EFFECT OF SAPONIN ON THE ACTIVE INGREDIENTS OF SOAP

BY

ADEDIRAN, ADENIKE ASISAT
93/3484

DEPARTMENT OF CHEMICAL ENGINEERING
FEDERAL UNIVERSITY OF TECHNOLOGY
MINNA – NIGERIA

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CERTIFICATION

This is to certify that I have supervised, read and approved this project reported by Adediran, Adenike Asisat (93/3484) and which I found adequate both in scope and quality for the partial fulfillment of the requirement for the award of Bachelor of Engineering (B. Eng.) Degree in Chemical Engineering.

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Dr. Edoga Mathew Date
Project Supervisor

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Dr. J. O. Odigure Date
Head of Department

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External Supervisor Date

DEDICATION

This project is dedicated to my parents, Mr. and Alhaja R. A. Adediran to whom I have given much less than I have received.

ACKNOWLEDGEMENTS

My sincere thanks go to the ALMIGHTY ALLAH for sparing my life and for seeing me through this programme.

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It would take pages to acknowledge everyone who in one way or another has provided me with assistance, but certain individuals deserve mentioning for their invaluable help. To the remaining people, my apologies and my grateful thanks.

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DECLARATION

I hereby declare that this project work is my original work and has never to my knowledge being submitted elsewhere before

ADEDIRAN, A. ASISAT

DATE

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ABSTRACT

The project was carried out to study the effects of saponin on soap. The caustic potash used for the production of soap sample was extracted from unriped plantain peels. Another sample was produced from laboratory potassium hydroxide and comparison was made. It was observed that soap made from caustic potash and laboratory potassium are soft soap.

Experiments were conducted to test the effect of saponin and softness, foamability and corrosiveness of soap. And from the analysis carried out, it was observed that saponin does not affect the softness of both soap samples irrespective of the quantity added. For the foamability and corrosiveness tests conducted, saponin increases the foaming of soap and also the level of alkaline in the soap samples. As a result, if saponin is to be used in large quantity in soap formulation, other additives will be added to bring down the level of alkaline.

1.0 INTRODUCTION

Soaps are cleansing agents used with water in the homes and in industries industries for a variety of cleaning purposes. Soap itself is a detergent, but in common usage the term detergent refers only to synthetic detergents used for washing. All detergents sold in stores are synthetics.

Soaps are necessary for washing because water alone has limited cleaning power. Oils and greases do not dissolve in water and in addition surface tension prevents water from fully wetting the substance being washed.

For a soap or detergent to do its work, it must first be dissolved in water. When the soiled substance is immersed in the soapy water, several complex processes begin to take place. The dirt is lifted and held in suspension until it can be rinsed away.

Soap is the earliest detergent known to man and apparently was first made by the Romans from animal fats and wood ashes (which contain the alkaline potassium carbonate) about 2,500 years ago. In colonial America and until the early 1940's, most soap was manufactured by an alkaline hydrolysis reaction called saponification. The first reaction may have been slow hydrolysis of the fat to get free fatty acid which would then be neutralized by the alkali carbonate to give soap. If sodium carbonate was used, a "hard soap" was produced, but with potassium carbonate the product would have been some sort of "soft soap", unless a further stage of salting out with common salt (sodium Chloride) was employed to convert the potassium soap to sodium soap.

As the chemical industry developed, alkalis (sodium carbonate and sodium hydroxide) made from salt have largely replaced the sources mentioned earlier. Local tallow was the major fat used in England, but it became necessary to augment it with imported tallow and other oils and fats such as coconut oil.

Soap cannot be used in acid solution (because it is decomposed with the liberation of fatty acids) and it forms a precipitate with calcium and magnesium in hard water. Hence, although soap is a good all round detergent, it has limitations, particularly for some industrial purposes in the textile field. About 1835, *Fremy* and *Runge* reacted olive oil with sulphuric acid, and in 1874 Turkey Red Oil was made by the action of sulphuric acid on castor oil. Theses products and other similar ones, were found useful in certain dyeing and other textiles processes.

Laundry products, toilet soaps, shampoos, dish washing products and cleaning products are the chief household uses of these materials. Industrial uses include cleaning compounds specialty surfactants for hospital, germicides, fabric conditioners, emulsifiers for cosmetics, flowing and wetting agents for agricultural chemicals and rubber processing aids.

1.1 AIMS AND OBJECTIVES OF THE PROJECT WORK

The aim of this research is to find the effect of saponin on the active ingredient of soap.

