SOAP MAKING QUALITY OF MELON SEED OIL

OKPALA TOCHUKWU VINCENT
Department of Chemical Engineering Technology, Federal Polytechnic Oko, Anambra State, Nigeria.
Email: tovino15@yahoo.om

Abstract: *The quality of melon (Cumeropsis mannii) seed oil was determined to know if the oil's quality is acceptable for making soaps. Oil was extracted from the melon seed using soxhlet extraction method and some of the physicochemical properties of the oil were determined. The result from the physicochemical properties showed how suitable the melon seed oil will be for soap production. The result showed a saponification value of 281.91 mgKOH/g and an iodine value of 81.65 I_2/100g among others, these values are within a range of values that favours an oil's use for production of good quality soap. It can be ascertained that melon seed oil has properties that are excellent for soap making.*

Key Words: *Melon seed oil, Soap making, Saponification value, Iodine value.*

1. INTRODUCTION:

Soap is useful in the daily life of every individual because it is used for bathing and other cleaning purposes. Soaps are used in industries as thickeners, components of some lubricants and as cleaning agents in factories. They are also essential in the manufacture of textiles. The importance of soap in people's daily lives can never be over emphasized. People were advised to wash their hands with soap during the covid-19 pandemic, so as to help in preventing the spread of the deadly coronavirus, this shows how important soap is. Soaps are formed when the fatty acids in fats or oils react with an alkali such as potassium hydroxide or sodium hydroxide. This reaction is called saponification reaction (Arasaretnam & Venujah, 2019).

Soaps can be produced using different fats and oils like palm oil, coconut oil, shea butter, neem oil, mutton fat, etc. These individual oils can also be blended/ mixed together to get a soap of desired quality. The quality of the soap produced is determined among others by the physicochemical properties of the oil used for the soap production. The availability of melon also called egusi has made it necessary to know the suitability of melon oil for soap production. Egusi also known as Cucumeropsis mannii is grown in some Nigerian states. This melon seed is used for cooking delicious soup when ground. Oil can be extracted from the melon seed, this oil is used for cooking in Northern Ghana.

Researches has been done on the properties (physicochemical properties) of different oils like palm oil, Shea nut oil, coconut oil, etc. (Mohammed & Usman, 2018; Warra et al., 2010; Boisa et al., 2020), to know their suitability in the manufacture of products. There is need to carry out more research on the suitability of melon seed oil for making soap.

The purpose of this study is to know the quality of melon seed oil, to know if the quality is enough for making soaps. This is achieved by measuring the physicochemical properties of the melon seed oil like saponification value, iodine value, acid value and free fatty acid.

2. LITERATURE REVIEW:

Researches have been done on the properties of different oils i.e physicochemical properties of oil (Aremu, et al., 2015), some researchers produced soap from oil after characterizing the oil (Essien et al., 2012). Essien et al. (2012) characterized the Cumeropsis manni seed oil (melon seed oil), they were also able to produce metallic soap of zinc, nickel and copper from the oil. The soap they produced impacted positively on the quality of a paint sample they produced. Owoicho (2012) in his work determined the physicochemical properties of neem seed oil and shea butter oil. The neem seed oil showed a saponification value of 200.45 mgKOH/g and an acid value of 8.95 mgKOH/g. The soap they produced using the oil was user-friendly and had good cleaning properties.

3. MATERIALS AND METHOD:

Delulled melon seeds were bought in Eke Awka market in Awka, Anambra state, Nigeria.

PROCEDURE FOR EXTRACTING OF MELON SEED OIL

The melon seed oil was extracted using soxhlet extraction with n-hexane as the solvent. The melon seed was ground and introduced into the thimble of the soxhlet extractor. The extracting solvent (95% n-hexane) was put into the round-bottom flask. The round-bottom flask containing the n-hexane was heated, which caused the n-hexane to evaporate and condense into the thimble containing the ground melon seed. The desired oil now dissolved into the

condensed n-hexane was siphoned back to the round-bottom flask. The process was continued until all the oil was extracted from the sample. The residue in the thimble was removed and the round-bottom flask containing the solvent and oil was heated till only the oil was left in the round-bottom flask.

$$\% \text{ oil content} = \frac{\text{Weight oil obtained}}{\text{Weight of sample used}}$$

DETERMINATION OF THE PHYSICOCHEMICAL PROPERTIES OF THE OIL

The saponification value, iodine value, acid value and free fatty acid were determined using AOAC (1984) official methods of analysis.

