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Study of the electric resistivity of Vegetable oil: Argan, Avocado and Olive

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SUMMARY

The objective of this study is to analyze the behavior of the electric resistivity versus to the temperature, for three vegetable oil: the oil of the Argan, Avocado and Olive. This study showed that the electric resistivity decreases when the temperature T increases (25 100 C °). We attributed this decrease is due to the effect of the thermal motion on the disorientation of the molecules of the oil.

Keywords: electric Resistivity, Temperature, Oil of the Argan, Avocado and Olive.

INTRODUCTION

The electric properties of oil depend on their chemical and molecular composition. The resistivity and the dielectric rigidity are the main electric characteristics of a substance. The electric conductivity of an oil is due to the presence of the free loads, and under the influence of an electric field, these loads move to give so an electric current .The electric resistivity σis the opposite of the electric conductivity.

Vegetable oil is more and more used, in pharmacy, in cosmetic etc. Consequently, several studies were realized to estimate the quality of the oil on the basis of their physical properties: viscosity, refractive index, electric resistivity etc…Pace, Risman, Bengtsson and El-Al Shami[1] suggested that the electric properties can be used as indicators of the state and the quality of vegetable oil. Several researchers worked on the chemical and physical properties of vegetable oil [2 -3-4- 5]

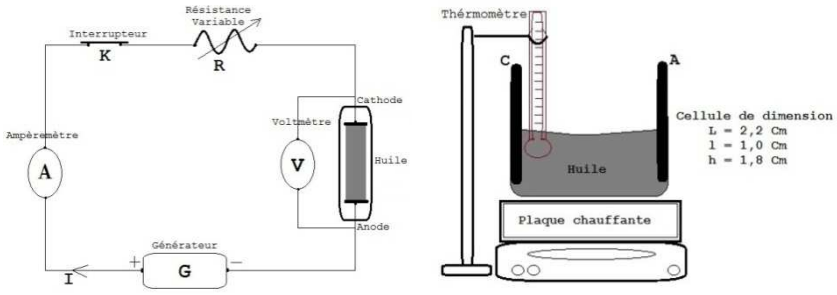
Vegetable oil is usually very low of toxic substance and has an excellent biodegradability; those type of oil can also be perceived as alternatives for mineral oils and base oils. Those qualities are due to low in particular to low oxidation and hydrolysis resistance. They are also as important as fossil as fuels. **[**6-7]

MATERIALS AND METHODS

We have used the resistivity measurement techniques called "colon": the electrical resistance of the oil is determined by measuring the current and the potential difference (pd) between two electrodes which are mounted on the cell.

1.1. Materials :

Cell used to measure the electrical resistivity.



a. Construction Equipment
b. cell for measuring electrical resistivity

1.2. Methods :

a) We use the following formula to calculate the electrical resistivity ρ:

$$\rho = R \times \frac{S}{L}$$

Where ρ is: resistivity (Ω.cm) ; S : the section (cm²); L : the length (cm)

S= l x L ; l =1.1cm ; L= 2.2 cm (distance between the two electrodes).

b):resistivity variation of vegetable oils is analyzed using Arrhenius application

$\rho = \rho_0 \exp(Ea/RT)$

with ρ as resistivity ρ_0 the pre-exponential factor Ω / m), Ea energy activation (J / mol); R perfect gas constant (J / mol / K), and T is the temperature (K). The value of ρ_0 may be approached as the infinite resistivity to temperature (ρ_0 de $\rho\infty$), The equation (1) can be rewritten as follows a long with the equation $\ln(\rho) = \ln(\rho_0) + (Ea/RT)$

The objective of this work is to adapt our results by the equation of Arrhenius, and to determine from this modeling, the physico-chemical characteristics of the studied oil.

RÉSULTS AND DISCUSSION

The measures of the electric resistivity of vegetable oil are represented on the figure 1