Saponin is a naturally occurring nonionic surfacants that reduce the surface energy, or surface tension of solution in which it is contain, so that it is called surface active agent. The research work will also involve the extraction of saponin from *Sobo* (Hibiscus Sabdarifa) plant and preparation of soap using caustic potash extract from ash of unripe plantain peels and also from laboratory potassium hydroxide. With the samples of soap produced, hardness or softness, foamability and corrosiveness tests will be carried out.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Historical

Soap itself was never actually "discovered", but instead gradually evolved from crude mixtures of alkaline and fatty materials. Plainly the Elder described the manufactures of both hard and soft soap in the first century, but it was not until the thirteenth century that soap was produced in sufficient quantities to call it an industry. Up to the early 1800's soap was believed to be a mechanical mixture of fat and alkali, then *Chevreul*, a French chemist showed that soap formation was actually a chemical reaction. *Domeier* completed his research on the recovery of glycerine from saponification mixtures in his period. Until *Leblanc's* important discovery, producing low priced sodium carbonate from sodium chloride, the alkali required was obtained by the crude leaching of wood ashes or from evaporation of naturally occurring alkaline waters like River Nile.

The raw materials Shortage of World War I led the Germans to develop "synthetic soaps" or detergents. These were composed of short-chain alkyl naphthalene sulfates which were good wetting agents but only fair in detergent action. This sparked the interest worldwide in developing detergents, and new developments are continuing to date. From the original short-chain compounds the development has progressed through long chain alcohol sulfates in 1920's and 1930's through alkyl-aryl long chain sulfonates in the 1940's, to branched chain compounds in the 1950's and 1960's. During the 1960's the requirement of biodegradability become important and caused the return to linear long chains, because only the linear chains can be easily biodegraded.

2.2 Composition of Soap

Soap compositions are divided into primary and secondary composition. Primary composition being those without which soap cannot be formed. These, include caustic potash, caustic soda and oil or fat. The secondary composition involves the soap additives which improve the quality of soap. They include Na_2Co_3, Brine, Kaolin, etc.

2.2.1 Oil and Fat

The Oils and fats used in the manufacture of soap are essentially triglycerides, that is esters of the trihydric alcohol, glycerol. The vegetable oils such as palm oil, groundnut oil, cashew-nut oil, olive oil, palm kernel oil and animal fats are naturally occurring esters.

The triglycerides which comprise the bulk of an oil or fat which is fresh, have the formula CH_2-OCR_1-CH-O-OCR_2-CH_2-O-OC-R_3, where R_1, R_2 and R_3 are long chain alkyl groups which may be the same, or different.

2.2.2 Caustic Potash (*Potassium Hydroxide*)

Caustic Potash also known as Potassium Hydroxide is one of the most important raw materials which are use in many chemical industries. It can be produced from a number of sources which include, mineral deposit, agricultural products, industrial wastes, etc. It is used in the manufacture of hard and soft soaps such as shaving soaps, in the production of explosives, gun powder, etc. However, its uses also are in its converted form.

Caustic Potash is employed almost exclusively in making soft soaps (liquid or pates) since the potassium soaps are more water soluble than the sodium soaps.

2.2.3 Caustic Soda (*Sodium Hydroxide*)

It is one of the dominated inorganic raw materials for soap making. It is the principal ingredient used in saponification process.

It is white deliquescent solid available as pellets, sticks or flakes with melting point of 318.4^{0}C, produced by the electrolysis of Nacl or by the reaction between Na_2Co_3 and slaked lime. It dissolves readily in water with evolution of heat. Concentrated or hot sodium hydroxide is invariably handled in nickel plate owing to a chemically resistant film of oxide which forms on its surface. Apart from the principal raw materials for soap making, it is used to manufacture sodium salt by neutralising the appropriate acid for instance;

$$NaoH + Hcl = Nacl + H_2O$$

The concentrated solution of NaoH should be 45% to 50% in other to produce a good soap.

2.3.0 SOAP ADDITIVES

2.3.1 Optical Brightness

These are bleaching agents which help to remove dirt from the soap, making it lighter and clearer. Sodium Hypochlorite is an example of the optical brighteners.

2.3.2 Dyes

This is to improve the colour of the soap e.g. Yellow R, Yellow D, Green, Red and White. The oil soluble types are recommended for soap production.