PROCEDURE FOR THE DETERMINATION OF SAPONIFICATION VALUE

2g of the extracted melon seed oil was added into a conical flask and 25ml of alcoholic potassium hydroxide solution was added to it. The flask was added to a reflux condenser and heated for 1 hour with frequent shaking. 1ml phenolphthalein (1%) solution was added to it. The solution was titrated hot with 0.5M HCl. A blank titration was also done without any oil in the potassium hydroxide.

$$\text{Saponification value} = \frac{(b-a)x\ 28.05}{\text{Weight of melon seed oil used}}$$

b = Titre value for the blank titration.
a = Titre value for the titration with oil sample.

The multiplication by 28.05mg is because 1ml of 0.5M KOH contains 28.05mg of KOH.

4. RESULT AND DISCUSSION:

The physicochemical properties of the melon seed oil were measured and used to determine the suitability of melon seed oil for making soap.

Oil content shows the amount of oil that can be gotten from a given sample. It is the percentage of oil contained in a given seed sample. The melon seed showed an oil content of 29.56%, this value is lower than an oil yield of 48.3% obtained for Cucumeropsis mannii (melon seed) in the work of Kolawole and Ayeoba (2019). Since Ugbogu and Akubugwo (2007) classified palm kernel seed with oil content of 28% as high oil yielding, then the melon seed used in this research with an oil content of 29.56% is also a high oil yielding.

Saponification value is the amount of sodium hydroxide or potassium hydroxide needed to saponify 1 gram of an oil or fat. The higher the saponification value of an oil or fat, the more suitable the oil will be for making soap (Ifijen & Nkwor, 2020). The melon seed oil showed a high saponification value of 281.91 mgKOH/g (Table 1). The melon seed oil's saponification value is higher than a saponification value of 196 mgKOH/g for a melon seed oil in the work of Eze and Olivia (2017). The saponification value of the melon seed oil is good because it is higher than a saponification value of 200.45 mgKOH/g for neem oil which was used to make good soap in the work of Owoicho (2021). The melon seed oil also showed a better saponification value than shea nut oil with a much lower saponification value of 183.9 mgKOH/g which produced good soaps in the work of Warra et al., (2010).

TABLE 1. Physicochemical properties of the melon seed oil

Parameter	
Saponification value (mgKOH/g)	281.91
Iodine value (I_2/100g)	81.65
Acid value (mgKOH/g)	7.89
Free Fatty acid (%)	3.93

Iodine value shows the degree of unsaturation of a given fat or oil. Oils with high iodine values are prone to oxidation (Ifijen, 2020), therefore oils with high iodine values are inappropriate for making soaps. The melon seed oil showed an iodine value of 81.64 I_2/100g (Table 1). This shows that the iodine value of the melon seed oil is within the range of non-drying oil. Non-drying oils are oils with iodine numbers less than 100 I_2/100g, these non-drying oils do not undergo oxidation on exposure to air and they are best for making soaps (Kochhar, 1998, as cited in Warra et al., 2020). The melon seed oil showed a close iodine value to a kwachamba brown groundnut oil with an iodine value of 81.21 I_2/100g (Nkafamiya et al., 2010).

Acid value is the mass of potassium hydroxide in milligram needed to neutralize the organic acids present in 1g of a fat or oil. Acid value shows the extent in which the oil has gone through hydrolysis or oxidation (Pearson's Composition and Analysis of Foods as cited in Ndukwe & Chahul, 2016). The higher the acid value of an oil the higher the extent it has deteriorated. The acid value for the melon seed oil was 7.89 mgKOH/g which is higher than the acid value of 2.8 mgKOH/g for melon seed oil in the work of Eze and Olivia (2017). The acid value of 7.9 mgKOH/g in the work of Boisa et al., (2020) for coconut oil was said to be fresh and in good condition because it was below a CODEX standard of 10 mgKOH/g used for their work.

Free fatty acids are formed by the hydrolysis of fats and oils. They are formed when the fat or oil is exposed to various environmental conditions or during storage. Low level of free fatty acids show oils of good quality and suitability for use (Mohammed & Usman, 2018). The melon seed oil showed a free fatty acid of 3.93%, this value is almost the same with the free fatty acid value of 3.9% for native coconut oil in the work of Boisa et al., (2020).

5. CONCLUSION:

This study investigated the physicochemical properties of melon (Cucumeropsis mannii) seed oil to know if the oil will be suitable if employed to make soaps. From the result obtained, the physicochemical properties of the melon seed oil are within an acceptable range that qualifies melon seed oil to be used for soap making. The properties of the melon seed oil are excellent and will likely produce soaps of good quality if the oil is employed in soap making.

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