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Effects of Fat Modification on the Physicochemical Properties and Fatty Acid Profile of Shortenings Formulated with African Pear (*Dacryodes edulis*) Pulp Oil and Tallow Tree (*Allanblackia floribunda*) Seed Oil

Akusu O.M*, Wordu G.O, Obiesie C

Department of Food Science and Technology, Rivers State University, Nkpolu Oroworukwo, P. M. B., 5080, Port Harcourt, Nigeria

Abstract

Edible oils were extracted from the pulp of African pear (*Dacryodes edulis*) and the seed of tallow tree (*Allanblackia floribunda*). The Allanblackia seed oil (ASO) and African pear pulp oil (APPO) were blended in the ratios of 80:20, 70:30, 60:40 and 50:50 and labelled B1 to B4 samples, consecutively to formulate bakery shortenings and commercial shortening was used as the control. Result for physical properties revealed that the refractive index (RI) of the formulated shortenings were significantly higher than that of the control sample (1.4489). There was no significant different (P>0.05) in the densities of samples B1 and B2, as well as those of samples B3 and B4 which have no significant different (P>0.05) from that of the control sample (0.905g/ml). The slip melting point (SMP) of the samples ranged from 35.46 – 35.66°C and these values were lower than the SMP of the control (43.72°C). The smoke points (SP) ranged from 205.20 to 214.220C with significant different among the samples and the control recorded the least SP of 190.20°C. Blends of 80:20 and 70:30 gave solid fat range of 5.15 – 6.00% at 35°C while 60:40 and 50:50 blends gave solid fat range of 0.10 – 4.45% at 35°C. Peroxide value ranged from 0.32 to 0.45mEq/kg which compared with that of the control. Percentage free fatty acid (FFA) ranged from 0.08 – 0.12% for samples B4 and B1, respectively. The total saturated fatty acids in blends B1, B2, B3 and B4 were 47.37, 46.02, 44.13 and 42.40% while the total unsaturated fatty acids were 52.63, 53.98, 55.87 and 57.60%, respectively. This is an indication that blending ASO with APPO increased the desired unsaturated fatty acid content of bakery shortenings formulated from the blends.

Keywords: Fat Modification, African Pear, Tallow Tree, Physicochemical, Fatty Acid Profile, Shortenings

Corresponding author: **Akusu O.M**
Department of Food Science and Technology, Rivers State University, Nkpolu Oroworukwo, P. M. B., 5080, Port Harcourt, Nigeria.
Email: akusu.monday@yahoo.com

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Introduction

Shortenings are tailored fat systems whose nutritional and functional properties have been manipulated in order to deliver specific consumer needs. Fats such as margarine and shortening have been modified to provide desirable consistency and keeping quality in the end product. These modified fats offer special functional utility to baking, confectionery and cooking applications. Being one of the most flexible basic food ingredients, it is expected that the use of shortening and margarine will continue to grow. Such modified fat systems have to satisfy a host of physical functionality and health/nutritional requirements; as tenderizing agents, facilitate aeration, texture, mouth feel, carry flavours and colours, provide a heating medium and structural integrity to pies, breads, pasta and other bakery products (Rios *et al*., 2014: Chibor *et al*., 2017). These types of requirements are sometimes at odds with each other in terms of the ingredients that are required to deliver specific functionality. In this manner, potentially harmful hydrogenated fats are common ingredients required for consistency. In Nigeria, partially hydrogenated palm stearin and low iodine value palm kernel oil based bakery shortening, which has low nutritional value is predominant. Beside its high content of saturated fatty acids, partially hydrogenated vegetable oils also contain trans fatty acids (Karabulut and Turan, 2006). Trans fatty acids showed an increase in cholesterol levels in blood. It is regarded as a risk factor for increasing coronary heart disease and atherosclerosis (Juttelstad, 2004). Intake of Trans Fatty Acids (TFA) increases risk factors for Cardiovascular Disease (CVD) (Judd *et al*., 2002; Mensink *et al*., 2003;