2.3.3 Perfumes

Industrial Perfumes are recommended to improve the odour of the soap. These are Cintronella, Lavender, Avon, lemon grass, Jallow

2.3.4 Water

This is used in large quantity in the soap manufacture. Hardners is not regarded as a disadvantage in manufacturing of Sodium soaps because the calcium carbonate formed is absorbed as a filler in the soap. However, its absorption causes a reduction in the quality of soap. In the small scale industries water is not required in large quantity as in large scale industries where apart from been used directly in soap making it is also used in the cooling of the machines.

2.3.5 Brine (Salt Solution)

Water containing dissolved salt for instance, Calcium Chloride or Sodium Chloride is used in the processing of soap. It is used in the full boiled process. Salt for soap manufacturing should be of high grade, containing not more than 0.5% of magnesium and calcium salts. It is mainly use for the separation of neat soap from lye and is recovered back through the treatment of glycerine. It is only used in the production of hard soap.

2.3.6 Surfactants (Foaming Agent)

These are chemicals added to reduce the surface energy or surface tension (more strictly interfacial tension), of solution which contain them because of which they also called surface active agents. Surfactants contain a hydro phobic (water hating or repelling) and a hydrophilic (water loving or attracting) end. Example of surfactant that will be used in this research is Saponin which produces polar and non-polar ends when dissolves in water. The polar end is sugar like, while the non-polar end is the important aspect of the saponin (that is the foaming end).

2.4 CLASSIFICATION OF SOAP

What is soap?

Soap is a metallic salt of high molecular fatty acids such as stearic, palmitic and oleic acids. Soap can be divided into broad major heading; Laundry Soap, Toilet Soap, Detergent, Liquid Soap, Medicated Soap

2.4.1 Laundry Soap

This is a hard soap with filler thickness to increase the bulk and hardness of the soap. It is mainly used for washing clothes. It can be employed for washing utensils and for personal hygiene. Examples of filler are Kaolin, $CaCo_3$ and Colour.

2.4.2 Toilet Soap

This is a soft soap with filler thickness to increase the bulk, hardness and quantities. Examples of filler include $CaCo_3$, Sodium Silicate, Brightner, Soda ash, Perfumes and Colour.

2.4.3 Detergents

These are substances that in water remove dirt much better than soap. They are usually in liquid or powder form. They are of two types; Soapy Detergents and Soapless Detergents. Soapy detergents are obtained by sulphonating fatty acids while soapless detergents are obtained by sulphonating mineral oils like alkyl benzenes – a hydrocarbon with a bezene ring.

2.4.4 Liquid Soap

This is usually the aqueous mixture of potassium soaps. It is used in breweries for the washing of bottles.

2.4.5 Medicated Soap

Basoline and carbonic acids are added for the making of medicated soap.

2.5 CHEMISTRY OF SOAP MAKING

Soaps are the metallic salts of fatty acids. The sodium and potassium salts of the fatty acids are soluble in water, and constitute our ordinary " hard" and "soft" washing soaps respectively. The chemical equation or reaction leading to the formation of both are shown below in equation (i) and (ii) below.

i. $C_3H_5(OC_{13}H_{27}CO)_3 + 3NaOH = 3C_{13}H_{17}0_2Na + C_3H_5(OH)_3$

Fat/Oil — Caustic Soda — Hard Soap — Glycerol

ii. $C_3H_5(OC_{13}H_{27}CO)_3 + 3KOH = 3C_{13}H_{17}0_2K + C_3H_5(OH)_3$

Fat/Oil — Caustic Potash — Soft Soap — Glycerol

The two common types of soap (i.e. hard and soft soaps) are shown in equation (i) and (ii) above. Glycerol is a valuable by-product of soap production. It is a very important industrial chemical used in the production of vanishing creams, shaving soap and tooth paste.

2.6 PRODUCTION PROCESS

2.6.1 Saponification

Soap is produced by the process called esters. It is a situation in which alkali reacts with fat or oil to give soap and glycerol as a by-product. There are three methods of making soap. Each method has its own advantages depending on the type, quality and standard of soap planned for production.

2.6.2 Preliminary Preparation

Before saponification takes place, there are some preliminary preparations to be made on materials. This initial preparation or input will determine the quality of the output.

The caustic soda is to be dissolved in water to form soda solution at ratio of 1:4 or more depending on the reading of Hydrometer when tested. The specific gravity should be between 1,250 – 1,300 to achieve the best result. The oil should be warmed to room temperature.

