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MAKING SOAP FROM DURIAN FRUIT PEEL EXTRACT

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ABSTRACT

Antibacterial bath soap is one of the liquid cleansing preparations made from basic ingredients and is used to clean the skin with the main benefit of effectively killing bacteria and other types of microorganisms so as to minimize skin irritation. Durian fruit skin contains alkaloids, flavonoids, steroids, triterpenoids, and tannins as antibacterial compounds and saponins that can produce foam in water. The main objective of this research is to formulate antibacterial bath soap from durian fruit peel extract. This type of research is an experiment, carried out by Soxhlet extraction of durian skin using 20%, 40%, 60%, 80%, and 96% methanol as solvent.
The antibacterial bath soap formula was made at a concentration of 25% durian skin extract including formulas F, G, H, I, and J using a differentiating ingredient, namely the durian skin extract, and was tested for physical and chemical evaluations including organoleptic, homogeneity, pH, foam height, and irritation test. For the results of the remaining durian skin extract, organoleptic tests will be carried out which include texture, color, and the presence or absence of fungi on the storage time of durian skin extract. The results showed that antibacterial bath soap from durian peel extract had met the requirements for a stable physical-chemical evaluation test which included pH, foam height, and irritation test as well as organoleptic and homogeneity tests for formula F.
Keywords: *Durian fruit peel extract, antibacterial bath soap, physical and chemical evaluation*

INDTRODUCTION

There are very few soaps marketed today that use natural ingredients. Most use synthetic materials as active ingredients. Synthetic active ingredients can cause negative effects for humans who have sensitive skin, which can cause irritation (Sears, 2001). Some of the synthetic active ingredients that are harmful to human skin health are: Diethanolamine (DEA), Sodium Lauryl Sulfate (SLS), as well as triclosan which is found in almost all bath soaps on the market. Iftriclosan accumulates in fat in the human body, it will potentially cause thyroid dysfunction (Mukiyo, 2011).

Therefore, currently research has begun to find alternative active ingredients for bath soaps derived from natural ingredients. Natural materials

can be used to replace synthetic materials, such as dyes, perfumes, bleaches, antibacterials, and others. One of them is using durian skin as a raw material for making soap. Durian (Durio zibhetinus) is a fruit that is in great demand by the public. In terms of structure, durian consists of three parts, namely part of the durian flesh about 20-30%, durian seeds about 5-15%, and the largest part is durian skin about 60-75%. During the durian season, environmental problems also occur as a result of durian skin waste which is considered to have no economic value.

The content of active compounds in the durian fruit peel can be taken up by the solvent during the extraction process. The selection of solvents according to the results of previous studies stated that the ethanolic extract of durian fruit peels contained positive alkaloids, flavonoids, tannins, saponins, steroids, and triterpenoids which in general the mechanism of action is to inhibit growth and cause death in bacteria and fungi (Nina Arlofa, 2015). & Hanny S., et al 2015). The research of Utami, Supriyanto, et al (2017) showed that methanol solvent was able to attract more active compounds than ethanol solvent.

Research purposes

1. Obtaining durian skin waste extract which will be used to make antibacterial bath soap and knowing the results of the organoleptic quality test analysis (texture, color, and presence or absence of fungus) on the storage time of durian skin extract.
2. Knowing the test results of phytochemical properties of antibacterial bath soap which include physical properties (organoleptic, homogenicity, and high foam) and chemical properties (pH test and irritation test on human skin) soap.

LITERATURE REVIEW

Durian

Durian is the name of a tropical plant originating from the Southeast Asian region. This name is taken from the characteristic skin of the fruit which is hard and has sharp curves so that it resembles a thorn. His popular title is "king of all fruit" (King of Fruit). Durian is a controversial fruit, although many people like it, others don't like its aroma. The name durian itself is taken from the characteristics of the fruit which has a thorny skin. Knowing durian is not only from its pungent aroma and delicious to eat, but durian has other features in the world of health and beauty.

Durian (Durio zibethinus Murr) is one of the plantation crops that has been known by the public which is generally only used for its fruit. Some literature

sources mention that the durian plant is a type of tropical fruit native to the archipelago from the island of Borneo (Sobir, 2015). Previously, durian was only a wild plant and was scattered in the "Malesia" forest, which now covers the country of Malaysia, as well as the areas of Sumatra and Kalimantan. Experts interpret, from the place of origin durian spread throughout Indonesia, then through Thailand to Burma, India and Pakistan. The spread to this extent was because the pattern of people's lives at that time was not permanent, so in the end the durian plant was disseminated to people who were already living permanently (Setiadi, 1999).

Durian fruit is round, elliptical or variations of the two forms. The ripe fruit is about 30-45 cm long and wide 20 - 25 cm, the weight is mostly between 1.5 - 2.5 kg. Each fruit contains 5 slices in which there are 1-5 seeds covered with white, cream, yellow, or dark yellow flesh. The size of the seed size, taste, texture, and thickness of the flesh depends on the variety (Untung, 2008). Flesh structure is thin to thick, white, reddish yellow or copper red. Durian fruit is green to brownish, covered by thorns that are pyramidal in shape, wide, sharp, and 1 cm long. Each durian tree can produce fruit between 80-100 grains, even up to 200 fruits, especially in old durian trees (Rukmana, 1996).

