Characterization of Deterioration of Edible oils using photo spectrometer over wide range of wavelengths

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Abstract: This paper deals with characterization of Deterioration of Edible oils using photo spectrometer over wide range of wavelengths. The oxidative Deterioration sensing characteristics have been evaluated for three different samples of edible oil, namely Sunflower, Palm and Ground nut oil at room temperature. The sensing mechanism of such a sensor material is based on measuring the absorption coefficient of vegetable oils using Spectrophotometer. The variation of the absorption coefficient of vegetable oils with the wavelength is studied.

Furthermore, attempts have been made to correlate variation of absorption coefficient due to oxidative Deterioration for old and new samples of oil (Sunflower oil it is minimum and for palm oil it is maximum). Thus; the most important application of the present method is to verify the quality of edible oil under oxidative Deterioration conditions.

I. INTRODUCTION

Vegetable oils are used as salad oils, cooking oils, spreads and ingredients in several foods. The price of vegetable oil may vary considerable from time to time, depending on production costs and availability. Due to economic importance of oils and fats it is vital to develop methods to confirm authenticity, to detect adulteration and to define the composition of blends. The biggest problem with deterioration of edible oil is rancidity and the main cause of rancidity is oxidation. The most common analytical assessments of oxidation are provided in terms of Peroxide value, Anisidine value, and Totox value. It is now generally agreed that the deterioration (decomposition) of oils and fats, whether due to the action of air, light and moisture, or the action of micro-organisms, is an oxidative process subsequent to partial hydrolysis. In these two forms of rancidity that of pure fats (where the absence of nidus prevents bacterial or mould growth) and that caused by micro-organisms; the course of the oxidation is not the same. Much has been written on the deterioration of pure oil when exposed to atmospheric conditions, eventually acquires the characteristic odour under such conditions but not any instant specific technique to identify deteriorated oil is reported in the literature [1-4]. When subjected to decomposition, however, it gives rise to a pungent "perfume" or ester-like odour quite different from that already noted.

The absorption coefficient of vegetable oils was determined using Spectrophotometer. The variation of the absorption coefficient of vegetable oils with the wavelength is studied. Data indicates that the absorption coefficient of the vegetable oils varies with wavelength. It can be observed that the palm oil has the highest absorption coefficient among the oils tested followed by groundnut oil, sunflower oil. The variations of the absorption coefficient in the range of wavelength studied were maximum for the palm oil and least for the sunflower oil.

II. EXPERIMENTATION

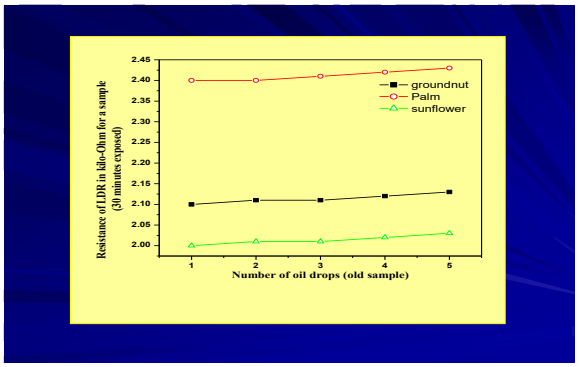
This method measures the oxidative Deterioration in terms of absorption coefficient and converts it to calibrated readings of oil Deterioration. The absorption coefficient of vegetable oils was determined using Spectrophotometer. The variation of the absorption coefficient of vegetable oils with the wavelength is studied.

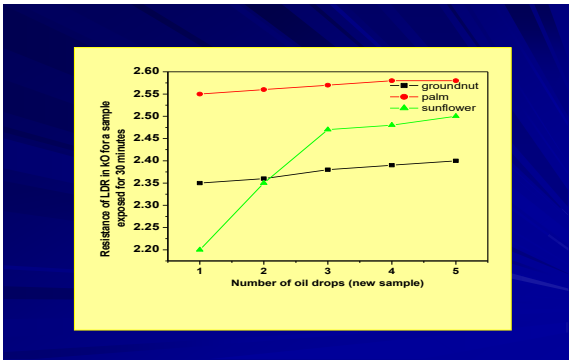
For initial testing, cuvate is filled with distilled water and then with different types of edible oil samples, normally three- four cycles are taken for each sample. The light passes through the oil samples and measures the absorption coefficient of sample over a range of wide range of wavelength range which is observed to be minimum for sunflower oil and maximum for palm oil sample. The value of absorption coefficient is less for old sample and more for new samples. The data is then calculated and converted further into different sensor specifications. [5-6].

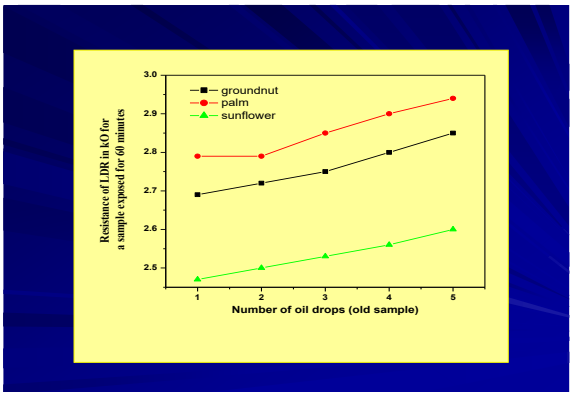
The purpose was to review the advances in the oil moisture measuring techniques and to consult on the procedures for adopting oil adulteration measurement techniques in the future research.

