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PHYSICOCHEMICAL PROPERTIES OF *ANACARDIUM OCCIDENTALE* NUT OIL

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ABSTRACT

Oil was extracted from the powdered seed of *Anacardium occidentale* using Soxhlet extraction technique giving 18.01±0.13% yield. The physicochemical property of cashew nut oil: refractive index, specific gravity, saponification value, iodine value, acid value, peroxide value, and color were 1.46±0.0, 0.96±0.13, 187.4±2.7mgKOH/g, 78.9±1.5mgKOH/g, 3.9±1.2mgKOH/g, 6.0±1.2meq/Kg, and light yellow, respectively. This suggests that the cashew nut oil is edible after refinement but might not be used for soap making but suitable for cosmetics and biodiesel. However, further detailed research is required on the additional quality parameters and possible uses of cashew nut oil.

KEYWORDS: Cashew, Oil, Dehulling, Extraction, Soxhlet, Physiochemical.

1. INTRODUCTION

Cashew, *Anacardium occidentale*, is native to Brazil, now cultivated in tropical regions. It is an evergreen tree, up to 12 meters tall. Cashew nut is the seed, surrounded by a double shell containing caustic resin. The cashew nut consists of an outer shell (epicarp), a tightly fitted inner shell (endocarp), and a strongly vesicant cashew nut shell liquid (CNSL).[12] The true fruit of the cashew tree is the nut, a kidney-shaped structure approximately 2 - 3 cm in length. The nut is attached to the end of a fleshy pulp called the cashew apple. Products derived from the nuts include the world's highly delighted roasted kernel snacks, kernel oil, and cashew nut shell liquid; and from the apple: juice, jam, and alcohol are among the products. Cashew nut kernel is an edible nut rich in lipids, proteins, minerals,[9] and health-beneficial bioactive

compounds.[10-12] The cashew nut kernel has a pleasant taste and flavor and can be eaten raw, fried, and sometimes salted or sweetened with sugar. The kernel is considered to be of high nutritive quality. However, growing conditions and the variety of cashew may have an influence on kernel composition. Cashew nut is an important delicacy that is mainly used in confectionery and as a dessert nut. It was shown that the powdered milk used in the standard milk chocolate recipe can be replaced with 25% roasted cashew kernel. It also contains high food value with about 40-57% oil and 21% protein content. Cashew is of considerable economic importance because their components have various economic uses.[7] The cashew industry ranks third in the world production of edible nuts with an estimated value of US $ 2 billion, the world cashew nuts production comes from both wild and cultivated trees.[6] The nut is edible, rich in oil, protein, and fiber. It is used in food, cosmetics and pharmaceutical. Traditional medicine uses include anti-inflammatory and antimicrobial properties.[11] Therefore, the objective of this experiment was to evaluate the physicochemical properties of cashew nut oil.

2. MATERIALS AND METHODS

2.1 Sample collection and preparation

The fruits comprising the pulp and the seed, were gathered from Igele Market in Ondo, Ondo State, Nigeria. The fruits grown in Ondo area of Ondo West local government council were harvested on the day of purchase. The process of dehulling was performed, wherein the fruit was meticulously sliced in half, facilitating the extraction of the stone seeds. Subsequently, the sample was divided into several dimensions. The sample was air-dried for 48 h prior to pulverization using a hammer mill in order to decrease the moisture content, hence improving the efficiency of the extraction and distillation procedure. While grinding, caution was taken to avoid grinding the particles too finely, since this would impede the solvent's ability to flow freely during extraction, potentially resulting in a decrease in the yield of the extracted oil.

2.2 Extraction of seed oil

Precisely 70 g of the ground seed sample was measured and placed in a 500 cubic centimeter beaker. It was then immersed in 300 cubic centimeters of hexane for a duration of 24 h. The resulting solution was successively and meticulously filtered using Whatman No 2 filter papers (8 µm particle size range and slightly slower filtration speed), until all remnants of oil were completely removed from the sample. The oil-hexane mixture, often known as miscella, was separated using the Soxhlet equipment. To ensure the complete evaporation of any

remaining hexane in the oil, the oil was heated at 78 °C for 2 h using a Gallen Kamp hot air oven model OV160.