Benefits of Durian Fruit Skin

Durian skin is burned and then turned into ashes, the water can launch menstruation, but it is also abortive. Another benefit of durian skin so far is to eliminate the pungent smell of durian by pouring water into the durian skin, this makes the substances in the durian skin mix with water which will then neutralize the durian smell. Durian fruit skin can also be used as a mosquito repellent and its roots can treat infections of the nails (Mulyanto, 2015).

Content of Secondary Metabolites in Durian Skin

The inner skin of the durian fruit contains tannins, alkaloids, traterpenoids, and flavonoids as antibacterial ingredients and saponins, substances that contain foam, so that durian skin can be used as an active ingredient in making antibacterial bath soaps that are environmentally friendly. (Nina Arlofa, 2015)

Soap

Bath soap is the result of the reaction of sodium or potassium compounds using fatty acids from animal fats and or vegetable fats in the form of solid, soft or liquid, foaming which is used as a cleanser by adding fragrances and other ingredients that are not harmful to health (BSN, 2016). Soap is the oldest type of cosmetics known to humans, skin cleansers are used in addition to cleaning as well as skin fragrances (Tranggono and Latifah, 2007). In addition, soap is

used to clean dirt on the skin in the form of dirt that is soluble in water or soluble in fat. Soap has the main constituents of which include fatty acids and alkalis.

The main components of soap are fatty acids with C16 and carbon chains sodium or potassium, usually used for washing and emulsifying. Soaps made with potassium hydroxide (KOH) are known as mild soaps orsoft soap, while soap made with sodium hydroxide (NaOH) is known as solid soap or hard soap. There are two ways to make soap, namely the saponification process and the neutralization process. The two processes are distinguished from the byproduct produced in the form of glycerol, where the saponification process produces glycerin, while the neutralization process does not produce glycerin. The saponification process occurs due to the reaction between triglycerides and alkali, while the neutralization process occurs due to the reaction of free fatty acids with alkali (Purnamawati, 2006). These two processes are the main processes that occur in soap making. The chemical reactions that occur in the saponification and neutralization processes can be seen in Figure 1 and Figure 2.

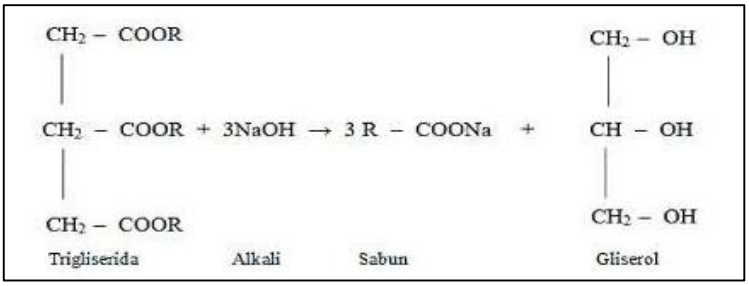


Figure 1. Saponification reaction in soap
(Source: Purnamawati, 2006)

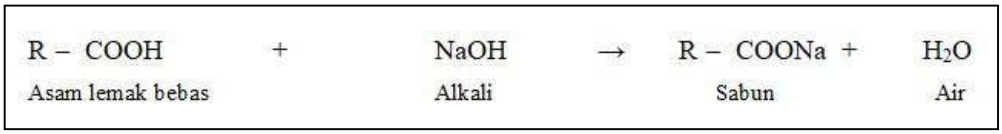


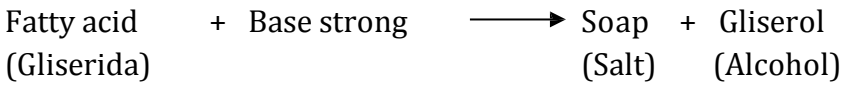
Figure 2. Neutralization reaction in soap
(Source: Purnamawati, 2006)

The aqueous layer containing the glycerol is separated, and the glycerol is recovered by distillation. Glycerol is used as a moisturizer in the tobacco, pharmaceutical, and cosmetic industries. Moisturizing properties arise from the hydroxyl groups that can hydrogen bond with water and prevent evaporation of water.

Soap is purified by boiling it in clean water (aquadest) to remove excess leachate, NaCl, and glycerol. Then additional substances (additives) such as pumice, dyes, and perfumes are added. The solid soap is melted and poured into

a mold. A soap molecule contains a long hydrocarbon chain plus ions. The hydrocarbon part of the molecule is hydrophobic (soluble in non-polar substances). While the ionic end is hydrophilic (water soluble), due to the presence of a hydrocarbon chain, a soap molecule as a whole is not completely soluble in water. However, soap is easily suspended in water because it forms micelles (micelles), that is, a group (50–150) of molecules whose hydrocarbon chains are clustered with the ends of the ions facing the water. (Ralph J. Fessenden, 2005)

In this study, soap was produced by the saponification process, namely the deliberate hydrolysis of esters from alkali to fat, usually by adding a strong base (caustic soda) to form glycerol (alcohol) and soap (salt) and the rest is acid.



