Available online atwww.scholarsresearchlibrary.com

Scholars Research Library

Archives of Applied Science Research, 2016, 8 (2):11-13
(http://scholarsresearchlibrary.com/archive.html)

ISSN 0975-508X
CODEN (USA) AASRC9

Comparison of rapeseed oil density with nigella oil before and after heating

Oumaima Dahass, Asma Kafih, Merieme Raqba, Taoufik Dahass, Maryem Belgharza, Aicha Bouchador and Mohamed Alaoui El Belghiti

Laboratoire de Chimie Physique Générale, Département de Chimie, Université Mohammed V, Faculté des Sciences, Avenue Ibn Batouta, Rabat

---

ABSTRACT

well as density and related to the viscosity of vegetable oils are known which implies that to see if oil can function as a lubricant simply knowing its density, so our present study we do the measurement of the density of two oils (rapeseed and nigella), and the results showed that rapeseed density decreases very dramatically depending on the temperature increase unlike the nigella , and we know very well that the oil nigella and expensive compared to rapeseed oil so we can not consider nigella oil as a good lubricant.

INTRODUCTION

The concept of green chemistry [1] was launched in order to "support the design of products and processes that reduce or eliminate the use and formation of hazardous substances." These eco-design rules sometimes seem binding but they can become profitable, especially for chemists and industrialists. Green chemistry principles tend towards more environmentally friendly methods of synthesis and use of renewable raw materials [2].

Some plant oils have similar electrical and thermal properties, even better than those of current dielectric liquid with superior environmental performance. In transformers, stable, inert liquid, having good electrical and thermal properties needed outside this liquid must be non-toxic to the environment and readily biodegradable [3].

Olive oil was used as a lubricant as long ago as 1650 BC. Various oils obtained from olive, rapeseed, castor beans, palm oil, and the fats from sperm whale, animal lard, and wool grease were used from the time of AD 50 until the early 19th century. These natural oils had limited stability. The Industrial Revolution of the late 18th century and its expansion into the 19th century stimulated the need for inexpensive, thermally and oxidative stable lubricants. Serious efforts were initiated in the 1930s to develop synthetic lubricants for operation over wide temperature ranges. Today, vegetable oils are drawing attention as biodegradable alternatives for synthetic esters as they are less expensive and are available from renewable sources.[4]

The world market for environmentally friendly lubricants is poised to grow in the next year. The greatest demand will be in Europe and Canada, countries with the utmost environmental awareness and regulation. The lubricant industry could take advantage of oilseed biotechnology to produce high-performance base oils that are compatible with the current stable of additives used in the lubrication industry. Selection of vegetable oils for this industry will rely upon the oils having relatively low cost, acceptable low-temperature properties,and acceptable oxidative and thermal tability. Compatibility of certain additives for particular applications will be essential to complete the product package. Vegetable oils with IV of 50–130 are ideal for hydraulic fluids. Below 50, fluids have high pour points due to lack of unsaturation, and above 130, oils tend to be oxidatively unstable. Fatty acids contained in some vegetable oils, for example palm oil, tend to cling to metal surfaces more effectively than mineral oils and therefore provide improved lubricity. [4]

MATÉRIALS AND METHODS

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 toits 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

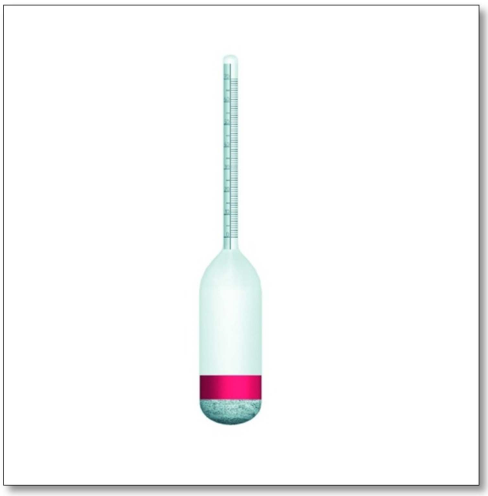

Figure 1: Standard glass hydrometer weighted with lead

Density is an important physical characteristic of any substance, and is a measure of the mass per unit of volume of that substance. It is an accepted fact that vegetable oil density decreases linearly with increasing temperature. This relationship can be expressed mathematically as [5],

r ¼ a þ b,T (1)

where r is the density expressed in g cm3 , T is the temperature expressed in C, a is the intercept and b is a negative slope.

RESULTS AND DISCUSSION

According to the figure below Rapeseed oil before and after heating to the advantage of having a lower density compared to Nigella oil.

Oils of densities are observed that decrease with increasing temperature, this reduction can be explained by different chemical changes experienced by the oil upon heating. By the orientation of the molecules when the temperature increases, thereby increasing the current flow in the oil.

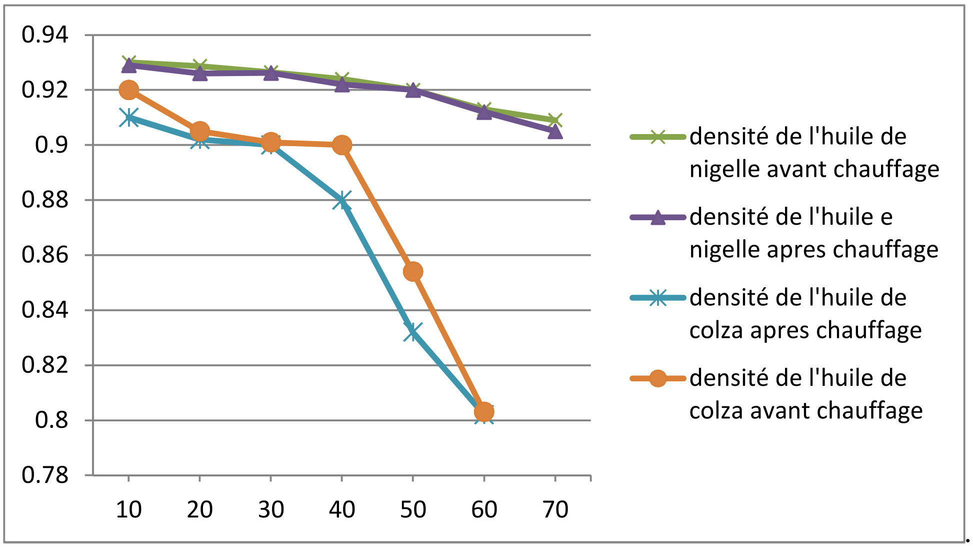

Figure 2 : Nigel densities and rapeseed oils before and after heating

CONCLUSION

The study of the density of rapeseed oils and Nigella compared before and after heating, can be useful for application in technology (biofuels and lubricants). This study allowed us to compare our results on the behavior of the density as a function of temperature with those of other researchers working on the same research topic.

RÉFÉRENCES

[1] Bozell J.J., Patel M.K., Feedstocks for the Future – Renewable for the Production of Chemicals and Materials, Edition American Chemical Society, **2006**.
[2] Anastas P.T., Warner J.C., Green chemistry theory and practice, Edition Oxford University press, **1998**.
[3] Baumann H., Bühler M., Fochem H., Hirsinger F., Zoebelein H., Falbe *J., Angew. Chem. Int. Ed. Eng*., **1988**,
[4] Ilija Gawrilow, Vegetable oil usage in lubricants, November **2004**, Volume 15 (11).
[5] Rodenbush CM, Hsieh FH, Viswanath DS. Density and viscosity of vegetable oils. *J Am Oil Chem Soc* **1999**;76:1415e9,