2.6.3 Fully Boiled Saponification Process

It is very important to boil fully the mixture reactant in order to produce a standard and quality soap. This allows the neat soap to be separated from the dirty soap (lye) that contains glycerol. This system is only suitable for medium and large scale production of laundry and toilet soap. The oil will be boiled while hot caustic soda solution is poured into the vessel. The caustic soda solution should be stirred before being poured into the oil to prevent sedimentation of the caustic soda.

Since the lye and glycerol could be retrieved only in the full boiled process which the salt will therefore be added after the saponification. This salt will dissolve the glycerol which would now settle at the bottom to allowing the neat soap to be on top. Once the glycerol has been removed, other additives like perfume and colour could be added and stirred with the molten soap. It is now poured into cooling moulds and allow to dry for 24 hours.

It should be noted that glycerol is a valuable by-product of soap production and a very important industrial chemical. It could be refined and used in the production of tooth pate, shaving powder, etc.

2.6.4 Semi Boiled Process

This is an improved system on the cold process. The oil is boiled to about 50^0C before the solution of caustic soda is poured into it. It is then given a proper mixing. The mixed reactant will finally have a temperature of more than 95^0C and the by-product glycerol could then be retrieved. The additives such as perfume and colour could now be added. When the temperature drops to about 50^{0}C, it has to be stirred thoroughly and allowed to stay about 20 hours in the cooling moulds before cutting, stamping and packing could be initiated.

2.6.5 Cold Process

The oil warmed to about 35^{0}C is measured into mixing tank or the reactor. The caustic soda solution is gradually poured into the oil while continous stirring is maintained for the formation of smooth paste. The additives and improvers such as silicate is added to the mixed soap when cooled to about 45^{0}C. This has to be stirred thoroughly and poured into the cooling moulds for about 8 hours.

Since this system could not generate excessive heat which could be above 95^{0}C there is no way the glycerol could be sieved out. This is the quickest and easiest method of producing soap.

2.6.6 Advantages of the Three Production Methods

a. The cold and semi-boiled process are the easiest method of making soap but the quality is lower and less capital is needed.

b. The full boiled process produces high quality and fine soap and the by-product which is glycerol could be retrieved and sold for additional income. The retrieving stage for glycerol from boiled soap are; boiling, salting and settling.

2.6.7 Finishing Process

The process at intermediate technology is cutting the slabs to either bars or tablets while the Trade name has to be engraved on the soap. The wrapping and packing is the final stage.

2.7 QUALITY OF A GOOD SOAP

a. A good soap should not bite.
b. A good soap must be hard.
c. It must be clean.
d. It must have a good odour.
e. It must not shrink or change colour with time.
f. It must be tolerant to the skin.

2.8 SOAP USAGES

Apart from washing of clothes, household items and body, soap is very useful for many things such as;

a. Lubrication of materials that keep other things from sticking together.
b. It can be used to ease a stuck drawer or window.
c. For moulds or other tracks.
d. It is used in manufacturing of tyres.
e. Used in manufacturing of aluminum and lead foil.
f. It is used for polishing of jewelry.
g. It is used for softening of leather.

CHAPTER THREE

3.0 MATERIALS AND METHODOLOGY

3.1 MATERIALS AND EQUIPMENT

In an attempt to carry out this investigation, many instrument and materials were used but only the main materials and equipment set-ups are presented in this chapter. These include

a. Materials

i. Unriped plantain peels
ii. Laboratory Potassium Hydroxide
iii. Palm Kernel Oil
iv. Sobo Flower (Hibiscus Sabdarifa)
v. Normal-hexane
vi. Reagent

b. Equipment

i. Beaker
ii. Crucible
iii. Magnetic Hot Plate
iv. Furnace
v. Oven
vi. Glass or Steel Stirrer
vii. Separating Funnel
viii. Weighing Balance
ix. Filter Paper
x. Funnel
xi. Measuring Cylinder
xii. Container
xiii. Stop Watch

3.2 EXPERIMENTAL PROCEDURE

This project covered the approach involved in the analysis of raw materials used as well of local soap produced.

3.2.1 PREPARATION OF CAUSTIC POTASH (KOH)

The unriped plantain peels were gathered and dried in the oven for a period of 3 to 4 hours after which they were crushed. The powdery resultant of the plantain peels was then pre-ashed by putting it in the crucible and placed on a hot magnetic plate. This was done to remove the moisture content and smoke. The sample was then placed inside the furnace for proper ashing.

