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FORMULATION ANTISEPTICS ARTISAN SOAP FROM EXTRACT SECANG WOOD (*Caesalpinia sappan* L.) AND KAFFIR LIME LEAVES (*Citrus hystrix* DC.)

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ABSTRACT

Solid soap as a body skin cleanser can be used as a souvenir. Kaffir lime leaves and sappanwood are natural ingredients and contains good anti-bacterial compound. This paper aims to explain how to make solid soap with shape of watermelon using thick extracts of kaffir lime leaves and sappanwood with a concentration of 1%. Kaffir lime leaf and sappanwood extracts were each made by soaking 300 g of powder in 500 mL pro analysis ethanol solvent for 48 hours and thickening using a rotary evaporator at a temperature of approximately 50 °C. The soap is made using the cold method (cold process). The research results showed that the soap had a fresh smell, solid shape, soft texture and color resembling the shape of a watermelon. Has a pH of 9.8 ± 0.4 and free fatty acids of 1.39 ± 0.2, according SNI Soap. Artisan soap is also antiseptic and able to inhibit *Escherichia coli* and *Staphylococcus aureus* bacteria.

Keywords: *souvenir soap, anti-bacterial agents, natural ingredients*

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INTRODUCTION

Bath soap is a skin cleansing preparation made from the saponification or neutralization process of fat, oil, wax, rosin or acid with an organic or inorganic base without causing irritation to the skin. (SNI 3532:2016) (1) Soap can be made in two ways, hot and cold methods. The difference between these methods is the use of temperature in the manufacturing process. (2)(3) Saponification which is a chemical process carried out on fatty or fatty acids together with a strong base, that is in the form of sodium hydroxide with a certain amount of water for solid soap or potassium hydroxide with water for liquid soap. (4)

Many Indonesian people grow kaffir lime plants as family medicinal plants. (3) Kaffir lime leaves contain antibacterial compounds such as alkaloids, flavonoids and tannins (5) which can inhibit the growth of *Staphylococcus aureus* and *E. coli*. (5) Meanwhile, sappan plant is a traditional plant that is widely planted in rural areas which has benefits as a traditional medicine. (6) In a research results (NI Made Gress Rakasari, 2019) the extract of sappanwood (*Caesalpinia sappan* L.) has a total of 6.02% flavonoids and total anthocyanin 2.43%. (7) In a phytochemical test (Diah M. Cahyaningtyas, 2019) sappan contains saponins, flavonoids, tannins and phenolic compounds. Apart from that, her research stated that the ethanol extract of sappanwood was able to inhibit *Staphylococcus aureus* bacteria. (8)

Some significant research includes solid bath soap from kaffir lime peel extract (*Citrus hystrix* DC.) (3) lemongrass oil (*Cymbopogon nardus* L.), (9) seagrass leaf extract (*Thalassia hemprichii*), (10) starfruit leaves (*Averrhoa bilimbi*), (11) combination of lemongrass leaf extract (*Cymbopogon nardus* L.) and pandan leaf (*Pandanus amaryllifolius*), (12) purple leaf extract (*Graptophyllum pictum* (L.) *Griff*) with combination of coconut oil, (13) ethanol extract of papaya seeds (*Carica papaya* L.) (14) souvenir soap from palm cooking oil. (15) Some of this research only tested the physical and chemical properties of soap and did not test its antibacterial property. So, based on previous research, researchers were encouraged to make watermelon-shaped antiseptic soap which could be used as a souvenir and was useful for eradication bacteria on the skin.

The aim of this research is to make solid soap in the form of watermelon using sappanwood extract (*Caesalpina sappan* L.) and kaffir lime leaf extract (*Citrus hystrix* DC.). The method used is that the powder is macerated with 96% ethanol solvent for 48 hours and evaporated using a rotary evaporator at a temperature of approximately 50 ^{0}C. In making this soap, the method used is the cold method or cold processing between oil from plants or vegetable oil and NaOH. (3)

RESEARCH METHODS

Materials and Instrumentation

The tool used in this experimental research is a rotary evaporator (Eyela), analytical scales (ohaus-America), oven (Memmert-Germany, PT. Sumber Karya Abadi Indonesia), simplicia fine grinder (Maksindo), hand blender (Oxone-OX 204-Indonesia), glassware from (pyrex glassware-America-CV. Harum Kimia - Indonesia).