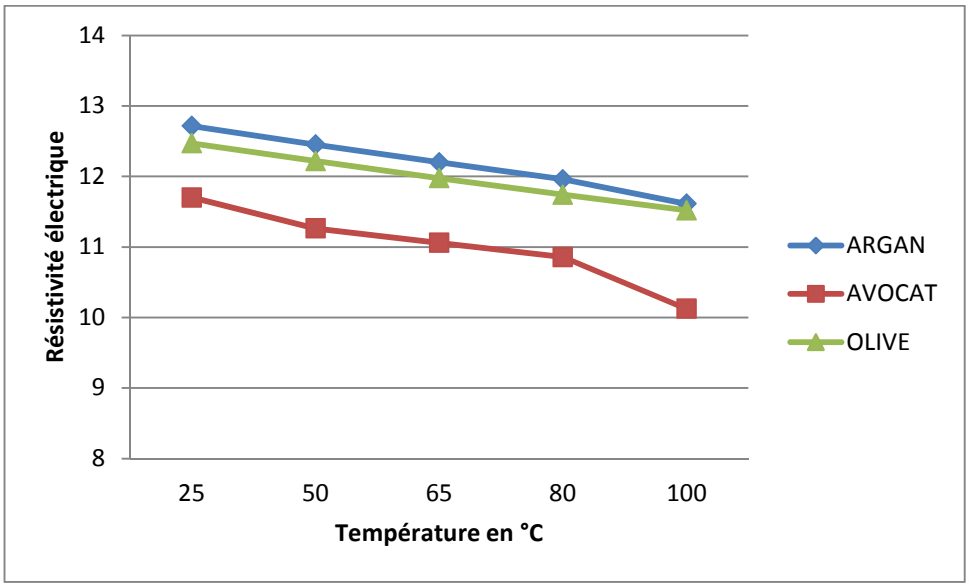


Figure 1 :electric Resistivity of vegetable oil (Argan, Avocado)and Olive) versus to the temperature of oil (in 10^6 Ω.cm)

Resistivity modelisation of oil (argon ,avocado,olive)

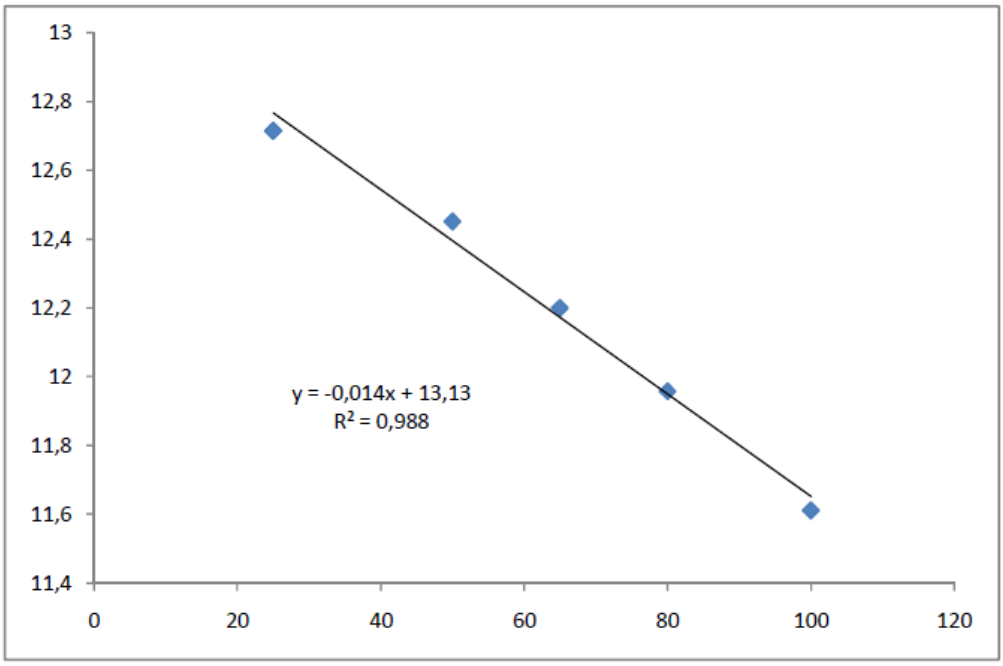


Fig :1. Résistivité électrique en fonction de la température de l'huile d' ARGAN, (en $10^6\Omega.cm$)