Baer *et al*., 2004; Ascherio, 2006). Specifically, TFA increase LDL-Cholesterol (LDL-C), decrease HDL-Cholesterol (HDLC) and promote inflammation and endothelial dysfunction (Gebauer *et al*., 2007; Wallace and Mozaffarian, 2009; Mozaffarian *et al*., 2009). Trans fats can also cause heart disease by other means, such as impaired functioning of the internal walls of blood vessels (DeRoos *et al*., 2001). They also caused partial deficiency of Omega-3 fatty acids thus increasing the risk of heart attack (Larque *et al*., 2000; Simpoulos, 2002). Need to formulate bakery shortenings that can be declared free of trans fatty acid with better functionalities, nutritional value, and shelf life makes it important to search for foods that have lower content of trans fatty acids. The increased consumer demand for healthy products has encouraged the use of other fat modification processes to produce trans-free bakery shortenings and margarine. Fat blending is one such modification process using vegetable oil with high melting points as a source of solid fat in placed of hydrogenated fats.

Allanblackia seed oil is a vegetable fat, solid and stable at room temperature (28±2°C), with slip melting point above 35°C and will remain at solid till 41°C. Its high stearin content of over 49% makes it a ready source of hard stock for the blending and modification process. Allanblackia seed oil is obtained from the seeds of vegetable tallow tree (*Allanblackia floribunda*) which exist widely in most parts of Africa. The tallow tree (*Allanblackia floribunda*) is a woody dicotyledonous and underutilized plant belonging to the family *Guttiferae* and the genus Allanblackia. It is an evergreen plant that thrives well in wet places especially in the rainforest regions which produces big brown fruits. Inside those fruits are the seeds that contain the Allanblackia oil (Atangana *et al*., 2011). The trees are widely distributed in certain parts of Africa; mostly in Sierra Leone to Cameroon and Gabon, Congo Brazzaville and Uganda. Traditionally, the oil extracted from the seeds has been used locally for cooking, preparing medicines and making soap at a subsistence level. It has recently been found that the oil could be used in the manufacturing of spreads (margarine), soap and beauty products. Several properties of this oil, for example; high melting point and better food value among others, make it superior to alternatives like palm oil (Novella Partnership, 2008).

African pear pulp oil is a low melting oil, needed to provide wide plasticity and spread ability in the blend. With a melting point of 25°C and about 68% polyunsaturated fatty acid content. African pear pulp oil is expected to improve functionalities, nutritional and health values of the blended shortening(s). African pear (*Dacryodes edulis*) tree belongs to the *Burseraceae* family and is found in Africa where it is distributed from Ghana to Angola through Congo Brazzaville. In Cameroon, it is mostly found in the south and in Adamawa and plateau (Noumi *et al*., 2014). The fruit pulp is generally eaten fresh or roasted. It is an important source of oil with a content of 50% dry weight (Silou, 2012). The fruits are fragile and about one half of harvested fruits are lost due to softening and spoiling (Noumi *et al*., 2014). The blend of Allanblackia seed oil (a solid fat) and African pear pulp oil which is rich in essential polyunsaturated fatty acids is expected to produce bakery shortening with improved functionalities, nutritional and health values. The objective of this work was thus, to evaluate the effects of fat modification (blending) on the physicochemical properties and fatty acid profile of shortenings formulated with African pear (*Dacryodes edulis*) pulp oil and tallow tree (*Allanblackia floribunda*) seed oil.

Materials And Methods

Collection of Samples

Mature and good quality fruits from the African pear (*Dacryodes edulis*) were purchased from the fruit market in Port Harcourt. The fruits were of optimum ripening as indicated in the complete bluish-black colour of the epicarp. Mature fruits of *Allanblackia floribunda* were obtained from Okehi and Igbodo in Eche Local Government area of Rivers State. Commercial bakery shortening (Vitali brand) was purchased from SPAR super store in Port Harcourt, Rivers State, Nigeria and was used as product control.