This proper ashing takes place for about 6 hours at temperature of 500^0C after which white ash was observed.

The ash was then placed in a beaker and distilled water of about 200 mls was poured into it and heated. The resulting solution was poured into a shaped filter paper with a clean container kept at the bottom for the collection of the clear caustic potash subsequently, this was then concentrated to get specific gravity (SP) of 1.984 by evaporation process. This method of extraction of caustic potash from the ash is called leaching process.

3.3 EXTRACTION OF SAPONIN

3.3.1 Leaching Procedure

Two hundred grams of Hibiscus Sabdarifa (Sobo Flower) was dried and grounded to powdery form. Two hundred (200 cm^3) volume of water was boiled and the powdery Sobo flower poured into the water. The mixture was left for 12 hours for leaching to be completed. By this time, the water turned deep red in colour and the residue was filtered off, leaving a clear deep red solution.

One hundred millilitres (100ml) of the solution was poured into a separating funnel and twenty millilitres (20ml) of normal hexane added and shaken for sometimes. During the shaking process, the mixture became foamy, which showed that saponin was available and had been extracted from the solution. The separating funnel was held stable for a few second to allow the formation of layers of solution and the foamy part. The solution at the bottom was then drained off and the foamy part at the upper layer containing saponin and normal hexane were washed with ten mililitres (10ml) of distilled water to separate the normal hexane from the saponin.

Despite the washing of the foamy part with water to remove the normal hexane, small amount was still remaining and this was subsequently heated off at low temperature.

The above procedure was repeated with new solution until the required quantity of saponin was obtained.

3.4.0 PREPARATION OF SOAP

3.4.1 Process

Semi hot saponification process in which heat was applied during the preparation was used.

One hundred and twenty grams (120g) of palm kernel oil (PKO) was used in the preparation of soap from laboratory potassium hydroxide and caustic potash extract from plantain peel ash.

One hundred and twenty grams (120g) of palm kernel oil (PKO) was accurately weighed into a 250 cm^3 beaker and kept on a magnetic hot plate stirrer to heat for about 50^0C. Then sixty-one grams (61g) of caustic potash for complete saponification was measured and poured into the 250 cm^3 beaker 120g of P.K.O. The magnetic stirrer was dropped into the beaker containing the mixture to aid in stirring in order to avoid sedimentation of the caustic potash and also to increase the rate of reaction. Water was added in between to break the foam and also to aid saponification. It took between 5 hours and 6 hours for proper saponification, after which the soap was then poured into five different soap molds and allowed to cool, before adding different quantity of saponin.

The same process was also used to prepare soap using laboratory potassium hydroxide.

3.5.0 QUALITATIVE ANALYSIS OF THE SAMPLES

3.5.1 Test for Softness

This analysis is a simple type and it involves sense of touch.

3.5.2 Procedure for Free Alkaline Test

Three grams (3.0g) of the soap sample was weighed and dissolved into 150ml hot distilled water at temperature of 41^0C. The solution was then transferred into a conical flask and 2 to 3 drops of methyl orange added to produce yellow colour.

A prepared standard acid solution of 0.05m H_2SO_4 was titrated against the soap solution until purple colour was observed, that was the end point. The volume of the acid (VA) was read from the burette and recorded.

The percentage of free alkaline in the soap was calculated based on the formula below:

$$\%K_2O = \frac{VA \times 56 \times MU}{10 \times Wt \times 2} = \frac{2.8 \times VA \times M}{Wt}$$

where; 2.8 is contant

VA - Volume of acid

M - The concentration of acid used

Wt - Weight of sample

Different samples of soap were analsed using the formula and the result recorded.

3.5.3 Test for Foamability

Three grams (3.0g) of each sample of soap was accurately weighed. It was maintained at a temperature of 41.0^0C before transferring it to 1000ml measuring cylinder.

Foam was generated gently by shaking the cylinder continuously for 20 seconds and the cylinder was placed on the bench to settle for 10 minutes after which the remaining height of foam on the solution was taken and recorded.

CHAPTER FOUR

4.0 RESULTS AND CALCULATION

4.1.0 Composition and Soap Samples

Tables 4.1 and 4.2 show the composition of the soap samples produced using caustic potash from plantain peels and laboratory potassium hydroxide respectively.