Or briefly saponification is a reaction that occurs between fat and caustic soda or the hydrolysis of esters. The basic condition maker that is usually used is NaOH and or KOH.

Table 1. Quality Requirements for Bath Soap According to SNI No. 3532-2016

No	Test Criteria	Unit	Quality
1	Water content	% mass fraction	Max. 15.0
2	Total fat	% mass fraction	Min. 65.0
3	Insoluble in ethanol	% mass fraction	Max. 5.0
4	Free alkali (calculated as NaOH)	% mass fraction	Max. 0.1
5	Free fatty acids (counted as oleic acid)	% mass fraction	Max. 2.5
6	Chloride level	% mass fraction	Max. 1.0
7	Unsaponifiable fat	% mass fraction	Max. 0.2
NOTES : Free alkali or free fatty acid is an option depending on the nature of the acid or base			

Fatty acids that are bound to sodium or potassium are then called soaps. But sometimes the manufacture in alkaline conditions also uses NH4OH. Soap made with NaOH dissolves more slowly in water than soap made with KOH. Soap made of strong alkali (NaOH, KOH) has a pH value between 9.0 to 10.8 while soap made of weak alkali (NH4OH) will have a lower pH value of 8.0 to 9.5. (Yuda Prawira, 2008)

Table 2. Chemical Formulas of Fatty Acids

Asam Lemak		Rumus Kimia
Asam Lemak Jenuh	Asam Kaproat	$C_6H_{12}O_2$
	Asam Kaprilat	$C_8H_{16}O_2$
	Asam Kaprat	$C_{10}H_{20}O_2$
	Asam Laurat	$C_{12}H_{24}O_2$
	Asam Palmitat	$C_{14}H_{28}O_2$
	Asam Stearat	$C_{18}H_{36}O_2$
	Asam Arachidat	$C_{20}H_{40}O_2$
Asam Lemak Tak Jenuh	Asam Palmitoleat	$C_{16}H_{30}O_2$
	Asam Oleat	$C_{18}H_{34}O_2$
	Asam Linoleat	$C_{18}H_{32}O_2$

Source: Kemendikbud Study House (2016)

Table 3. Types of Fatty Acids on the Properties of Soaps Produced

Fatty acid	**The Characteristics of Soap**
Linoleic Acid	Moisturizing
Myristic Acid	Hardening, cleaning, foaming, soft
Oleic Acid	Moisturizing
Palmitic Acid	Hardens, stabilizes foam
Stearic Acid	Hardens, stabilizes foam

Source: Kamikaze (2002)

Vanilla Oil

Vanilla is the most expensive spice in the world after saffron because vanilla requires alot of labor to obtain it. Vanilla extract is obtained from every part of the fruit. The main compound that gives vanilla its distinctive aroma is vanillin which can be made synthetically from phenol and is soluble in ethanol. (Encyclopedia "Vanilla") Vanilla has antioxidant,antimutagenic, anti-tumor, and anticarcinogenic activities. From other sources, vanilla is also used as an antimicrobial agent to prevent mold and mildew on the skinpuree fruit. In addition, vanillin (a compound isolated from vanilla fruit) has a very potential as an antimicrobial against fungiAlternaria sp., Aspergillus sp., Penicillium sp., Fusarium sp., Saccharomyces cerevisiae, Zygosaccharomyces bailii, and Zygosaccharomyces rouxiiand four bacteriaPantoea agglomerans, Aeromonas enteropelogenes, Micrococcus lylae, and Sphingobacterium spiritovorun. (Bambang Kunarto, 2007)

Extraction

Extraction is the process of separating a substance based on differences in certain properties, especially its solubility in two immiscible liquids. In general,

extraction is carried out using a solvent based on the solubility of the component in other components in the mixture, for example water or organic solvents. The material to be extracted is usually in the form of dry crushed material, usually in the form of powder or simplicia. The purpose of natural material extraction is to extract the chemical components found in natural materials, such as antibacterial and antifungal compounds which are extracted using solvents. (Sembiring, 2007)

In the extraction process with solvents, the amount and type of compounds that enter the solvent liquid is largely determined by the type of solvent used and includes two phases, namely the rinsing phase and the extraction phase. In the rinsing phase, the solvent rinses the components of the cell contents that have been broken in the previous crushing process. In the extraction phase, at first there is swelling of the cell wall and loosening of the cellulose framework of the cell wall so that the pores of the cell wall become widened which causes solvents to easily enter the cell. The material inside the cell is then dissolved into the solvent according to its solubility level and then diffuses out due to the force caused by the difference in the concentration of the dissolved material inside and outside the cell. (Voigt, 1995)

Liquid Solid Extraction

Liquid solid extraction (leach) is the process of separating a solute contained in a solid by contacting the solid with a solvent (solvents) so that the solid and liquid mix and then the solute separates from the solid as it dissolves in the solvent. Separation can occur because of the pushing force(driving force) i.e. the difference in the concentration of the solution (solute) in the solid with the solvent and the difference in the solubility of the components in the mixture. (McCabe, 2005)