Oil Extraction and Refining

African Pear Pulp Oil

African pear pulp was extracted from the fruit, oven dried at 60°C for 24h as outlined by Giami *et al*. (1999) in a hot air oven (model QUB 305010G, Gallenkamp, UK), ground using a laboratory mill (model MXAC2105, Panasonic, Japan). The oil was extracted using the bulk extraction process described by AOAC (2012) method. The finely grounded flour samples were soaked in excess n-Hexane (analytical grade) at a ratio of 1:5 (1g flour sample/5ml solvent) and shaked vigorously for 6h using the laboratory shaker. The miscella layer (oil and hexane) was filtered using no.4 whatman filter paper. Separation of hexane was done by distillation at 65°C using the soxhlet distilling unit. The oil was dried at 100°C to eliminate all traces of hexane.

Allanblackia Seed Oil

The Allanblackia seeds were cracked, sorted and extracted using the rendering process. The method described by Rosenthal *et al*. (1996) was followed with modification. The seeds were pulverized made into a paste and boiled for 6h; oil floated to the surface and was allowed to stand overnight. This was finally skimmed from the mixture with a sieve and heated to remove any trace of moisture before storing in an air tight plastic container for further use

Oil Refining

The extracted African pear pulp oil was refined using the procedure described by O'Brien (2004) with little modification. The crude oil was treated with 8% (v/v) of 0.1N NaOH (aq) at 65°C for 10min with continuous stirring, using a laboratory stirrer (model JKL 2145, REMI Motors, India). The treated oil was then washed with warm distilled water and the aqueous phase was separated off using a separatory funnel. The washing process was repeated until the aqueous phase became neutral to phenolphthalein indicator. The separated oil was dried at 1000C before bleaching with fuller's earth. To 100ml of the dried oil sample was added 3g of fuller's earth in a 250ml conical flask. The entire content was stirred continuously for 20min with a magnetic stirrer while heating at 80°C. It was filtered at 500C using Whatman no.4 filter paper to obtain the refined oil.

Formulation of Bakery Fat Blends

The different based stocks of Allanblackia seed oil and African pear pulp oil were blended in the following ratios: 80:20, 70:30, 60:40 and 50:50 in accordance with recommended blend of fats for bakery and all-purpose shortening formulation (Petrauskaite *et al*., 1998).

For a 100g bakery shortening (product), consisting of 98.28g vegetable fat phase plus 1.72g additives (O'Brien, 2004), the 98.28g vegetable fat phase for each product blend was made up of the earlier stated ratios (80:20, 70:30, 60:40, and 50:50) of the base stocks from Allanblackia seed and African pear pulp oils as shown in Table 1.

FAT PHASE									ADDI-TIVES
FAT BLEND SAMPLES	ASO (%)	APPO (%)	TOTAL FAT (g)	H20 (g)		CA E330 (g)	BHT E321 (g)	PS E201 (g)	SC (g)
B1	80	20	98.28	0.5	0.4	0.17	0.075	0.075	0.5
B2	70	30	98.28	0.5	0.4	0.17	0.075	0.075	0.5
B3	60	40	98.28	0.5	0.4	0.17	0.075	0.075	0.5
B4	50	50	98.28	0.5	0.4	0.17	0.075	0.075	0.5

Table 1: Production Blends for Bakery Shortenings

Key: ASO = Allanblackia Seed Oil, APPO = African Pear Pulp Oil, DMG = Distilled Monoglyceride, CA = Citric acid, BHT = Butylated Hydroxytoluene, PS = Potassium Sorbate, SC = Sodium Chloride, H2O = water

Production Process of Bakery Shortening

For a batch of Allanblackia seed and African pear pulp oil bakery shortening, 98.28g each of the earlier fat blends were added to 1.72g of additives (0.4gDMG + 0.17gCA + 0.075BHT + 0.075gPS + 0.5gNaCl + 0.5gH_2O) at recommended levels by NIS:289 (1992) and CODEX STAN 32 (1981). It was processed according to the method of O'Brien (2004) with modification as shown in Figure 1 using the following procedures:

Emulsification: The fat blend (98.28g) were melted at 70°C in a 500ml beaker, distilled monoglyceride (E471) emulsifier (0.4g) was added with continuous stirring.

Homogenization: The aqueous phase was prepared first by dissolving citric acid (0.17g), butylated hydroxyl toluene (0.075g), potassium sorbate (0.075g) and sodium chloride (0.5g) in 0.5ml of warm distilled water. The solution was added to the melted fat in the beaker and homogenized properly by continuous stirring with a laboratory stirrer (model JKL 2145, REMI Motors, India).