Table 4.1 Composition (g)

Sample of Soap	P.K.O.	Caustic Potash	H_2O	Perfume	Saponin
A	120	61.0	20		-
B	120	61.0	20		5
C	120	61.0	20		10
D	120	61.0	20		15
E	120	61.0	20		20

Table 4.2 Composition (g)

Sample of Soap	P.K.O.	Lab KOH	H_2O	Perfume	Saponin
A	120	61.0	20		-
B	120	61.0	20		5
C	120	61.0	20		10
D	120	61.0	20		15
E	120	61.0	20		20

Results on Softness Test

Table 4.3 gives the result obtained during the test for softness of the soap samples produced.

Table 4.3 Composition (g)

Samples of Soap (Sets 1 and 2)	Quantity of Saponin added	Softness	
		After 1 week	After 2 weeks
A	0	Liquid	Paste
B	5	Liquid	Paste
C	10	Liquid	Paste
D	15	Liquid	Paste
E	20	Liquid	Paste

Results on Corrosive Test

Table 4.4 shows the result obtained during corrosive test. The result gives the percentage of unconverted potassium hydroxide (%KOH) in the samples.

Table 4.4 Composition (g)

Samples of Soap		Caustic Soda from Plantain Peels	Free-Alkaline (%KOH)	Laboratory (KOH	
		Acid Vol. used		Acid Vol. used	(%KOH)
A	0	55.22	2.58	53.14	2.48
B	5ml	59.03	2.75	55.89	2.61
C	10ml	66.34	3.10	58.66	2.74
D	15ml	71.00	3.31	67.50	3.15
E	20ml	75.05	3.50	70.05	3.27

Results on Foamability Test

Table 4.5 shows the result obtained during foamability test. The net height of foam of samples were recorded for the set of samples prepared using caustic potash from plantain peels and laboratory potassium hydroxide.

Table 4.5

Soap Samples		Net height of foam for samples prepared using caustic potash from plantain peel	Net height of foam for samples prepared using laboratory KOH
A	0	10.05 cm	11.70 cm
B	5ml	11.00 cm	12.50 cm
C	10ml	14.00 cm	16.00 cm
D	15ml	16.00 cm	18.05 cm
E	20ml	17.40 cm	19.00 cm

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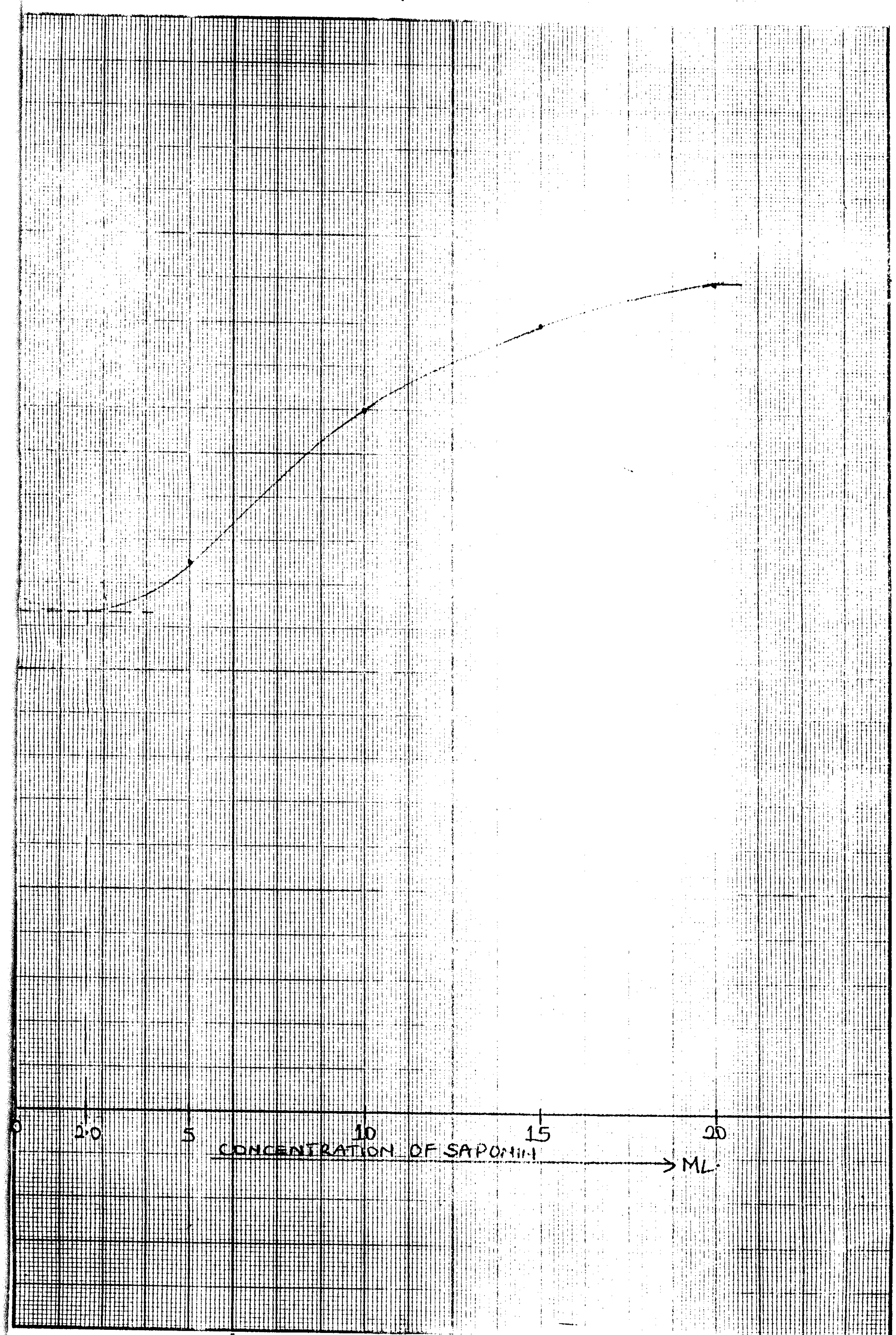
GRAPH FOR FOAMABILITY TEST