On natural materials, solute usually confined in a cell so that in the process of direct contact between the solvent and the solute This results in the breakdown of the cell wall due to the difference in pressure between the inside and outside of the cell wall. If one of the processes is relatively faster, then the extraction speed is determined by the slow process, but if the two processes take place at a speed that is not much different, then the extraction speed is determined by the two processes. (McCabe, 2005)

Liquid-liquid Extraction

In liquid-liquid extraction, one or more components of a mixture are separated with the help of a solvent. Liquid-liquid extraction is mainly used when separating the mixture by distillation is not possible (eg due to the formation of azeotropes, sensitivity to heat or because it is uneconomical). Liquid-liquid extraction always consists of at least two stages, namely intensive mixing of the

extraction material with the solvent and separation of the two liquid phases as much as possible. In liquid-liquid extraction, the solute is separated from the carrier liquid (diluent) using a liquid solvent. This mixture of carrier liquid and solvent is heterogeneous, if separated there are 2 phases, namely the diluent phase (raffinate) and the solvent phase (extract).

The difference in the concentration of the solute in a phase with the concentration at equilibrium is the driving force behind the dissolution (release) of the solute from the existing solution. thrust(driving force) which causes the extraction process can be determined by measuring the distance of the system from equilibrium conditions (Indra Wibawa, 2012). To achieve a good liquid-liquid extraction process, the solvent used must meet the criteria, namely high ability to dissolve the solute component in the mixture, high ability to be taken back, the difference in specific gravity between the extract and the raffinate is greater, the solvent and solution to be extracted must be not easy to mix, not easy to react with the substance to be extracted, does not corrode the tool, is not flammable, non-toxic, and the price is relatively cheap. (Martunus & Helwani, 2005)

Extraction Method

The extraction method is based on the presence or absence of a heating process. Extraction can be divided into two types, namely cold extraction and hot extraction.

a. Cold way extraction

In this method, no heating is carried out during the extraction process in order to prevent the desired compound from being damaged. There are several types of cold extraction methods, namely:

1. Maceration or dispersion

   Maceration is an extraction method using a stationary solvent or by stirring several times at room temperature. This method can be done by immersing the material with occasional stirring. In general, the immersion is carried out for 24 hours, then the solvent is replaced with a new solvent. Maceration can also be carried out with continuous stirring (kinetic maceration).

   The advantages of this method are that it is effective for compounds that are not heat resistant (degraded due to heat), the equipment used is relatively simple, inexpensive, and easy to obtain. However, this method also has several disadvantages, namely long extraction time, requires large amounts of solvent, and the possibility that certain compounds cannot be extracted because of their low solubility at room temperature. (Sarker, SD, et al, 2006)

2. Percolation

   Percolation is an extraction method in which materials are arranged in a pile using a solvent that is always fresh until the process is complete and is generally carried out at room temperature. The procedure for this method is that the material is soaked with a solvent, then a new solvent is flowed continuously until the color of the solvent is no longer colored or remains clear, which means that there are no more dissolved compounds. The advantages of this method are that no additional process is needed to separate the solids from the extract, while the weakness of this method is that the number of solvents required is quite large and the process also requires a long time, as well as uneven contact between the solids and the solvent. (Sarker, SD, et al, 2006).

b. Hot way extraction

   This method involves heating during the extraction process. The presence of heat will automatically speed up the extraction process compared to the cold method. There are several types of hot extraction methods, namely:

   1. Reflux extraction

      Reflux extraction is an extraction method carried out at the boiling point of the solvent for a certain time and a certain amount of solvent in the presence of reverse cooling (condenser). In general, the process is repeated three to five times in the first rafinat. The advantage of the reflux method is that solids that have a coarse texture and are resistant to direct heating can be extracted by this method. The weakness of this method is that it requires a large amount of solvent (Irawan, B., 2010).

   2. Extraction with soxhlet tool

      Extraction with a Soxhlet apparatus is an extraction with a solvent that is always replaced, generally carried out using a special tool so that a constant extraction occurs in the presence of a back cooling (condenser). In this method, the solid is stored in a Soxhlet apparatus, while only the solvent is heated. The solvent is cooled in the condenser, then extracts the solids. The advantages of the Soxhlet method are that the extraction process takes place continuously, requires a shorter extraction time and a smaller amount of solvent when compared to the maceration or percolation method. The disadvantage of this method is that it can cause damagesolute or other components that are not heat-resistant due to continuous heating of the extract. (Sarker, SD, et al, 2006)

Factors Affecting Extraction

The following Factors affect the extraction

1. Type of solvent
   The type of solvent affects the compounds filtered out, the amount of solute extracted, and the rate of extraction.
2. Temperature
   In general, an increase in temperature will increase the amount of solute dissolved into the solvent.
3. Ratio of solvent and raw material
   If the solvent-raw material ratio is large, it will also increase the number of dissolved compounds. As a result, the extraction rate will increase.
4. Particle size
   The extraction rate also increases when the particle size of the raw material gets smaller. In the sense On the other hand, the extract yield will be greater if the particle size is getting smaller.
5. Stirring The function of stirring is to accelerate the reaction between the solvent and the solute.
6. Duration
   The longer extraction time will produce more extract, because the contact between the solute and the solvent is longer. (Ubay, 2011)

Solvent

A solvent is a liquid or gas that dissolves a solid, liquid or gas, resulting in a solution. The most common solvents used in everyday life are water (aquades) and organic chemicals (containing carbon) which are also called organic solvents. Solvents usually have lower boiling points and are more volatile, leaving the dissolved substance that is obtained. To distinguish between the solvent and the substance being dissolved, the solvent is usually present in greater amounts.