Pasteurization: The homogenized mixture was pasteurized at 85°C for 2m. Heating was turned off and the content transferred to a mixing trough.

Crystallization: The homogenized and pasteurized solution was crystallized (plasticized) by cooling to 17°C with continuous agitation, using the laboratory stirrer (JKL 2145) at 300rpm and chilling in a mixing trough packed with ice cubes round its jacket.

Tempering and Storage: The mass of plasticized blend was tempered in a thermo regulated refrigerator (Model YDK 330, Express cool, Japan) at 22 – 25°C for 48h to attain a stable polymorphic form. The bakery fat obtained was stored in an opaque, sealed plastic cup at room temperature (28±2°C).

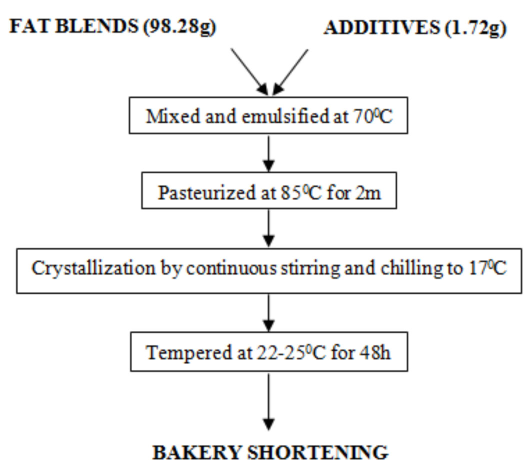

Figure1: Flow Diagram for Bakery Shortening Production

Analysis of Shortenings

Physico-Chemical Properties

The density, smoke point, slip melting point, refractive index, iodine value, free fatty acid and peroxide value of the formulated bakery shortenings were determined using the standard AOAC (2012) methods.

Solid Fat Content (SFC)

The solid fat content - temperature profile was determined using the density method as noted by Nazaruddin (2013). Density of solid fat is higher than the density of liquid oil, so density increase when fat crystalizes and decrease when it melts.The glass pycnometer was used to measure density at the following temperature: 5°C, 10, 15, 20, 25, 30, 35, 40, 45 and 50°C. The percentage SFC was calculated using the McClement (1999) equation as follows:

$$\text{SFC (\%)} = \frac{p - pl}{ps - pl} x \frac{100}{1}$$

SFC (%)=(p-pl)/(ps-pl) x 100/1

Where; p = density of fat at the desired temperature
pl = density of fat when completely liquid.
ps = density of fat when completely solid.

Fatty Acid Profile (FAP)

The fatty acid profile of the formulated bakery shortenings was determined using AOAC (2012) method as described by Chibor *et al*. (2017). Fatty acid methyl esters (FAME) were prepared from the extracted fats/oil. In 50 ml round bottom flasks, 50 mg of each sample was kept in separate flasks and 3 ml of sodium methylate solution (0.5mol/l of methanolic solution of NaOH) was added. The reaction medium was refluxed for 10min; 3 ml of acetyl chloride was added; mixture was refluxed again for 10 min and then cooled to ambient temperature; 8 ml hexane and 10 ml of distilled water was added and allowed to stand for 5 min to establish a two phase solution. The upper organic phase was recovered into a vial for GC analysis using Agilent 7890A, coupled with flame-ionization detector (FID)

Statistical Analysis

All the analyses were carried out in duplicate. Data obtained were subjected to Analysis of Variance (ANOVA), differences between means were evaluated using Tukey's multiple comparison test and significance accepted at $P \leq 0.05$ level. The statistical package in Minitab 16 computer program was used.