Name..............................Dept..............



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GRAPH for FOAMABILITY TEST

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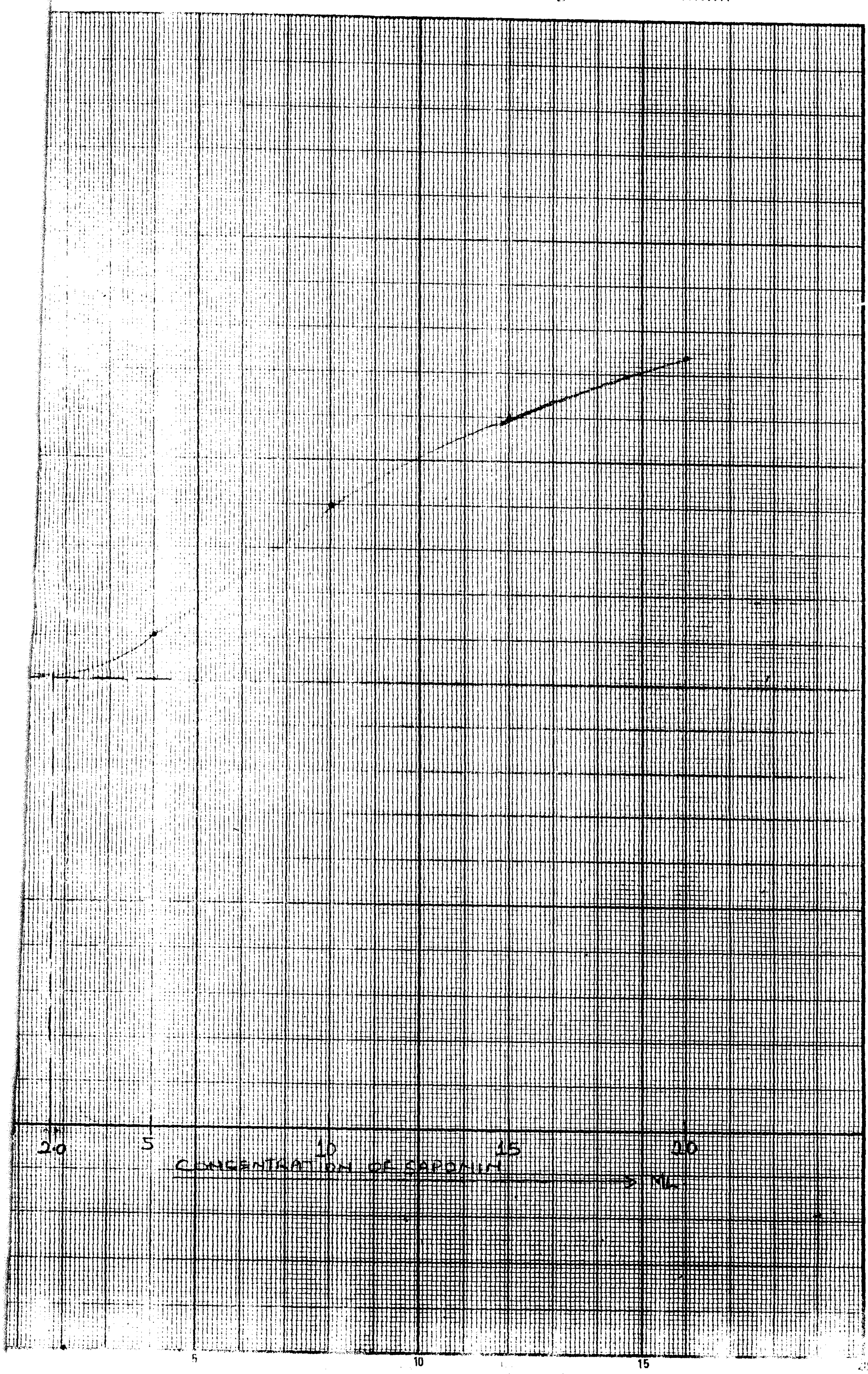