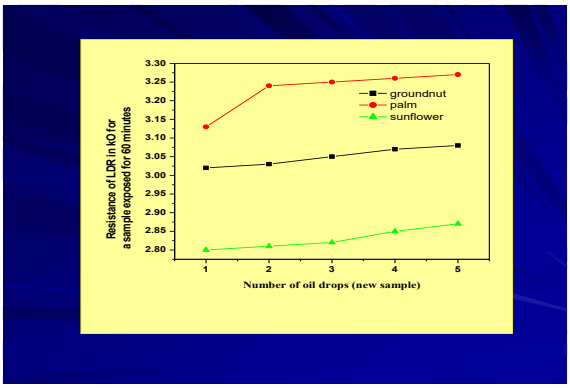
III. RESULTS AND DISCUSSION

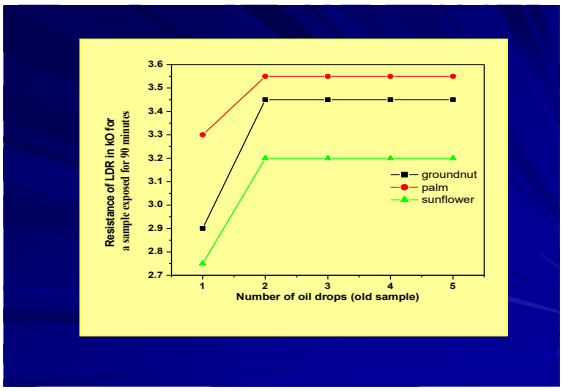
From fig. 1(A), it is seen that the absorption coefficient which is minimum for sunflower oil and maximum for palm oil sample. This indicates that the moisture react is more with sunflower oil as compared to the Ground nut and Palm oil.

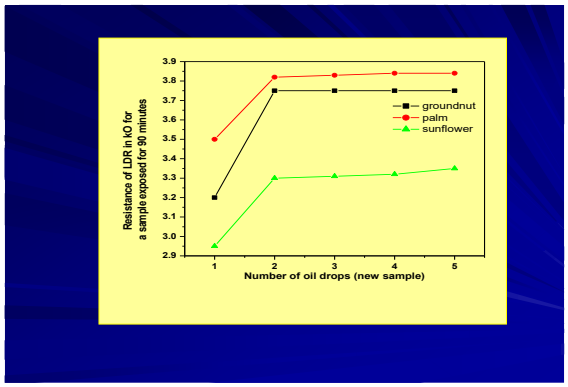


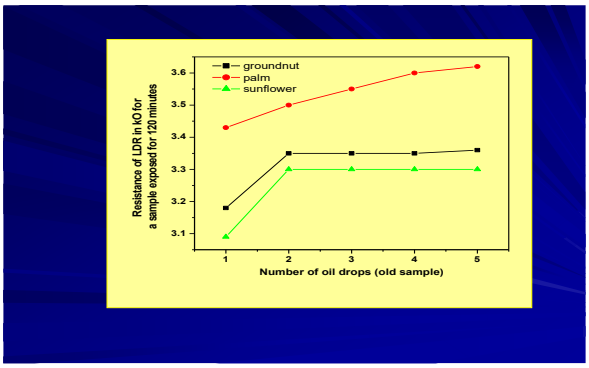


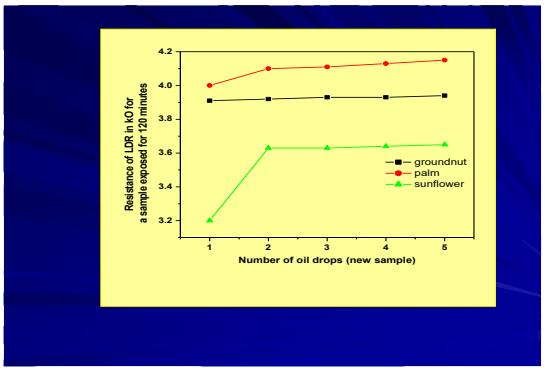












It is also seen from fig.2 the value of absorption coefficient is less for old sample and more for new samples. In case of sunflower oil it is minimum in both the cases in every day exposure as compared to the Ground nut and Palm oil. This reveals that the oxidation of Sunflower oil is more Sunflower oil (0.27, 0.20), as compared to both [Ground nut oil (0.29, 0.28) and Palm oil (0.38, 0.30)] oils.

IV. CONCLUSION

It is concluded that the absorption coefficient of sample over a range of wide range of wavelength range which is observed to be minimum for sunflower oil and maximum for palm oil sample Sunflower oil (o.27, o.20), as compared to both [Ground nut oil (o.29, 0.28) and Palm oil (0.38, 0.30)]. The value of absorption coefficient is less for old sample and more for new samples.

REFERENCES

[1] Wee-Sim Choo, John Birch, Jean-Pierre Dufour, “Physicochemical and quality characteristics of cold-pressed of flaxseed oils” Journal of Food Composition and Analysis 20 (2007) 202–211.

[2] Eunok Choe and David B. Min “Mechanisms and factors for edible oil oxidation” Comprehensive reviews in food science and food safety, Vol.5, 2006, 169-186.

[3] Mayne R. Coe and J. A. Leclebc “Photochemical studies of rancidity peroxide values of’ oils as affected by selective light”, Journal of Industrial and Engineering Chemistry, 26(1934) 245-48.

[4] Doaai Osman et al “Comarative study on electrical properties of alkyl benzene-insulating mineral oil mixtures, Oriental Journal of Chemistry, 22 (2006) 469-480

[5] P.S. More et al " High-performance temperature-selective SnO_2:Cu based sensor" Materials letters Vol. 57 (2003) 2177-2184.

[6] P. S. More et al " Effect of variation of sintering temperature on gas sensing characteristics of SnO_2:Cu system (Cu = 9 wt.%) system" Materials letters,58,(2003) 205-210.