2.3 Physiochemical characterization of the seed oils

The iodine value, acid value, peroxide value, viscosity, refractive index, smoke point, and melting point were measured using the established protocols outlined by the American Oil Chemist Society (AOCS) and the American Society for Testing and Materials (ASTM).

2.3.1 The iodine value is a measure of the unsaturation of a substance, specifically the number of double bonds it contains. Precisely 0.1 g of the oil sample was measured and placed into a conical flask. Then, 2.0 mL of tetrachloromethane were added to the oil sample, followed by 4.0 ml of Wij's solution. The mixture was stirred to mix, covered, and left undisturbed for 30 min in a dark environment. 3.0 mL of a 10% KI solution and 20 mL of distilled water were added to the mixture, which was then titrated with 0.1 N Sodium thiosulfate until a clear solution was obtained. The blank titration was done using all the reagents involved without any sample. Average of triplicate determinations was reported for both sample and blank titrations.

Calculation

Iodine value

$$(g/100g\ oil) = (B - S \times W \times 12.69)$$

Where;

B is the blank titer, value S is the sample titre value and the weight of the sample is W.

2.3.2 Peroxide value

Precisely 0.1 g of the oil sample was measured, and dissolved in a 30 mL acetic acid/chloroform mixture (3:2) and 0.5 mL of 10% KI was added to the mixture. It was agitated and kept for 2 min before adding 30 mL of distilled water and 0.5 mL of 1% starch solution and titrated with 0.1 N sodium thiosulfate till a milky solution was obtained and the titre taken. The blank titre was obtained by using all the reagents without any oil sample.

$$(meq/kg) = S\text{-}B \times 0.1 \times 1000/W$$

Calculation: Peroxide value where; B is the blank titer value, S is the sample titer value and W is the weight of the sample.

2.3.3 Acid value

Each oil sample (1.0 mL) was weighed into conical flasks and 20 mL of ethanol/petroleum ether (1:1) is added to the samples. Two drops of phenolphthalein indicator were added to the mixture and titrated with 0.1 M KOH solution to a pink colouration which persisted for 30 s. The blank titre was obtained using all the reagents without any oil sample. Average of triplicate determinations was reported for both sample and blank titrations.

Calculation: Acid value

$$(\text{mgKOH/gOil}) = V \times N \times 5.61/W$$

where V is the volume of KOH, W is the weight of the sample examined (g), and N is the normality or molarity of KOH.

2.3.4 Saponification value

Precisely, 0.1g of the oil sample was measured and placed into conical flasks, followed by the addition of 12.5 mL of a 0.5 M KOH solution. The combination was heated for a duration of 15 min, then left to cool. Following this, 2 drops of phenolphthalein indicator were introduced to the mixture. The substance was subjected to titration using a 0.1 M HCl solution until a transparent solution was obtained. The blank was prepared with all reagents except any oil sample. Average of triplicate determinations was reported for both sample and blank titrations.

Calculation: Saponification value

$$(\text{mgKOH/gOil}) = [28.05 \times (A-B) \times F]/S$$

Where; S is sample weight, A is the titre value of blank (ml), B is the titre value of sample (mL), and F is the molarity of the HCl standard solution.

3. RESULTS AND DISCUSSION

The physiochemical properties of the oils obtained in this study are shown in Table 1. The oil extracted from the cashew nut has pale yellow color. The percentage yield of the Cashew nut oil was 18.01±0.13%. The mean values of refractive index and specific gravity of cashew nut oil were 1.46±0.0 and 0.96±0.13 respectively. The result is in agreement with the previous report by.[1;11] The mean of saponification value is 187.4±2.7mgKOH/g, which is lower than that of palm kernel oil (280.5 mg KOH/g), coconut oil (257.5 mg KOH/g), and groundnut oil (195.5 mg KOH/g) as reported by Amira et al.[2] The low saponification value indicates that the oil may not be used for soap making. The mean iodine value was 78.9±1.5mgKOH/g,

which is less than 100 and is classified as nondrying oil. This result of iodine is lower than previously reported value by Idah et al[8] (86.5 mg KOH/100g). Iodine value, which is an indication of the susceptibility of an oil to oxidation is used to quantify the amount of double bonds in an oil. Lower iodine value indicates the presence of lower fraction of unsaturated fatty acids in the seed and its decreased oxidation potential.[5] While the mean acid value was 3.9±1.2mgKOH/g, the mean peroxide value recorded 6.0±1.2meq/Kg. The peroxide value is an indication of the deterioration of lipids due to oxidation of double bonds of unsaturated fatty acid and is an index of rancidity. The low peroxide value indicates the slow oxidation of oils.[3]

Table 1: Characteristics of Cashew nut oil (n=3±SD).