CHAPTER FIVE

5.0 DISCUSSION AND RESULTS

5.1 EXTRACTION OF CAUSTIC POTASH FROM UNRIPED PLANTAIN PEELS

The result of the experiment carried out on extraction of caustic potash from plantain peels, showed that high quantity of caustic potash can be extracted from it and also that this caustic potash was used to prepare soap.

5.2 EXTRACTION OF SAPONIN

From the experiment that was carried out, it was seen that saponin, which is a foaming agent can be extracted from the plant (i.e. Hibiscus Sabdarifa) using normal hexane as the solvent of extraction.

The leaching of the solution from the plant (i.e. Hibiscus Sabdarifa) could be done by soaking in cold water, but the best result was obtained by first crushing or grinding the sobo plant and soaking it in hot boiled water for about twelve (12) hours.

5.3 RESULT OF SOFTNESS TEST ON SOAP SAMPLES

The results obtained from softness test show that in one (1) week of production, the soap samples are in liquid form. However, in about two (2) weeks and above, the samples turned to paste irrespective of the quantity of saponin thas was added.

This shows that saponin does not affect the softness of soap produced using caustic potash plantain peels or laboratory potassium hydroxide.

5.4 RESULT OF CORROSIVE TEST

The results obtained from corrosive test show that the more saponin added, the more the percentage unconverted potassium hydroxide. However, the percentage unconverted potassium hydroxide is higher in soap samples produced from plantain peels than that from laboratory hydroxide.

The result also shows that when saponin is to be used in large quantity, the soap will be corrosive and will require other additives to reduce the level of corrosiveness.

5.5 THE RESULT OF FOAMABILITY TEST

This results shows that the more the quantity of saponin added, the more the foamability of the soap increases. This foamability is higher in soap produced from laboratory potassium hydroxide than that from plantain peels.

From the graph plotted using the results of foamability test, it was seen that for both soap samples, the optimum point for saponin concentration is 2.0 ml. Which means that 2.0 ml concentration of saponon should be added to get a good sample.

5.6 CONCLUSION

The research work has shown that caustic potash can be extracted from unriped plantain peels, and that the soap produced with this caustic potash is usually soft soap or in form of paste no matter the amount of saponin added. It was also detected that saponin can be extracted from sobo plant (that is Hibiscus Sabdarifa) using normal hexane as solvent.

From the analysis carried out on the soap, it was observed that the more the quantity of saponin added the more the foamability of the soap sample. But the foamability was more obvious in soap sample made from laboratory potassium hydoxide. The graph plotted with the foamability result shows that the optimum point of concentration is 2.0 ml. And this is the concentration of saponin that can be added to get a good quality soap sample. High quantity of saponin also increases the alkalinity of soap whereas saponin does not affect the softness of soap sample.

RECOMMENDATIONS

As a result of the difficulties encountered in the course of this research, the following recommendations are for future work:-

For any further study in this regards, caustic potash could be extracted from Banana plant ash, Palm bunch ash, etc. And the ash should be white to get a pure caustic potash.

Saponin which was extracted from Sobo plant (Hibiscus Sabdarifa) in this research work could also be extracted from soap bark, soap nut, liconce and other plants. But when Sobo plant (Hibiscus Sabdarifa) is to be used, it should be the light Sobo plant and not the deep red one.

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