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Extraction and Characterization of Oil from Melon and Coconut Seeds

Oti Wilberforce J.O[1]Eze – Ilochi Nkechinyere Olivia [2]
[1]*Ebonyi State University, Abakaliki, Ebonyi State, Nigeria*
[2]*Evangel University Akaeze, Ebonyi State, Nigeria*

Abstract: *Oil from coconut and melon was extractedand characterized using standard methods for physicochemical parameters such as saponification value, acid value, peroxide value, iodine value (mg KOH/g) and specific gravity. The results revealed that the saponification value (mg KOH/g), acid value (mg KOH/g), iodine value (mg iodine/100g), peroxide value (mg/peroxide/kg), and specific gravity were found to be 254.00 ± 9.12; 1.20 ± 0.61; 9.30 ± 0.91; 0.40 ± 0.02 and 0.92 ± 0.71for coconut oil while196.00 ± 8.72; 2.80 ± 0.82; 17.80 ± 1.02; 3.20 ± 0.91 and 0.95 ± 0.80 formelon oil respectively. Except for saponification values, the values of other parameterswere higher in melon oil than in coconut oil. Statistical analysis of variance of the results revealed that there were significant differences at $p < 0.05$ in the determined parameters except for peroxide values and specific gravity..Low acid values obtained for the oils suggest thatboth oils are edible. High saponification values obtained revealed that the oils have great potential in industrial applications such as cosmetics and soap making. Low iodine values obtained revealed that they are non-drying oil and also suggest that the oils contain few unsaturated bonds while low peroxide values indicated that the oils have low susceptibility to oxidative rancidity and deterioration.*

Keywords*: Coconut, Melon, Saponification value, Acid value, Peroxide value, Specific gravity*

I. INTRODUCTION

Due to increase in human population and industries, the use of plant oil has drastically increased and as a result, oil from plants is less available and costlier these days. Unsaturated triglycerides are the main constituents of plant oils **(**Ahmed, *et al.,* 1999**)**. Oils are classified into essential and fixed oils. Essential oils are volatile, and are usually derived from the non-seed parts of the plants while fixed oils are derived from the seeds (Evbuomwan *et al.*,2015). Essentialoils are used to produce perfumes, flavours, deodorants, antiseptics and pharmaceuticals, while fixed oils are often edible because of their nutritional value (Kubow, 1990).The choice of the coconut and melon seeds in this work is due to their high yield of the oil compared to other plants. They are edible oils and have various applications in food, medicine and industries(Obasi*et al.,* 2012). Oils from coconut and melon are commonly used in cooking, and are useful as feedstock for biodiesel production, in addition to being used as skin moisturizer (Clark, 2011).

Extraction is the process of separation of a substance from a matrix and it can be done either by mechanical extraction (expression) or chemical extraction (solvent extraction). It includes liquid-liquid and solid-liquid phase extraction(Young *et al.,* 1994). In this work, extraction of oil from seed was a solid-liquid extraction.

Acid Valueis the amount of free fatty acid (FFA) present in oil or fat. The acid value of an oil or fat is the amount of base in milligrams required to neutralize the free organic acid present in 1g of fat or oil(Akoh and Nwosu, 1992). Saponification value of oil or fat is the amount in milligrams of alkali required to neutralize the free fatty acids from complete hydrolysis of the sample. It is a measure of average molecular weights (chain length) of fatty acid present. Peroxide value is a measure of the peroxide contained in the oil. A solution of oil in the mixture of acetic acid and chloroform is titrated with solution of potassium iodide Mattson and Grundy (1985). Specific gravity or relative density refers to the ratio of the weight of sample to the weight of distilled water. It is given as weight of sample/weight of distilled water. It has no unit.

The main objective of the study is to extract oil from melon and coconut seeds and characterize the oils by determining their chemical properties such as saponification value, peroxide value and iodine value in addition to the specific gravity of the extracted oil.