Results And Discussion

Physical Properties of Shortenings Formulated with Allanblackia Seed and African Pear Pulp Oils

As presented in Table 2, the refractive index (RI) of the formulated shortening samples (B1, B2, B3 and B4) were significantly higher than that of the commercial shortening (1.4489). Refractive index increase with increase unsaturation of triacylglyceride in the oil (Nelson 1994). Indicating that blending as a modification process enhances the amount of unsaturated triacylglyceride. There was no significant different ($P>0.05$) in the densities of shortenings formulated with 80:20 and 70:30 (ASO:APPO) blends and those of B3 and B4 (60:40 and 50:50). The densities of B3 and B4 were not significantly different ($P>0.05$) from that of the commercial shortening (control sample) with the value of 0.905g/ml. The density of a fat has a linear relationship with its solid fat content (McClement, 1999; Nazzaruddin, 2013). The slip melting point of the formulated shortenings ranged from 35.46 – 35.66°C and these values were not significantly different ($P>0.05$) but lower than the slip melting point of the control (43.72°C)

The smoke points were encouragingly high, ranging from 205.20 – 214.22°C. Each value were significantly different from the other with the commercial shortening recording the least smoke point of 190.20°C. Smoke point of 205 – 214°C is high and suitable for a wide range of cooking operations including baking and frying (Chibor *et al*., 2017). Smoke point of 180°C, 202°C and 212°C had been reported for vegetable shortening and venespati (CIA, 2011; Bhise *et al*., 2014)

Blend (ASO:APPO)	Refractive Index	Density (g/ml)	Slip Melting Point (°C)	Smoke Point (°C)
B1 (80:20)	1.4655b±0.000	0.899b±0.000	35.56b±.0.085	214.222±0.113
B2 (70:30)	1.4658ab±0.000	0.900b±0.001	35.50b±0.134	211.16b±0.014
B3 (60:40)	1.4661a±0.000	0.902ab±0.001	35.46b±0.629	208.18c±0.028
B4 (50:50)	1.4662a±0.000	0.903a±0.001	35.66b±0.226	205.20d±0.000
CS	1.4489c±0.000	0.905a±0.001	43.72a±0.6.08	190.20e±0.120

Table 2: Physical Properties of Bakery Shortenings Formulated with ASO and APPO

Solid Fat Content – Temperature Profile of Shortenings Formulated with Allanblackia Seed and African Pear Pulp Oils

The solid fat content (SFC) is the amount of fat crystals in the fat blend and is responsible for many product characteristics including general appearance, ease of packing, organoleptic properties, ease of spread, oil exudation, lubrication and dough aeration (Ghotra *et al*., 2002, Karabulut et al., 2004). As presented in Figure 2, the solid fat content of shortening samples B1 ranged from 0 - 92.98%, 0 - 90.12%, 0.10 - 87.26% and 0.1 – 84.40% at a temperature of 40°C – 5°C for samples B1, B2, B3 and B4, respectively. All the blends gave percentage solid fat of 4.00 – 6.00% at 35°C. Commercial shortening (Control) recorded the least solid fat at 5°C. Sample B1 with steep profile and narrow plastic range is suitable for 'filler fats'. The value for this sample compared with the solid range of 44% at 10°C to 2.5% at 40°C reported by Chrysam (1985). All the formulated shortenings were fully melted at 45 – 50°C. They also fall within the recommended solid fat range of ≥20% at 25°C and 5 – 15% at 35 – 40°C for bakery shortening (Podmore, 2002; Cheong, 2010). Dos Santos *et al*. (2014) also reported that baking shortening performs optimally with a SFC between 15 to 25% at the working temperature of the dough. Presence of sufficient SFC is necessary for the dough proofing temperature to provide gas retention and to strengthen the dough (Ghotra *et al*., 2002). These views are in accordance with those of other researchers who stated that a SFC of 15 to 25% at a working temperature is desirable for better creaming performance in cake (Danthine and Deroanne, 2003).

