

Characteristics Of Changes In Polarization Angle In Virgin Coconut Oil (VCO) And Olive Oil Using A Diode Laser With A Wavelength Of 532nm

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Abstract – Research on the characteristics of changing the polarization angle using a diode laser with a wavelength of 532nm has been carried out. The samples used in this study were olive oil and VCO. In this experiment, we observed a change in the polarization angle using a laser. The results obtained from this study indicate that olive oil and VCO have different characteristics as seen on the graph which has different peaks, and both of these oils have optically active and non-linear strengthening properties seen from the graphs of VCO+VCO and olive oil+olive oil. which is compared with single VCO and single olive oil

Keywords – polarization angle, VCO, Olive oil

I. INTRODUCTION

Two types of coconut oil are known in the market, namely, coconut cooking oil and Virgin Coconut Oil (VCO). Where coconut oil with the type of cooking oil is coconut oil extracted from the results of the RDB (Refining, Deodorizing, and Bleaching). Meanwhile, VCO-type coconut oil is coconut oil made from fresh coconut without going through RDB. Where one type of VCO coconut oil is Herco Coconut Oil [1].

Cooking oil is one of the optically active ingredients because it has a chiral molecular structure, namely a molecule that has a carbon atom (C) that binds four different atoms [2]. Identification of active optical properties using Malus's Law can be measured using two polarizers. The first polarizer functions to convert unpolarized light into polarized light, while the second polarizer is referred to as an analyzer because it is useful for analyzing the intensity of polarized light resulting from the first polarizer [3].

Subjects that generally already have active optical properties are a solution of sugar and cooking oil. The quantity in the measurement of the change in polarization can be used as an indication of the high and low quality of subjects with optically active properties [4]. To determine the quality level of a material using the polarization method, research has been carried out that shows the subject of a sugar solution can rotate the plane of polarization and the value of the change in angle is linear with its concentration [5]. The biggest change in polarization angle describes the lowest oil quality [6].

In this study, the characteristics of changes in the polarization angle were carried out using natural polarization of diode laser light with a wavelength of 532nm which was passed on to samples of virgin coconut oil (VCO) and olive oil. Then an analysis of the results obtained will be carried out on changes in the polarization angle. This study aims to obtain the characteristics of light polarization in olive oil and Virgin Coconut Oil (VCO).

II. METHOD

The equipment used in this study consisted of a polarizer, an analyzer, a light source using a green diode laser with a power of 5 mW and a wavelength of 532 nm, and a cuvette. While the materials used are Virgin Coconut Oil (VCO) and Olive Oil. The first research procedure was to prepare the instrument and arrange the tool as shown in Figure 1. The next stage is sample testing by observing changes in the polarization angle of the sample using the transmission polarization method.

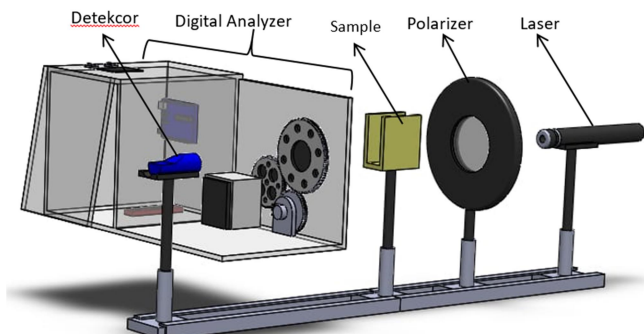


Fig. 1. Schematic of the light polarizer

III. RESULTS AND DISCUSSION

Figure 2 shows the change in polarization angle in olive oil and VCO. As seen in the graph for olive oil there are 2 peaks, namely at an angle of 30° and 60°. Then the VCO shows that there are two peaks but the peaks are almost the same height as olives, namely at an angle of 30° and 60°. This is because there are characteristics of triglyceride molecules in each oil solution, where the asymmetrical content of these molecules in cooking oil makes it optically active.