II. MATERIALS AND METHODS

Sample Collectionand Preparation

Coconut and melon seeds were purchased directly from Meat Market in Abakaliki, Ebonyi State, Nigeria. The coconuts was dishelmed and washed, size reduction was carried out by manual grating to get fine particles of uniform size particle. The melon seeds were dishelmed, washed and grinded just like that of coconut.

Extraction of oil: After grating, the coconut juice was fermented for 24 to 48 hours after which the oil separated from the water having the oil at the upper layer. It was then separated using separating funnel. The melon seeds were screened in the Laboratory by hand-picking to remove the bad ones. A grinding machine was washed with hot water and detergent to remove dirt. After washing with detergent, the seeds were grind four times with already washed machine to get powdered form of it. The ground sample was extracted by squeezing on a smooth wood inclined gently to the horizontal.

Procedure

All the procedures used were adapted from (Okene and Evbuomwan, 2014) and the experiments were carried out in triplicates

Determination of Acid Value

0.5 g of the oil sample was weighed into a conical flask using a plastic dropper.20mL of Absolute ethanol was added. 3 drops of phenolphthalein was added and the solution was titrated using 0.1 M sodium hydroxide until pink colour persists (Okeneand Evbuomwan, 2014)

$$\text{Free Fatty Acid} = \frac{\text{titre value x M x 5.61}}{\text{weight of oil sample used}}$$

Where M = Normality of the KOH.

$$\text{Acid Value} = 2 \text{ x Free Fatty Acid Value}$$

Determination of Iodine Value

0.5g of the sample was weighed into a conical flask. 15mL of chloroform was added after which 25mL of wiji's solution was added and covered tightly using a sheet of foil and kept in the dark for 30 minutes. 20mL of 10% potassium iodide was added followed by 150mL of distilled water, at that point the colour changed from brown to wine red. 5mL of 1% starch indicator was added which turned the solution blue black. The whole solution was titrated with 0.1N sodium thiosulphate till immediately the end point is achieved (V1). Solution turns blue black to colourless. The blank was carried out a blank as well starting with 15mL of chloroform (V2).

$$\text{Iodine value} = \frac{12.69 \text{ x } (v2 - v1) \text{ x N}}{\text{weight of sample used}}$$

Determination of Saponification Value

0.5g of the sample was weighed into a conical flask. 50mL of 0.5N alcoholic solution of potassium hydroxide was added and the solution was refluxed for 30 minutes to ensure perfect dissolution. The solution was allowed to cool and 3 drops of phenolphthalein was added. The solution was titrated with 0.5N HCl, Titre value recorded as V1. It was observed that the pink solution turns colourless. Blank titration was carried out (V2) as well starting from 50mL of 0.5N alcoholic solution but without adding the oil sample.

$$\text{Saponification value} = \frac{56.1 \text{ x } 0.5 \text{ x } (v2 - v1)}{\text{weight of the sample used}}$$

Determination of Peroxide Value

0.5g of the sample was weighed into a conical flask. 25mL of solvent mixture was added, that is, 2 volume of glacial acetic acid and 1 volume of chloroform. 1mL of 10% potassium iodide was added and shaken vigorously. The solution was covered with a stopper and kept in the dark for 30 minutes. 35mL of starch indicator was added, and titrated (V1) with 0.02 M sodium thiosulphate until solution turned colourless. The blank was done starting with 25mL of solvent mixture.

$$\text{Peroxide Value} = \frac{1000 \text{ (V1 - V2) x M}}{\text{weight of sample.}}$$

M = molarity of sodium thiosulphate

Determination of specific gravity

An empty specific gravity (SG) bottle was weighed and weight recorded as W1. The empty SG bottle was filled to the mark with distilled water and weighed W2.The SG bottle was washed, dried and allowed to cool. It was filled to the mark with the oil sample and weight noted as W3.

$$\text{Specific gravity} = \frac{w3 - w1}{w2 - w1}$$

III. RESULTS

Table 1 presents the physicochemical properties of coconut and melon oil and their P-values of the non-parametric analysis of Variance. Figure 1 present the