Most chemical reactions are widely carried out in solution. A solution consists of a solvent (solvent) and a solute (solute). The solvent (solvent) is generally a substance that is in solution in large quantities, while other substances are considered as solutes. Solvents fulfill several functions in chemical reactions, where solvents dissolve reactants and reactants so that they are mixed, so this will facilitate the combination of reactants and reactants that should occur in order to convert reactants into products. The solvent also acts as a temperature control, one of which is to increase the energy of the particle collisions so that the particles can react faster, and can absorb the heat generated during exothermic reactions.

To achieve a good extraction process, the solvent used must meet the following criteria (Martunus & Helwani, 2004; 2005):

1. Available in large quantities.
2. When mixed with air it is not explosive.
3. Chemically and thermally stable.
4. Does not cause the formation of emulsions.
5. Does not corrode the tool.
6. Non-flammable, non-toxic and relatively inexpensive.

Solvent Classification

Based on the polarity of the solvent, chemists classify solvents into three categories, namely:

a. Protic Solvent

Protic solvents are solvents that have a hydrogen atom bonded to oxygen (as in hydroxyl) or nitrogen (as in amine groups). More generally, the characteristics of protic solvents are the appearance of a hydrogen bonded solvent, the solvent has acidic hydrogen (despite its very weak acidity), and the solvent can stabilize ions. One example of this polar protic solvent is methanol (CH_3OH). (Wakhid Fajar Purnomo, 2008)

Methanol is an alcohol compound with 1 carbon chain. Molecular weight 32.04 g/mol, boiling point 333.70 K, and the density at STP is 0.272 g/cm3. Physically, methanol is a clear, colorless liquid, smells like alcohol, can mix with water and ethanol as well aschloroform in any ratio, hygroscopic, volatile, and flammable with a blue flame. (Green et al, 2008)

Methanol is a semi-polar solvent so it has the ability to dissolve polar and non- polar compounds. Methanol has a better ability than ethanol and water in dissolving polar and non-polar compounds. (Supriyanto, et al., 2017)

b. Aprotic Solvent

Aprotic solvents are the opposite of protic solvents i.e. solvents that do not have a positively polarized hydrogen atom. Solvents in this category generally have an intermediate dielectric constant and polarity. The characteristics of aprotic solvents are that the solvent does not have hydrogen bonds, the solvent does not have acidic hydrogen, and the solvent can stabilize ions. Usually the bond is a double bond between carbon and oxygen or nitrogen. Examples of solvents that fall into this category are acetone [(CH3)2CO] and ethyl acetate (CH3CO2CH2CH3). (Wakhid Fajar Purnomo, 2008)

c. Nonpolar Solvent

Nonpolar solvents are compounds that have a low dielectric constant and do not soluble in water. Examples of solvents from this category are benzene (C6H6) and carbon tetrachloride (CCl4). The solvent solubility indicator can

be determined from the value of the dielectric constant and the value of the polarity of the solvent. (Wakhid Fajar Purnomo, 2008)

Theoretical basis

Based on the literature review, soap is the result of a reaction that occurs when vegetable oil or fat is mixed with an alkaline solution. The soap making process is carried out in two stages, namely:

a. Extraction Stage
   Things that can affect the extraction process include:
   1) Solvent Type
   2) Size of extracted solid
   3) Temperature
   4) Time
   5) Comparison of solids and solvents
   6) Stirring speed
b. Saponification Stage
   Soap is made by reacting triglycerides (vegetable oils) with alkali. Where soap is produced using NaOH alkali in the form of solid soap, while with KOH alkali in the form of liquid soap. In this study, alkaline KOH will be used. The decision was taken because liquid soap will facilitate the testing of phytochemical properties which include physical and chemical properties of the resulting soap preparations.

SCOPE OF PROBLEM

This research is limited to several things as follows:

1. This research was conducted on a laboratory scale.
2. The solvents in the extraction process used were 96% methanol, 80% methanol, 60% methanol, 40% methanol, and 20% methanol.
3. The solvent used in the soap making process is KOH solution.
4. This study was conducted to determine "The Effect of Methanol Solvent Levels on the Quality of Durian Fruit Skin Extract Results and the Quality of Antibacterial Soap Preparations Produced Using Soxhlet Extraction Equipment".

HYPOTHESIS

1. The soxhletation results were obtained using 96% methanol, 80% methanol, 60% methanol, 40% methanol, and 20% methanol with the best observation results from the comparison of organoleptic tests were the results of soxhletation using 96% methanol solvent.

2. In this research test, all bath soap results obtained did not cause side effects/irritations on human skin preparations.
3. In this experiment, the results of observation and testing of the phytochemical properties of the best soap preparations were obtained from the durian skin extract resulting from soxhletation with 96% methanol as solvent.