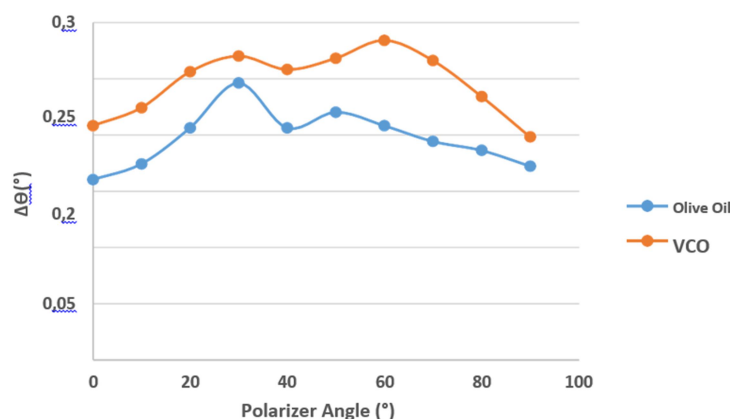


Fig. 2. Changes in the polarization angle of olive oil and VCO

This study shows the results of different values of changes in the polarization angle in the two samples, namely Olive Oil and Virgin Coconut Oil (VCO) solutions. In a previous study by Firdausi (2015) where triglycerides in a mixture of vegetable oils using a light source showed a very small optical rotation, which resulted in a polarization increase in vegetable oils of less than 1° on average. Although it shows a very low average polarization change, various types of oil show different values depending on the condition of the oil.

Observation of changes in the polarization angle was then carried out by combining olive oil with olive oil, by attaching two cuvettes each containing olive oil. Figure 3 shows a graph of the relationship between the value of the change in the polarization angle in olive+olive oil with olive oil. Based on Figure 2, it can be seen that the value of the change in the polarization angle of

olive oil + olive oil is higher than that of single olives. The results of observations of changes in the polarization angle on VCO + VCO and single VCO as shown in Figure 4 show that the difference is not too large, which is 2.5% and it can be concluded that the VCO and olive oil gain are not linear and are optically active and also have no effect on position. which is used both cuvette 1 is in front and vice versa cuvette 2 is in front.

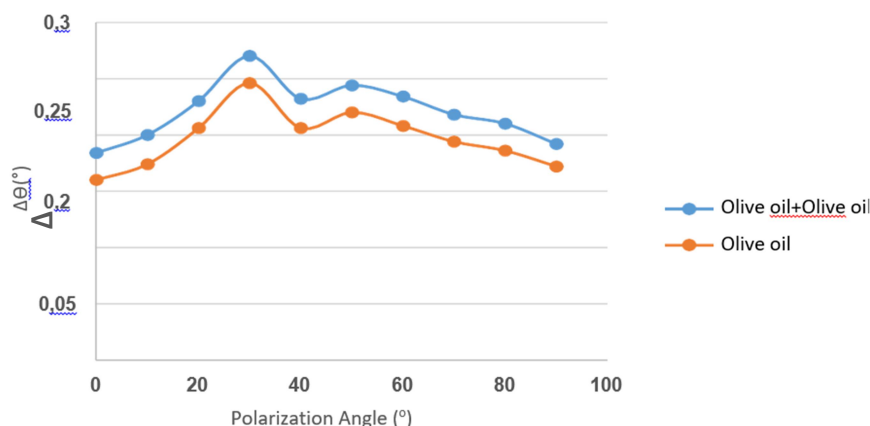


Fig. 3. Change of Polarization Angle in olive oil+olive oil and olive oil

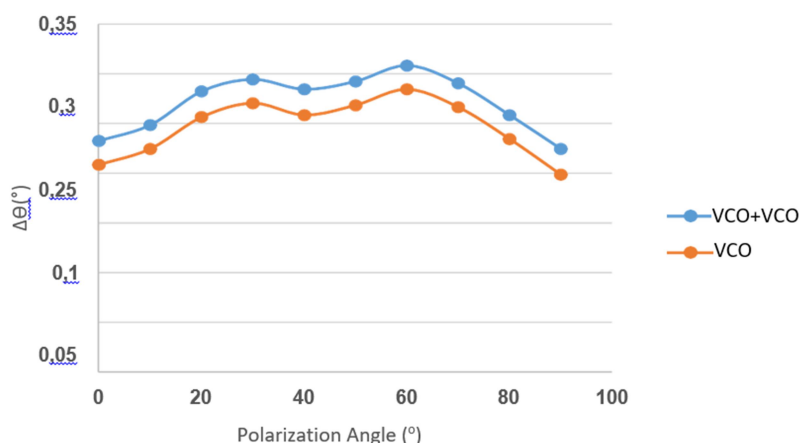


Fig. 4. Changes in the polarization angle on VCO+VCO and VCO

IV. CONCLUSIONS

Olive oil and VCO have different characteristics as seen in the graph which has different peaks, and both of these oils have optically active and non-linear strengthening properties seen from the graph of double VCO and double olives compared to single VCO and olive oil.

ACKNOWLEDGMENT

This research is funded in addition to the state budget Diponegoro University Fiscal Year 2022 Decree of the Chancellor of Diponegoro University Number: 374/UN7.P/HK/2022 No. SPK: 185-35/UN7.6.1/PP/2022.

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