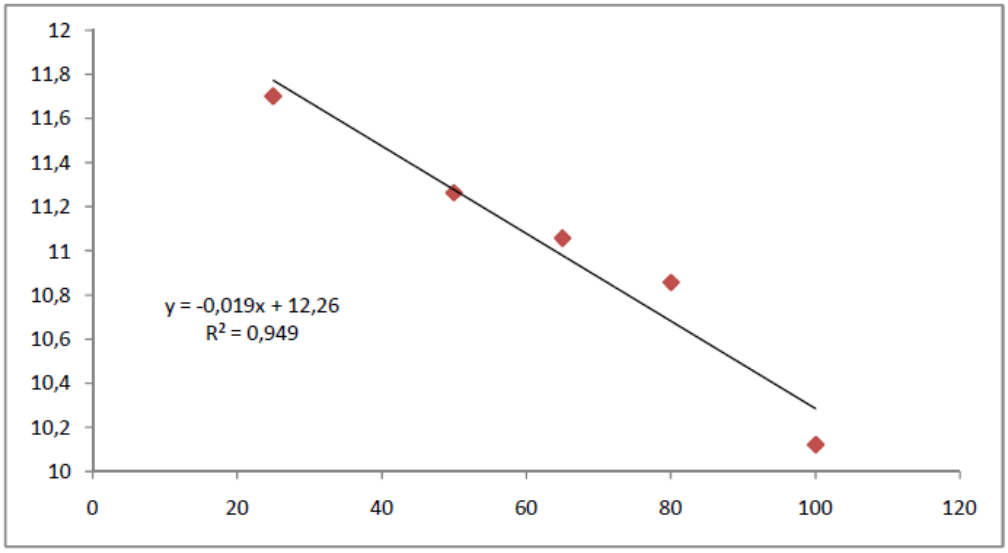


Fig : 2. Résistivité électrique en fonction de la température de l'huile d'AVOCAT, (en $10^6\Omega.cm$)

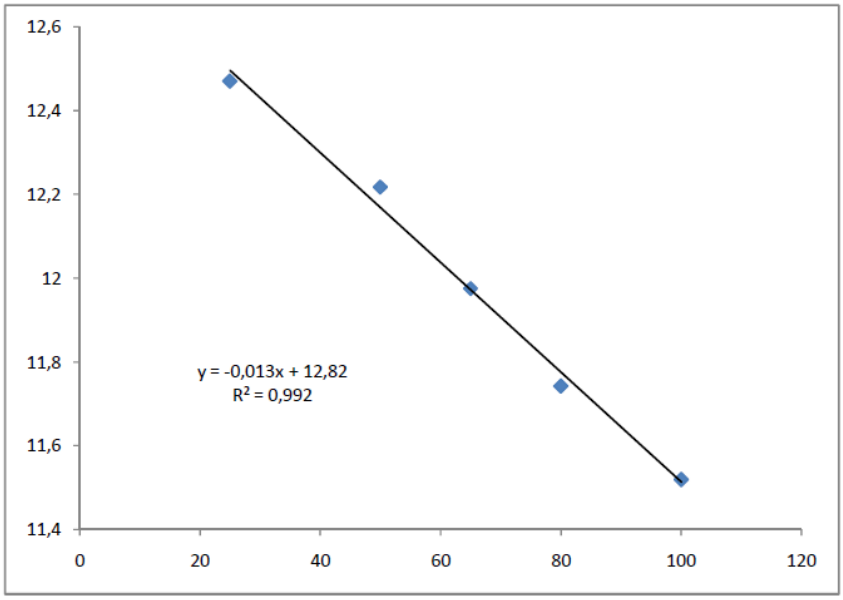


Fig : 3 Résistivité électrique en fonction de la température de l'huile d'OLIVE, (en $10^6\Omega$.cm)

To explain this change we cite the following:

- Oil's chemical variations
- Molecule's orientation which helps the current flow oil

As it was predicted by Arrhenius equation the resistivity of three vegetable oils, Argan, avocado and olive oil decreases with the temperature.

The energy of activation, as well as the pre-exponential term was obtained. These results can be used as a way of characterizing the quality of the oil. These values depend on the nature of the oil.

CONCLUSION

The increase of oil the electric conductivity which we studied is favored by the increase of the temperature. This subject was already studied by several authors and that allowed us to compare our results.

Thus the results we got allowed us to conclude that the change oils electric measures of oil in function of temperature may be used as a degradation indicator of the alimentary quality of high-temperature oils

The aim of our research which is oil physico-chemical measures of oil it is to give important information according to the quality this might be, just the beginning as we intend to work more on viscosity and thermal conductivity respect to temperature.

RÉFÉRENCES

[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 5èmecolloque 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 deQuébec.
[3]. F. Khallouki, C. Younos, R. Soulimani, T. Oster, Z. Charrouf , B. Spieglehalder, H. Batsch et R.Owen, *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).ThèseSciences Univ. de Perpignan.**1984**.
[6]. YILMAZ, N. B. (**2011**). *Biomass Bioenerg*, 35(5), 2028 e 33.
[7]. Nwafor, O. (**2003**). *Renew Energ*, 28(2), 171 e 81.