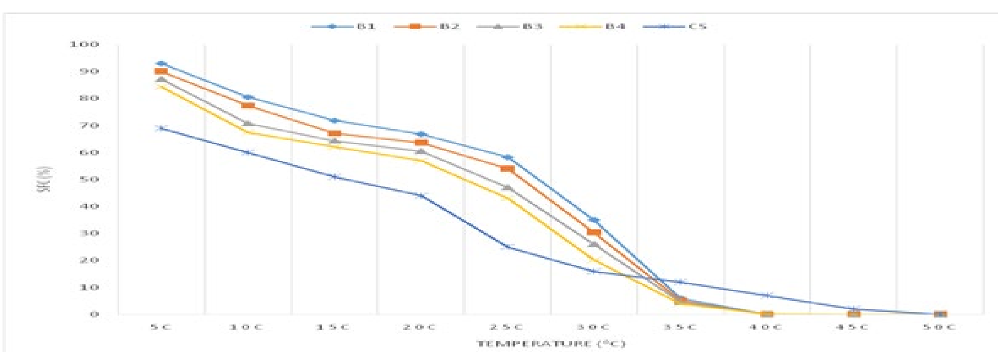

Figure 2: Solid Fat Content – Temperature Profile of Shortenings Formulated with ASO and APPO

Chemical Properties of Shortenings Formulated with Allanblackia Seed and African Pear Pulp Oils

Shortening formulated with 80:20 blends of ASO and APPO (B1) gave iodine value of 43.16g/100g and ranged to 49.23g/100g in sample B4 which represented the lowest and highest values significantly ($P<0.05$) as shown in Table 3. The iodine value of B3 and B4 were significantly higher than that of the commercial shortening. The relatively high iodine values for samples B3 and B4 is an indication that the products are rich in polyunsaturated fatty acids. Iodine value of 91.66g/100g had also been reported for shortening (Bhise *et al*., 2014). Peroxide value (PV) ranged from 0.32 to 0.45mEq/kg and these values were lower than the maximum allowable standard of 10mEq/kg for edible fats (NIS:289, 1992) and also lower than the maximum acceptable value of 2.00mEq/kg for margarine and shortenings (Zearoomali *et al*., 2014). Peroxide value of 1.3 – 1.7mEq/kg had been reported for shortening (Ghazalia *et al*., 2000). Bhise *et al*. (2014) also reported PV of 0.92mEq/kg for bakery shortening which is not too high from the values observed in this study.

Percentage free fatty acid (FFA) ranged from 0.08 – 0.12% for samples B4 and B1 with significant difference. Sample B4 recorded significantly ($P<0.05$) lower FFA than 0.10% observed in the commercial shortening (control sample) and also lower than the maximum acceptable value of 0.20mgKOH/g for margarine and shortenings (NIS:289, 1992; CODEX, 1999; Zearoomali *et al*., 2014). Low FFA in fat indicates that the fat will be stable over a long period of time and protect against rancidity and peroxidation (Aremu *et al*., 2015). The values of FFA observed here are in agreement with the value of 0.09% reported for bakery shortening by Bhise *et al*. (2014). High levels of FFA acids are undesirable in finished oils because they can cause off-flavours and shorten the shelf life of oils (Aremu *et al*., 2015). The level of FFA of fats and oils in shortening products is an indicator of its overall quality. They may formed through hydrolysis or in the advanced stages of oxidation (Aremu et al., 2015). High quality fats are low in free fatty acids, the lower the free fatty acid, the more acceptable the oil is to man in terms of palatability (Aremu *et al*., 2015). Hence, the produced shortening will be palatable for consumption as a result of the recorded low free fatty acid in this study.

Shortening Samples	Iodine Value (g/100g)	Peroxide Value (mEq/kg)	Free Fatty Acid (%)
B1 (80:20)	43.97d±0.163	0.45a±0.01	0.12a±0.001
B2 (70:30)	45.87c±0.354	0.44a±0.002	0.11ab±0.000
B3 (60:40)	47.41b±0.007	0.41b±0.003	0.09bc±0.001
B4 (50:50)	49.23a±0.007	0.32c±0.003	0.08c±0.001
CS	45.43c±0.318	0.41b±0.013	0.10ab±0.009

Table 3: Chemical Properties of Shortenings Formulated with ASO and APPO

Fatty Acid Profile of ASO, APPO and the Shortening Samples Produced from their Blends

