Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Der Pharmacia Lettre, 2016, 8 (4):62-64
(http://scholarsresearchlibrary.com/archive.html)

ISSN 0975-5071
USA CODEN: DPLEB4

Study of the electrical resistivity of several vegetable oils: Nigella, Olive, Argan, Prickly pear and Palm

Assia Slita, Nadia Filali, Larbi El Hammari, Imane Hassanain, Aicha Sifou, Sanaâ Saoiabi, M. Elazzouzi and Mohamed Alaoui El Belghiti

Laboratoire de Chimie Physique Générale, Département de Chimie, Université Mohammed V, Faculté des Sciences, Avenue Ibn Batouta, BP 1014 Rabat.

ABSTRACT

The objective of this study is to analyze the behavior of the electrical resistivity versus temperature for several vegetable oils : Nigella oil, olive oil, argan oil , palm oil and prickly pear. This study showed that the electrical resistivityρ decreases as the temperature T increases (25 -100 ° C). We attributed this decline to the effect of thermal agitation of the molecules disorientation oil.

Key words: Electrical resistivity, Temperature, Nigellaoil, Prickly pear, Olive oil, Arganoil, Palm oil.

INTRODUCTION

To be insulating, liquid must drive the least possible electrical current when a voltage is applied to it, its conductivity σ should be as low as possible or conversely, its resistivity ρ(Ω.m) must be as strong as possible ($\rho = 1/\sigma$)

The conductivity of an insulating liquid is due to the presence of free charge under the effect of an electric field. The move of charges causes conduction current.

Contrary to the permittivity that is exclusively a feature of constitution of the oil (intrinsic),.the resistivity is highly dependent on packaging property. Thus, the resistivity of the oil is influenced by the presence of foreign substances considered as impurities (dust, particles, gases, moisture). That even as little as a few ppm influence the measured values.

The higher is the temperature, the lowest is the viscosity of the liquid and the ion mobility is high [1], and therefore more high conductivity. Furthermore, the separation of separable impurity ions is greater when the temperature is high. The resistivity of a liquid decreases as the temperature increases.

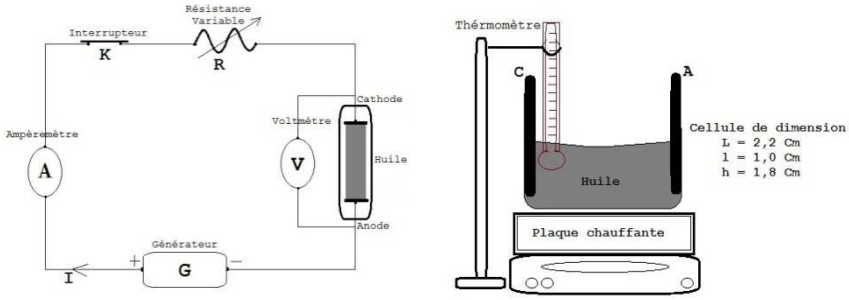
Vegetable oils are increasingly used in pharmacy, cosmetics etc ... Therefore, several studies have been conducted to assess the quality of the oil on the basis of their physical properties: viscosity, refractive index, resistivity electrical etc. Paceand al [2] suggested that the electrical properties 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 [3, 4, 5,6].

MATERIALS AND METHODS

Materials

Vegetable oils have generally a very low toxicity and an excellent biodegradability. These qualities are due in particular to the low resistance of oxidation and hydrolysis. These two characteristics are conducive to the eco-

toxicological aspects, plant oils are already used in distribution transformers and their attempts are being made to expand their use in power transformers [7].



(a): Construction of the used apparatus (b): measuring cell resistivity

Methods:

• Measurement of the electrical resistivity of vegetable oils:

We used the following formula to measure the electrical resistivityρ:

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

Where:ρ is the resistivity (Ωcm.) S is the section (cm ²) and L is the length (cm)

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

RESULTS AND DISCUSSION

The measurements of the electrical resistivity of vegetable oils are shown in Fig.1.