RESEARCH METHODOLOGY

Research variable

1. The solvent variations used were methanol 96%, methanol 80%, methanol 60%, methanol 40%, and methanol 20%.
2. Variations in the process of making soap (using the extract of durian fruit peel, each with methanol solvent).

How research works

1. Dilution of 96% methanol solution to 80% methanol, 60% methanol, 40% methanol, and 20% methanol with a volume of each solvent is 400 mL. Calculate the volume of diluted 96% methanol using the formula: V × M= V × M
2. Soap Making:
   Before carrying out the extraction process, the saponification process, and testing the extract and soap results. The raw material in the form of durian fruit skin is cut, then dried in an oven at 100 C for about 4 hours. Then blended and dried again in the oven at 100 C for 7 hours 30 minutes. The results of the durian fruit skin that has been dried.

Extraction Process

Dry powder of monthong durian skin as much as 100 grams in a socket with 20 mL of 96% methanol. Soxhletation was carried out for 1 hour after the first drop. After the Soxhlet extraction process is complete, the durian skin powder is replaced with new one. Also replace 96% methanol solution with 80% methanol solution, 60% methanol solution, 40% methanol solution, and 20% methanol solution. Restart the Soxhlet extraction process.

Saponification Process

Saponins are soluble in polar solvents such as water. Meanwhile, methanol is a semi-polar solvent so that the saponins in the durian fruit peel can be extracted. In this process, first measure 25 mL of the extracted durian skin. Then weigh 2.12 grams of KOH, then dissolve it into 4 ml of distilled water and let the solution cool. Weighing 9.4 grams of stearic acid, adding to each durian skin extract, and

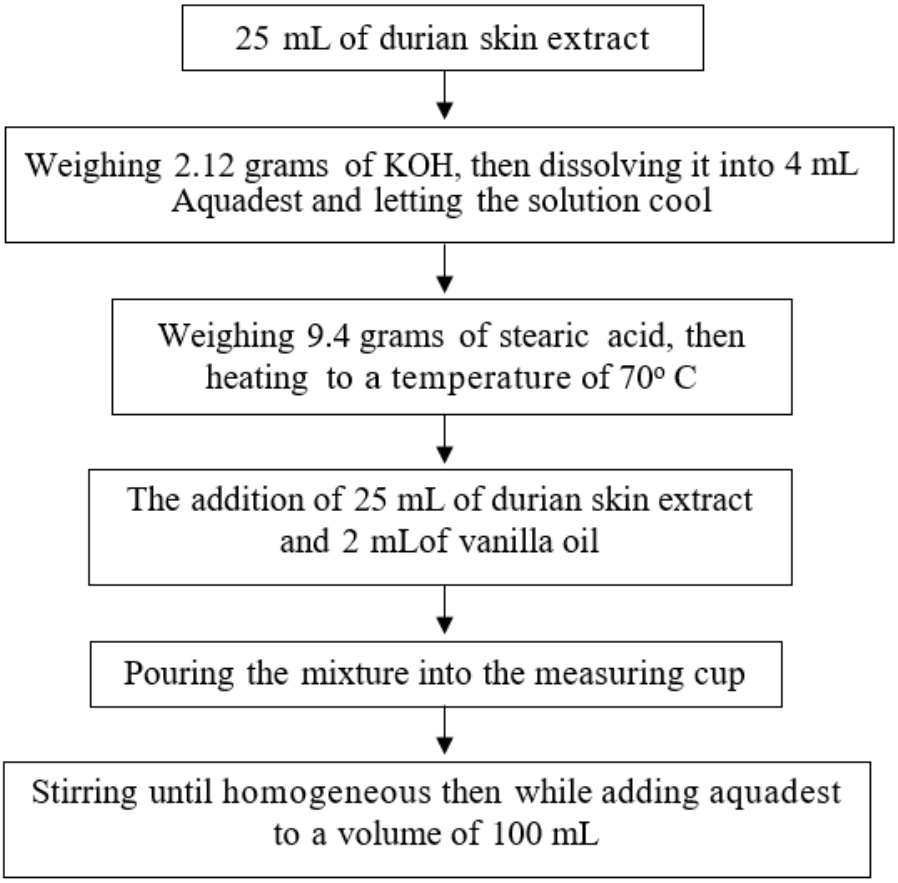
heating to a temperature of 70 C. Add the KOH solution to the extract and stir it, then add 24 mL of 96% methanol, 5 mL of glycerol while heating the mixture for 1 hour. Cool the mixture to 50 C and add a few mL of vanilla oil. Finally, pour the mixture into a measuring cup. Stir until homogeneous then add aquades solution to 100 mL.