The fatty acid profile of the Allanblackia seed oil (ASO) and African pear pulp oil (APPO) and that of the products (B1, B2, B3 and B4) are shown in Table 4. Allanblackia seed oil contains 51.64% total saturated and 48.36% total unsaturated fatty acids. Stearic acid was the predominant saturated fatty acid (49.87%) while oleic acid of 44.87% was the predominant unsaturated fatty acid recorded in ASO. African pear pulp oil contained 34.12% and 68.88% of saturated and unsaturated fatty acids, respectively. Oleic acid being the predominant unsaturated fatty acid with the value of 40.45%. It also contained 23.17% linoleic acid (omega-6) and 0.51% ecosatrienoic acid (omega-3), higher than 9.20% linoleic acid contained in palm oil (Chibor *et al*., 2017). High content of polyunsaturated fatty acid in African pear pulp oil and its linoleic acid content makes it a rich source of essential fatty acid that will enhance the nutritional value of the vegetable shortenings. The total saturated fatty acids in blends (B1, B2, B3 and B4) were 47.37, 46.02, 44.13 and 42.40%, respectively while the total unsaturated fatty acids were respectively 52.63, 53.98, 55.87 and 57.60%. This showed that blending Allanblackia seed oil with African pear pulp oil increased the desired unsaturated fatty acid content of bakery shortenings formulated from the blends

Fatty Acids (%)	Oil Samples		Shortening Samples			
	ASO	APPO	B1	B2	B3	B4
Lauric (C12:0)	0.15		0.12	0.1	0.05	
Myristic (C14:0)	0.1	2.00	0.48	0.65	0.85	1.00
Palmitic (C16:0)	1.39	15.18	3.38	5.52	6.91	8.30
Palmitoleic (C16:1)	0.10	1.20	0.30	0.43	0.54	0.60
Stearic (C18:0)	49.87	14.84	42.87	39.03	35.40	32.00
Oleic (C18:1)	44.87	40.45	43.99	43.55	43.10	42.66
Linoleic (C18:2)	1.18	23.17	6.13	7.78	10.00	12.18
Arachidic (C20:0)	0.13	2.10	0.52	0.72	0.92	1.10
Eicosenoic (C20:1)	0.97	0.91	0.95	0.95	0.93	0.92
Eicosadienoic (C20:2)	1.24	0.84	1.16	1.12	1.10	1.04
Eicosatrienoic (C20:3)		0.51	0.10	0.15	0.20	0.20

Table 4: Fatty Acid Profile of Allanblackia Seed Oil, African Pear Pulp Oil and their Blends

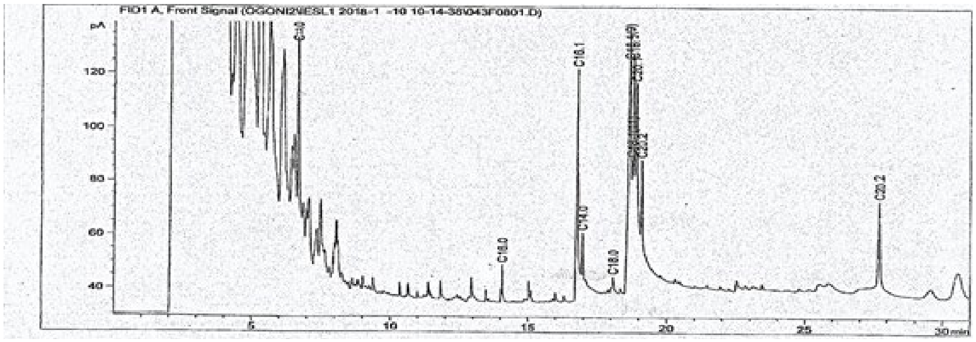

Figure 3: Fatty acid GC Chromatogram of Sample B1 (80:20 Allanblackia:African Pear Pulp Oil Blends)