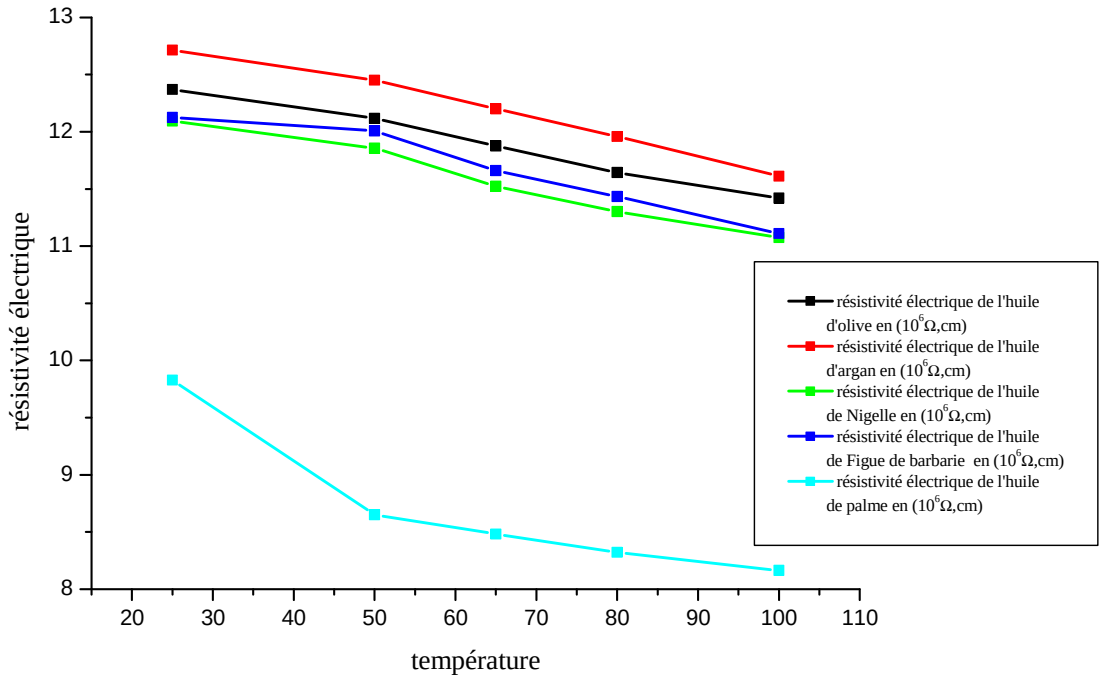


Figure 1: Electrical resistivity of vegetable oils (Nigella , Olive, Argan, Prickly pear , and Palm.)

The causes to explain the change of the decrease in electrical resistivity as a function of the temperature are:

- ✓ Different chemical changes occurring oil.
- ✓ The orientation of the molecules (decrease in viscosity) which facilitates the passage of current in the oil.

CONCLUSION

The increase of the oils in electrical conductivity is promoted by the increase of the temperature.

The research works of several authors who have studied this subject have allowed us to compare the electrical properties of our samples with those obtained by these researchers.

Thus, the results we obtained in our study allowed us to the conclusion that change electrical measurements oils, depending on the temperature, can be used as a leading indicator of deteriorating food quality to high oil temperature.

The interest of our study which is the physico-chemical measurements of oils, give us very important information about the quality of the oil studied, our next perspectives in the same subject are to measure the viscosity and the thermal conductivity according to the temperature.

REFERENCES

[1] B.P. KANG,‹‹ Thermal dependencyof viscosity, power factor and ions content of electricalinsulating oil››, *IEEE Transactions on Power Apparatus and Systems,(USA)* 9.September **1965**.
[2].Pace et al. 1968; Risman et Bengtsson 1971; El-Al Shami et. **1992**
[3].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
[4].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.
[5] 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**.
[6] M. Charrouf. Contribution à l'étude chimique de l'huile d'Arganiaspinosa (L.) (Sapotaceae). Thèse Sciences Univ. de Perpignan.**1984**.
[7] A. Darwin , C. Perrier and P. Foliot , "The use of natural ester fluids in transform" , Proceedings of MATPOST conference , Lyon (France) , Paper 0036, November 15-16 , **2007**.