Table 3 Liquid Soap Preparation Formula Each 100 mL contains:

Ingredients	Utility	Contain
Fruit peel extract durian	active wait	25%
Stearic Acid	Emulsifier	1-20%
Glycerol	Humectants	5-15%
Vanilla oil	Fragrance	-

(Ikka Wahidatul Rahmi et al, 2017)

Process flow chart Making Liquid Soap Preparations



RESULTS AND DISCUSSION

Organoleptic Test

Effect of Methanol Solvent Level on Extract Quality

Fixed variable used:

Sample weight : 100 grams
Solvent volume : 200 mL
Extraction time : 60 minutes

Durian Fruit Skin

Based on the results **organoleptic test** Durian fruit peel extract can be explained as follows:

Formula A : Methanol solvent extraction yield 96%
Formula B : Methanol solvent extraction yield 80%
Formula C : Methanol solvent extraction yield 60%
Formula D : Methanol solvent extraction yield 40%
Formula E : Methanol solvent extraction yield 20%

Based on the results of research observations from the initial conditions of the durian fruit peel extract for up to two months on organoleptic testing (texture, color, and presence or absence of fungus) formulas A, B, C, D, and E showed the greater the methanol content used for Soxhlet solvent, the higher the concentration of methanol used for Soxhlet solvent could be. improving the quality of the resulting extract and storage time can reduce the quality of organoleptic.

Based on the results of the Physical Evaluation of Soap Preparations (Observation of Changes in Shape, Color, and Odor)

Formula F : Soap from Extracted Methanol Solvent 96%
Formula G : Soap from Extracted Methanol solvent 80%
Formula H : Soap from Extracted Methanol Solvent 60%
Formula I : Soap from Extracted Methanol Solvent 40%
Formula J : Soap from Extracted Methanol Solvent 20%

The results showed that the first to fourth week of the organoleptic test of soap formulas F, G, H, I, and J showed a stable odor for 4 weeks of storage. Meanwhile, for the shape and color which is close to stable, it is the formula F soap preparation.

pH test

The degree of acidity or pH is a process of measuring the level of acidity of a substance in solution. Measurement of the pH value serves to determine whether the soap produced is acidic or basic. The results of measuring the pH of antibacterial liquid bath soap in this study were in accordance with the standards set by SNI 2016, namely 9-11 (Alyazahra Habiany Rubianto et al, 2016-2017). In general, liquid soap products have a pH that tends to be alkaline, this is because the basic ingredient of the liquid soap is KOH which is a strong base

The results of the observations show that the resulting pH value has met the requirements of SNI. A pH value that is too low can cause an increase in the absorption of soap on the skin so that it can cause irritation to the skin, while a pH value that is too high can also cause irritation to the skin (Purnamawanti, 2006:31). The results also showed a small increase in pH. This is because the pH meter temperature at each measurement of the pH of the preparation for each formula is not constant or the temperature is not the same, changes in pH can also be caused by chemical changes in the active substance or additional substances in the preparation under storage conditions due to the influence of the carrier or the environment.

Table 4. Data on pH Measurement Results from Antibacterial Bath Soap

Formula	Observation week			
	I	II	III	IV
F	9.5	9.9	9.9	9.9
G	9.7	9.8	10	10
H	9.5	9.8	10	10
I	9.6	9.9	10	10
J	9.6	9.8	9.9	9.9

Homogeneity Test

The results of the homogeneity examination of the preparations carried out from the first week to the fourth week showed that there were no particles in the antibacterial bath soap preparations, both formulas F, G to formula J. Durian, namely saponins, flavonoids, and tannins are easily mixed with a water-oil type base so that there is no agglomeration of particles and phase separation. Judging from the physical evaluation test of soap preparations, there was still a phase separation during the 4-week observation. This indicates that the antibacterial bath soap has not met the homogeneity requirements even though there is no agglomeration of particles in the soap preparation.

Table 5. Data of Homogeneity Test Results from Antibacterial Bath Soap

Formula	Observation week			
	I	II	III	IV
F	Homogeneous	Homogeneous	Homogeneous	Homogeneous
G	Homogeneous	Homogeneous	Homogeneous	Homogeneous
H	Homogeneous	Homogeneous	Homogeneous	Homogeneous
I	Homogeneous	Homogeneous	Homogeneous	Homogeneous
J	Homogeneous	Homogeneous	Homogeneous	Homogeneous

Irritation Test

In the manufacture of this antibacterial bath soap, the concentration of the active substance (the result of durian fruit peel extract) used is 25%. The reason is that durian rind extract is good to use at a concentration of 25% because it has the largest diameter of the inhibition zone atcandida albicans compared to concentrations of 15% and 20% (Hanny S., et al 2015). Candida albicans causes candidiasis, which is a fungal disease that is acute and sub-acute including skin candidiasis which causes fungal infections in the groin area, between the toes, and armpits.

The test is carried out directly on the skin of the human body. It is hoped that this soap preparation can be directly applied to humans if it has been proven to have no irritating effect on human skin. The test results stated that the antibacterial soap preparations were formulas F, G, H, I, and J which were characterized by the absence of edema and erythema on the skin after more than 4 hours of exposure to soap (Table 3.6), so it can be stated that antibacterial bath soap did not irritating to the skin. Erythema is the red color of the skin caused by enlarged capillaries caused by allergies, while Edema is an abnormal accumulation of fluid in the interstitial spaces (gaps between cells) or body tissues that causes swelling.