Kaffir lime leaf material (*Citrus hystrix* DC.) was obtained from the Tulung Agung area, Ngunut village, Tulung Agung district, East Java, while sappanwood (*Caesalpinia sappan* L.) was obtained from the Spice and Medicinal Plant Research Institute (Balitro). Plant was identified by Indonesian Institute of Sciences (LIPI) via letter number B.466/IV/D1.01/3/2021. Ethanol pro analysis (PT. Merck Tbk-Jakarta Indonesia), Natrium hydroxide pro analysis (PT. Merck Tbk-Jakarta Indonesia), olive oil cosmetic grade (PT. Mustika Ratu Tbk-Jakarta), organic cold pressed extra virgin coconut oil (UKM Product-Jakarta Indonesia), tropical cooking oil (PT. Bina Karya Prima-Jakarta Indonesia), sunflower seed oil (PT. Dinamik Multi Sukses-Bekasi Indonesia), filter paper and pH indicator strips pH 0-14 (PT. Merck Tbk-Jakarta Indonesia), aqua (PT Tirta Fresindo Jaya- Bogor Indonesia).

Simplicia Preparation

Kaffir lime leaves were selected and taken with the same size, color and shape. The method used in selecting simplicia was purposive sampling. Kaffir lime leaves are washed with tap water and dried and powdered using a grinder to the size of 100 mess, while selected

sappanwood shavings that have the same color are air-dried and then powdered to a size of 100 mess (3)(6)

Preparation of Kaffir Lime (*Citrus hystrix DC.*) and Sappan Wood (*Caesalpinia sappan L.*) Peel Extracts

300 grams of kaffir lime leaf powder was weighed, macerated in 500 mL ethanol, left for 48 hours, then separated between the filtrate and sediment using Whatman paper no.1. The filtrate was concentrated using a rotary evaporator at a temperature of approximately 50 ^{0}C. (3) Meanwhile, to make sappanwood extract, 300 grams of powder was weighed, macerated with 500 mL of ethanol, left for 48 hours, filtered using Whatman filter paper and evaporated at a temperature of 50 ^{0}C. (3) (6)

Solid Form Artisan Soap. (3)(6)

Tabel 1. Watermelon shaped and Solid Form Soap Formula.

No	Ingredients	Range (w/w%)	Total (g)	Purpose
1	Olive oil	25	162,5	Fatty acid
2	Coconut oil	30	195	Fatty acid
3	Palm oil	30	195	Fatty acid
4	Castrol oil	7	45,5	Fatty acid
5	Sunflower oil	8	52	Fatty acid
6	Sappan extract	1-2	10	Active substance
7	Kaffir lime leaf extract	1-2	10	Active substance
8	Fragrance	qs	qs	Fragrance addition
9	Sodium hydroxide	∑ saponification number	92,12	Alkali
10	Aquadest	2,3 x ∑ NaOH	211,88	Alkaline solvent

Soap preparation

How to make soap using a cold process by mixing olive oil, coconut oil, palm oil, Castrol oil, sunflower oil, stir until even, add sodium hydroxide solution until homogeneous, then cool to a temperature of 38 ^{0}C, after cooling, add perfume, then stir until smooth, mix. divided into 3 parts. The first part is the base, the second part of the base is added with secang extract, and the third part of the base is added with kaffir lime leaf extract. (3) Then the soap

is molded using a 20x20 cm wooden mold which was previously covered with rice paper. The bottom layer is filled with soap containing kaffir lime leaf extract, then the second layer is filled with soap base and the third layer is filled with soap with secang extract. Leave it in the AC room (25 ºC) for 7 days before removing the soap from the mold and cutting it into pieces. (3)

Testing Soap Preparations

Soap is tested organoleptically which is carried out by the naked eye which includes smell, color and shape, (16) the soap pH test uses universal pH by weighing a 0.1 gram sample dissolved in 25 mL of distilled water, stirring until homogeneous then dipping universal pH paper into the solution, then look at the pH using the universal pH scale (0-14). (10)

Antibacterial activity using the well method was carried out using the following procedure: the Mueller Hinton agar medium containing the test bacteria was made with a hole (diameter 6 mm) and each one of this are given test substance and 20 µL sample (0.5%; 1.0%; and 1.5%). All Petri were placed in the refrigerator for 20 minutes (8 ^{0}C), then incubated for 24-48 hours at 37 ^{0}C. The inhibition zone formed was measured (mm) and compared with base soap as the control negative and antiseptic soap on the market as control positive. (8)(16).