Table 1: Physicochemical Properties of Coconut and Melon Oils

Properties	Coconut Oil	Melon Oil
Saponification value (mg KOH/g)	254.00 ± 9.12	196.00 ± 8.72
Acid value (mg KOH/g)	1.20 ± 0.61	2.80 ± 0.82
Iodine value (mg iodine/100g)	9.30 ± 0.91	17.80 ± 1.02
Peroxide value (mg peroxide/kg)	0.40 ± 0.02	3.20 ± 0.91
Specific gravity at 30^0C (kg/dm^3)	0.92 ± 0.71	0.95 ± 0.80

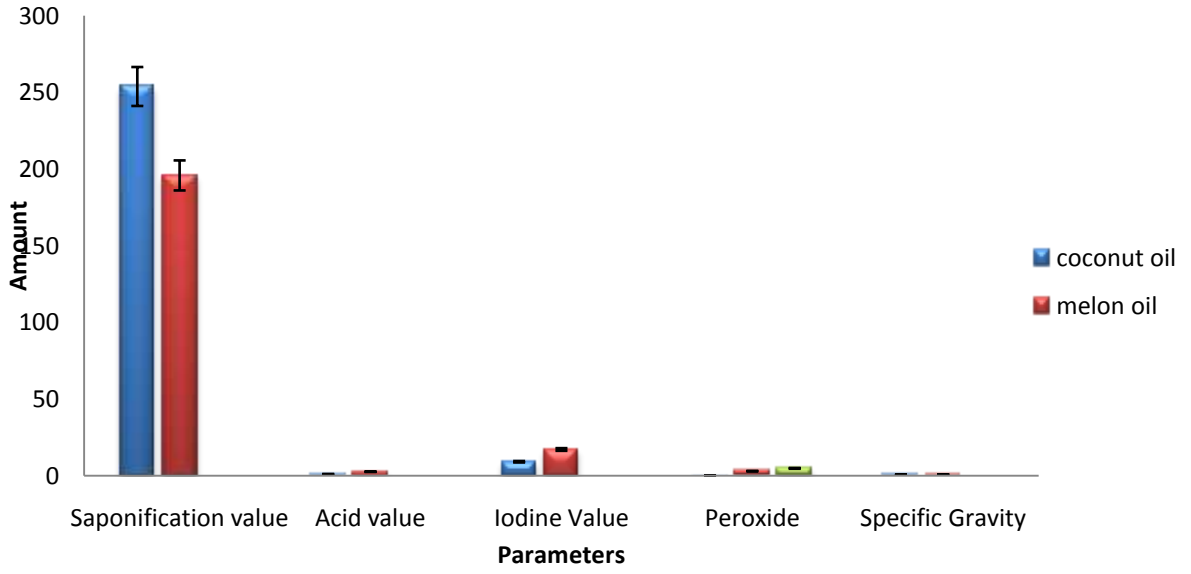

Fig. 1: Levels of some parameters in melon and Coconut oils.