Table 6. Irritation Test Result Data from Antibacterial Bath Soap

Formula	Observation week			
	I	II	III	IV
F	No Irritating	No Irritating	No Irritating	No Irritating
G	No Irritating	No Irritating	No Irritating	No Irritating
H	No Irritating	No Irritating	No Irritating	No Irritating
I	No Irritating	No Irritating	No Irritating	No Irritating
J	No Irritating	No Irritating	No Irritating	No Irritating

CONCLUSIONS AND SUGGESTIONS

Conclusion.

Based on the results of experiments that have been carried out, the following conclusions are obtained:

1. In the variation of methanol solvent levels in the extraction process, organoleptic test observation data (texture, color, and the presence or absence of fungi) were obtained. The results of the durian fruit peel extract were the greater the methanol content used for Soxhlet solvent, the higher the quality of the extract produced and the longer storage. reduce organoleptic quality.
2. The results of the durian peel extract can be made or formulated into antibacterial bath soap with variations in the extraction process methanol solvent, namely methanol 96%, 80%, 60%, 40%, and 20%, and fulfills the requirements for chemical evaluation (pH test and irritation test on human skin) for all soap formulations and met the stable physical evaluation requirements for formula F.

Suggestion

1. In the extraction process, it is necessary to conduct research on the effect of variations in methanol solvent on the yield of durian fruit peel extract using a water bath and the like. This is because the heat generated can be regulated even though the process takes longer than using an electric stove.
2. While in the soap making process, variations of solid soap samples can be added and a process of observation and testing is carried out to complete the liquid soap research data that already exists in this study.
3. Further research is needed to apply the durian skin extract as an active ingredient for the soap industry.

REFERENCES

Arlofa, Nina. 2015. Test the Phytochemical Content of Durian Fruit Peel as an Active Ingredients for Making Soap. Serang Raya University, Serang. Banten.

Fessenden, Ralph J. 2005. Organic Chemistry Third Edition, 3rd Edition, Volume 2. Jakarta: Erlangga.

Irawan, B. 2010. Improvement of Patchouli Oil Quality by Extraction and Distillation in Various Solvent Composition, Thesis, Diponegoro University, Semarang, Indonesia.

Kunarto, Bambang. 2007. vanilla (Vanilla planifolia Andrews): Processing Technology, Oleoresin, and Quality Standards. Semarang University Press. ISBN 978-979-3948-59-1.

Martunus & Helwani, Z. 2005. Extraction of Aromatic Compounds from Heavy Gas Oil (HGO) with Solvents Triethylene Glycol (TEG). J. Si. Tech. 4[2]: 34-37.

Mukiyo. 2011. Hazardous Substances Contained In Cosmetic Products (On line) (http://gombhalmukiyo.blogdetik.com/zat-zat-danger-yang-terdapatdalam- produkkosmetik/, accessed 20 November 2019).

Soldier, Juda. 2008. Saponification Reaction in Soap Making Process. On line. (http://yprawira.wordpress.com/reaction-saponification-the-process-soap-making/, accessed on 20 November 2019).

Purnomo, Wakhid Fajar. 2008. Thesis: "Synthesis and Characterization of Organotin Compounds (IV) Carboxylates: Trimethyltin N-Maleoilglycinate". FMIPA, UI, Depok, West Java.

Rahmi, IW, Nurhikma, E., Badia, E., Ifaya, M. 2017. Formulation of Female Cleansing Soap(Feminine Hygiene) from Durian Fruit Peel Extract (Durio zibethius Murray). Journal of Mandala Pharmacon Indonesia 3(2): 80-89.

Rukmana, R. 1996. Durian: Cultivation and Post-Harvest. Canisius. Yogyakarta. 120 p. Sarker SD, Latif Z., and Gray AI, 2006, Natural products isolation. 2nd ed. Totowa (New Jersey). Humana Press Inc. 18:6-10.

Sembiring B. 2007. Standardized Simplicia Preparation Technology for Medicinal Plants. Puslitbangbun News. August 2007. 13[12]. Balitro.litbang. depta.go.id (accessed November 21, 2019).

Setyowati, Hanny, et al. 2015. Durian Fruit Skin Cream (Durio zibethinus L.) As Herbal Medicine Fungal Infection Treatment Candida Albicans.". Semarang: College of Pharmacy.

Setyowati, WAE, Damayanti, DR 2013. Effect of Extraction Method on Activity Durian Fruit Skin Antioxidant (Durio zibethinus Murr) Petruk variety. FMIPA FKIP UNS, Surakarta, Indonesia.

Sukma, Indra Wibawa Dwi. 2012. Liquid-Liquid Extraction. Lampung University. Tranggono, Latifah. 2007. Handbook of cosmetic science. Jakarta: PT. Gramedia Main Library; 6.

Ubay. 2011. Solid-liquid extraction.www.extraction-solid-liquid.html. Accessed on November 21 2019.

Utami, Supriyanto, S., Rahardjo, S., Armunanto, R. 2017. Antioxidant Activity of Cocoa Beans from Drying of Dried Cocoa Beans at Light, Medium and Heavy Degrees. AGRITECH, 37(1).

McCabe, WL, JC Smith, P. Harriott. 2005.Unit Operations of Chemical Engineering. McGraw Hill, NY, (7th Ed.).