES

- [1] Pace et al. 1968; Risman et Bengtsson 1971; El-Al Shami et. 1992
- [2] Z. Charrouf. Valorisation de l'arganier, résultats et perspectives ; in :Collin G. Garneau F-X 5è me colloque Produits naturels d'origine végétale. Proceeding Actes du colloque de Sainte Foy (Québec)4. au 9 août 2001. Laboratoire d'analyse et de séparation des essences végétales. 2001 Université de Québec.
- [3] F. Khallouki, C. Younos, R. Soulimani, T. Oster, Z. Charrouf , B. Spieglerhalder, H. Batsch et R.Owen, Consumption of argan oil (Morocco) with its unique profile of fatty acids, tocopherols, squalene, sterols and phenolic compounds should confer valuable cancer chemopreventive effects, Eur J. cancer prev. 2003, 12 : 67-75.
- [4] Norme marocaine homologuée de corps gras d'origines animale et végétale, huiles d'argane N M08.5.090. Ministère de l'Industrie, du Commerce, de l'Energie et des Mines 2002.
- [5] M. Charrouf. Contribution à l'étude chimique de l'huile d'Arganiaspinosa (L.) (Sapotaceae). Thèse Sciences Univ. de Perpignan. 1984.