Sample	RI	SG	SV (mgKOH/g)	IV (mgKOH/g)	AV (mgKOH/g)	PV (meq/kg)	Colour
Cashew nut oil	1.46±0.0	0.96±0.13	187.4±2.7	78.9±1.5	3.9±1.2	6.0±1.2	Pale yellow

RI, Refractive Index; SG, Specific gravity; SV, Saponification value; IV, Iodine value; AV, Acid value; PV, Peroxide value.

CONCLUSION

The result of this study showed that cashew nut oil is nutritionally rich and is good source of protein, fat and minerals. The oil properties of cashew nut are within the specification of most vegetable oils. This suggests that the cashew nut oil is edible after refinement but might not be used for soap making but suitable for cosmetics and biodiesel.

REFERENCES

1. Adepoju, A.B., Coker, O.J., & Adetula, O.A. (2019). Effects of processing methods on the proximate and physicochemical properties of flour and oil of cashew nut. Nigerian Journal of Nutritional Sciences, 40(1): 87–90.
2. Amira, A., Olaniyi, P., Babalola, O.O., & Mary, O.A. (2014). Physicochemical Properties of Palm Kernel Oil. Current Research Journal of Biological Sciences, 6(5): 205–207.
3. Anyasor, G.N., Ogunwenmo, K.O., Oyelana, O.A., Ajayi, D., & Dangana, J. (2009). Chemical Analyses of Groundnut Oil. Pakistan Journal of Nutrition, 8(3): 269–272.
4. AOAC.(2000). Official Methods of Analysis of AOAC INTERNATIONAL, 17th Edition. Crude Protein in Animal Feed, Forage, Grain, and Oilseeds, Block Digestion

Using Copper Catalyst, Steam Distillation into Boric Acid, AOAC INTERNATIONAL, Gaithersburg, MD.

5. Audu, S. S., Beetseh, C.I., Edward-Ekpu, D.U., & Ewuga, A.A. (2019). Proximate, mineral contents and physicochemical properties of Chrysophyllum albidum (African star apple) kernel flour and oil. Journal of Applied Sciences and Environmental Management, 23(7): 1245-1249. [6] FAO (2000). Cashew production in Africa, 1961-2000. Food and Agriculture Organization of the United Nations. Production Database. http: //apps.fao.org/ page/collections.
6. Fetuga, B.L., Babatunde, G.M., Ekpenyong, T.B., Oyenuga, V.A. (1975). The feeding stuff potential of Cashew nut scraps kernels meal. Proceedings of the Conference of Animal feed of Tropical and subtropical origin. Tropical products Institute (London), 201- 207.
7. Idah, P.A., Simeon, M.I., & Mohammed, M.A. (2014). Extraction and Characterization of Cashew Nut (Anacardium occidentale) Oil and Cashew Shell Liquid Oil. Academic Research International, 5(3): 50-54.
8. Lima, J.R., Garruti, D.S. & Bruno, L.M. (2012). Physicochemical, microbiological and sensory characteristics of cashew nut butter made from different kernel grades-quality. LWT - Food Science and Technology, 45(2): 180–185.
9. Michalak, M., & Kieltyka-Dadasiewicz, A. (2019). Nut oils and their dietetic and cosmetic significance: A Review. Journal of Oleo Science, 68(2): 111–120.
10. Misganew, A.A. (2022). Nutritional and Physicochemical Characteristics of Cashew Nut (Anacardium occidentale L.) Grown in Pawe District, Northwestern Ethiopia. International Journal of Research in Agricultural Sciences, 9(6); 2348-3997.
11. Trox, J., Vadivel, V., Vetter, W., Stuetz, W., Scherbaum, V., Gola, U., Nohr, D., & Biesalski, H.K. (2010). Bioactive compounds in cashew nut (anacardium occidentale l.) kernels: Effect of different shelling methods. Journal of Agricultural and Food Chemistry, 58(9): 5341–5346.