IV. DISCUSSION

From Tables 1, the saponification value of coconut oil and melon oil extracted are 254.00 ± 9.12 and 196.00 ± 8.72mg KOH/g respectively. These values serve as important parameter in determining the suitability of oil in soap making. According to Harwood and Padley (2011), oils within this saponification values yields soaps of soft consistency and hence could be used for making shaving creams. Acid values for both oils were low though the values obtained were significantly higher in melon oil (2.80 ± 0.82 mgKOH/g) than in coconut oil (1.20 ± 0.61 mgKOH/g). The lower the acid value of oil, the few fatty acid it contains which makes it less exposed to rancidity (Obasi*et al.,* 2012). This means it will be easier for melon oil to become rancid than coconut oil.The iodine value of coconut oil (9.30 ± 0.91 mg iodine/100g) was significantly lower thanthat of melon oil (17.80 ± 1.02 mg iodine/100g). The iodine value is a measure of the unsaturation of fats and oils and it is an indicator of double bonds in the molecular structure in terms of classification of fats and oils. Iodine values below 100 confirm that the oil is non-drying (Akoh and Nwosu, 1992). Hence coconut and melon oils are non-drying because their iodine values were lower than 100. The peroxide values of 0.40 ± 0.02 (mg peroxide/kg) and 3.20 ± 0.91(mg peroxide/kg) obtained also served as an index of rancidity. According to Okene and Evbuomwan, (2014), high oxidative stability is possible when peroxide value is less than 10.00 mg peroxide/kg, hence the two oils willbe resistant to peroxidation during storage. The specific gravity of 0.92 ± 0.71(kg/dm^3) and 0.95 ± 0.80 kg/dm^{3}were obtained from coconut and melon oil respectively which implies that both oils are less dense than water.

V. CONCLUSION

The results of the analysis showed that coconut oil has a higher saponification value when compared with melon oil, therefore is more suitability for industrial application. High saponification values obtained revealed that the oils have great potential in cosmetics, candle and soap making industries. Acid value, iodine value, specific gravity and peroxide value of coconut oil was found to be lesser than that of melon oil. Acid value is an important index to determine the quality age, edibility, and suitability of oil for use in industries. Acid value is used to measure the extent to which glycerides in the oil has been decomposed by lipase and other physical factors such as light and heat. . Low acid values obtained for the oils showed that both oils are edible. Low iodine values obtained revealed that they are non-drying oil and also suggest that the oils contain few unsaturated bonds while low peroxide values indicated that the oils have low susceptibility to oxidative rancidity and deterioration. Hence it confirms that they are presence of high level of antioxidants in the oils.

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REFERENCES

[1]. Ahmed, S. M.; Bamofleh, S. and Munshi, A. (1999).Cultivation of Neem (AzadirachtaIndica) in Saudi Arabia, Econ. Bot, vol. 43, pp 35-38.

[2]. Akoh, C. C. and Nwosu, C.V. (1992). Fatty Acid Composition of Melon Seed Oil Lipids and Phospholipids, J. Am. Oil Chem. Soc., vol. 69, pp 314-317.

[3]. Clark, M (2011). Once a Villain Coconut oil charms the Health food World, The New York times. pp 10-32

[4]. Evbuomwan, B. O.; Felix-Achor, I. and Opute, C. C. (2015).Extraction and Characterization of Oil from Neem Seeds, Leaves and Barks, European International Journal of Science and Technology, Vol. 4 No. 7, pp 1-7.

[5]. Harwood, J. C. and Padley F. D. (2011).The Lipid Hand book, 2nd Edition Chapman and Hall London, pp249-275.

[6]. Kubow, S. (1990). Toxicity of Dietary Lipid Peroxidation Products, Trends Food Sci. Technol., vol. 1, pp. 67-71.

[7]. Mattson, F. H. and Grundy, S. M. (1985). Comparison of Effects of Dietary Saturated, Monounsaturated and Polyunsaturated Fatty Acids on Plasma Lipids and Lipoproteins in Man, J. Lipid Res., 26, pp. 194-202.

[8]. Obasi, N. A.; Ukadilonu, J.; EberechukwuEze, E. I.; Akubugwo, F. and Okorie, N. H. (2012). Proximate Composition Characterisation and Comparative Assessment of Coconut and Melon, vol. 4, pp 12-45

[9]. Okene E.O., Evbuomwan, B. O. (2014). Solvent Extraction and Characterization of Oil from Coconut Seed Using Alternative Solvents International Journal of Engineering and Technical Research, Vol. 2(12), p 45.

[10]. Young.F. V. K, food, C, Biernoth E, Krog M, Davidson, M.S.J and Gunstone.F.D. (1994). Processing of fats and oils in Gunstone, Journal of American Oil Chemists Society, vol. 6, pp 56-89.