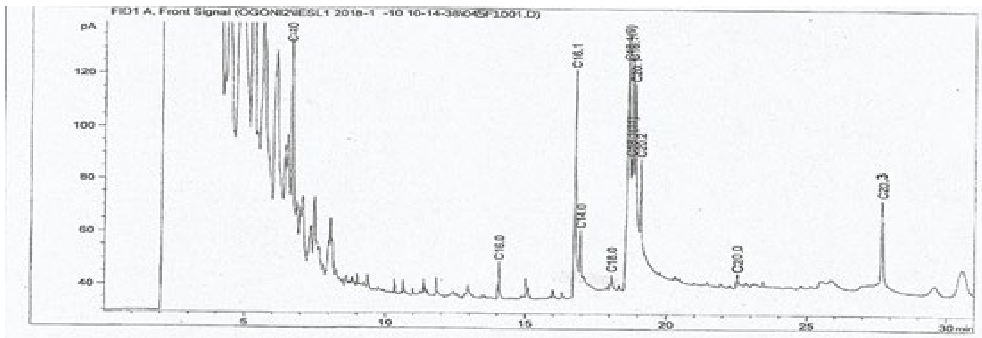

Figure 4: Fatty acid GC Chromatogram of Sample B2 (70:30 Allanblackia:African Pear Pulp Oil Blends)

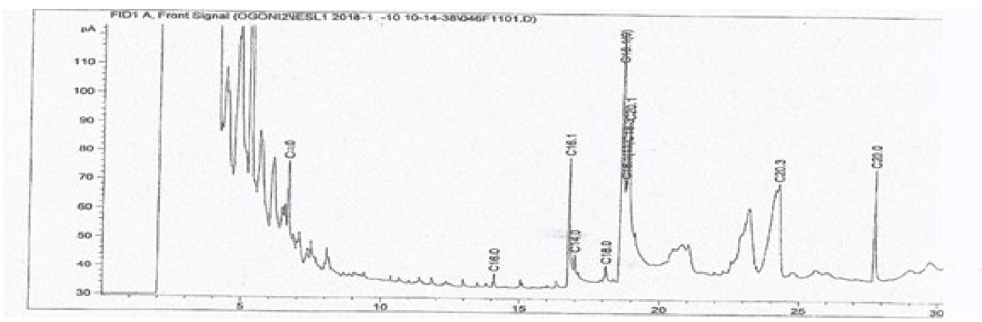

Figure 5: Fatty acid GC Chromatogram of Sample B3 (60:40 Allanblackia:African Pear Pulp Oil Blends)

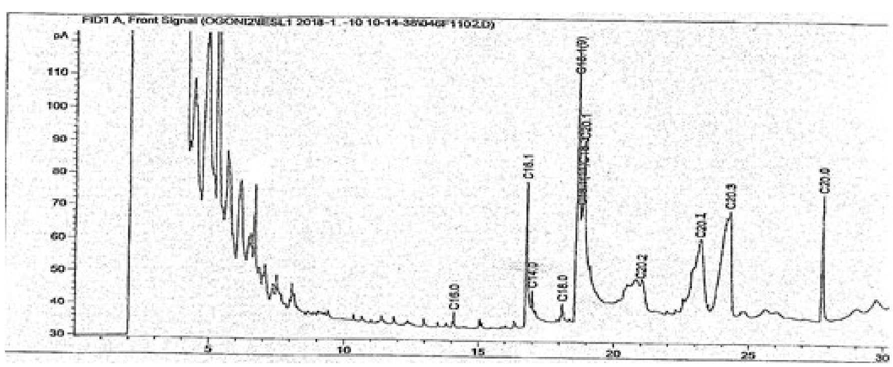

Figure 6: Fatty acid GC Chromatogram of Sample B4 (50:50 Allanblackia:African Pear Pulp Oil Blends)

Conclusion

Findings from this study has shown that by modifying solid and liquid fats through blending, the percentage free fatty acid and peroxide value of the products were reduced significantly, thus enhancing their oxidative stability. Modification of the fat properties by blending Allanblackia seed and African pear pulp oils increased the unsaturated fatty acid content of the formulated shortenings without compromising the needed physical and functional properties. Shortenings formulated from blends of 80:20 and 70:30 Allanblackia seed and African pear pulp oils gave solid fat range of 5.15% – 6.00% at 35°C which are desired fat range for icing shortening, all-purpose and bakery shortening while 60:40 and 50:50 blends gave solid fat range of 0.10 – 4.45% at 35°C which are suitable for soft-tube spreads and margarine. Blending of Allanblackia seed and African pear pulp oils in the right proportion will hence, enable the production of non-hydrogenated shortening with desired functionality and physical characteristics.

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