The free fatty acid test uses the alkalimetric titration method by weighing 5 grams of the sample then adding 100 mL of neutral ethanol then heating until all the soap is dissolved, on the back of the sample is titrated with 0.1 N sodium hydroxide solution until a light pink color appears. (1)(3)

RESULTS AND DISCUSSION

Organoleptic tests are carried out including smell, shape and color. (9)(14) The soap is solid and has a soft texture, smells of orange. The top layer is brownish red, the middle layer is cream and the bottom layer is green.

The pH test is carried out to see whether a soap sample is acidic or basic using universal pH. The soap sample has a pH value of 9.8 ± 0.4 so that the pH value of the soap meets the requirements based on (SNI, 2016), that is a pH value between 9 and 11. (1) The degree of acidity or pH is used to express the level of acidity or alkalinity of a solution. Where, what is meant by acidity is the concentration of hydrogen ions in the water solvent. The pH of the soap in artisan soap samples is high because of the presence of sappanwood extract and kaffir lime leaf extract containing flavonoid compounds (7)(16) which are alkaline, and the presence of sodium hydroxide in soap making. (3) Normal skin has a pH balance of around 5-6.5 use of soap will cause the skin's pH value to increase temporarily, because after using soap the skin will be rinsed with water.

Free fatty acids are fatty acids found in soap and are not bound to the sodium triglyceride compound. (3) Free fatty acids are formed due to a long hydrolysis process, so they require heating and water. (9) The purpose of the free fatty acid test is to determine whether the free fatty acid content meets the requirements or does not meet the requirements based on (SNI, 2016) (3) If the free fatty acid content in soap is too high, it can cause the soap to smell rancid and be less safe for skin health.

Artisan soap was also analyzed for its antiseptic properties against *Escherichia coli* and *Staphylococcus aureus* bacteria in figure 1.

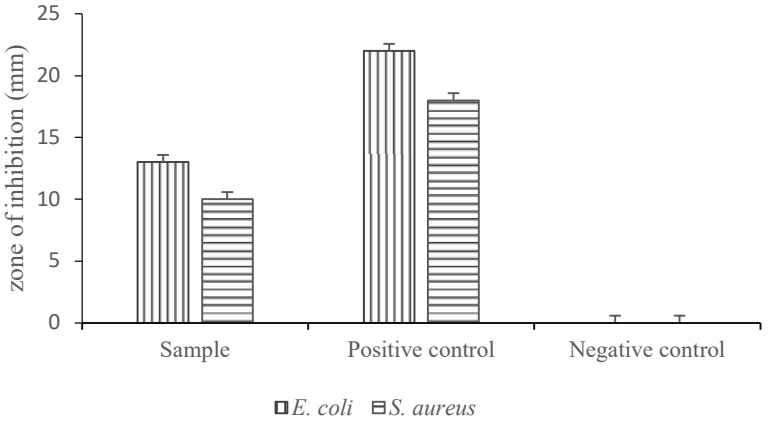


Figure 1. Antibacterial activity of artisan soap (sample) against *Escherichia coli* and *Staphylococcus aureus*. Sample (formula), commercial soap on the market (positive control), soap base (negative control)

CONSLUSION

Kaffir lime leaves (*Citrus hystrix* DC.) and sappan wood (*Caesalpinia sappan* L.) can be used to make watermelon-shaped artisan solid bath soap which is useful for souvenirs. The organoleptic test results show that the soap is solid, soft and the color is like a watermelon. Soap also has antibacterial properties against *Escherichia coli* and *Staphylococcus aureus*. The Soap has a pH and free fatty acids according 2016 SNI Soap requirements.

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