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The Utilization of VCO (Virgin Coconut Oil) in Manufacturing of Solid Soap with Red Betel Leaf Extract Addition (Paper Crotum Ruiz &Pav)

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Abstract. Soap is a compound of sodium or potassium with fatty acids from vegetable oils or solid animal fats, soft or liquid, and foamy. Considering the potential of VCO as the raw material for making soap and supported by the benefits of red betel leaves, then this research is done by making solid bath soap from VCO which is supplemented with Red betel leaf extract. The purpose of this research is to make solid soap from VCO with an extract of red betel leaf based on SNINo.06-3532199. Analyzing VCO oil, which is used for the manufacture of soap, consists of analysis of saponification figures, Iodine number and peroxide number. Has made solid soap from VCO oil with Red betel leaf extract. From the five quality standards established under SNI 06-3532-1994 only two quality standards that can be done that is water quality and the amount of acidity. The percent of water quality obtained is 10% meanwhile the amount of acidity obtained is 9,32%. According to the data, it can be concluded that the solid soap made was not fulfill SNI 06-3532-1994.
Keyword: soap, VCO, red betel leaf

1. Introduction

Soap is a compound of sodium or potassium with fatty acids from vegetable oils or solid animal fats, soft or liquid, and foamy[1]. The soap is produced by the process saponification, which is the hydrolysis of fat to fatty acid and glycerol under alkaline conditions [2]. Sodium Hydroxide (NaOH) and Potassium Hydroxide (KOH) are commonly used to make alkaline condition. The standard of soap quality has been established by the government in SNI no. 06-35321994. This provision is made to ensure the quality of the soap to be used by Community.

One of the main ingredients of soap manufacturing is oil. The oils that can be used such asolive oil, palm oil, fish oil, coconut oil[3]**.** It already produced a solid soap from VCO (Virgin Coconut Oil). The advantage of coconut oil is a high content of saturated fatty acids, especially lauric acid about 44-52%, so that coconut oil is resistant to oxidation that can cause rancid smell. Coconut oil also contains 13-19% fatty acids, acids palmitate 8-11%, 6-10% capric acid, 5-9% caprylic acid, 5-8% oleic acid, stearic acid 1- 3%, and 2% linoleic acid[3]

Indonesian medicinal plants were recently widely used is red betel *(Pipercrocatum).* Phytochemical screening of red betel leaves shows the presence of the ingredients essential oil. Soap with extract red betel leaf can be used to reduce whitish complaints caused by bacteria *Candida sp* and *Staphilococcusepidermis*[4]**.** Antibacterial and antimicrobial effects of soap red betel extract is

estimated originate from the content of flavonoids, alkaloids, saponins, tannins and essential oils. Flavonoids act as antibacterial by forming compounds complex to extracellular proteins that interfere with the integrity of bacterial cell membranes. [5]

Focusing on the potential of VCO as the raw material of soap manufacture and supported by The benefits of red betel leaf, then this research is done by making a solid soap bath Of VCO added with red betel leaf extract. This research is expected to obtained a solid soap with oil content of red betel leaf oil based on SNINo.06-35321994.

2. Method

2.1 Tools

An analytical balance, goblets, water bath, stirring glass, oven, separating funnel, erlenmeyer flask, Condensator, biuret, micro biuret, test tube, soap container, blender, Bottle weigh, the basic ingredients of coconut oil coconut meat are sold in Local market, red betel leaf.

2.2 Ingredients

NaOH (pa), glacial acetic acid, KI (pa), KOH (pa), PP solution, HCl, $Na_2S_2O_3$, H_2O_2

2.3 Squeezed Producing

10 coconuts prepared. The shredded coconut meat, mixed with hot water at 70 ° C with a ratio of 1: 1 (1 gram of coconut meat grated: 1 ml water) in the basin. After the coconut meat is squeezed with a cloth and filtered with a plastic filter, the obtained coconut milk is then allowed to stand for 2 hours in order to separate the cream and skim. Creams that contain lots of fat mixed with extracts red betel leaf for the manufacture of VCO contains flavonoid[5]

2.4 Preparation of red betel leaf extract

Selected fresh red betel leaves, which have been sorted based on color, fresh leaves, stems are also cut and then washed, weighed using an analytical balance sheet which weighing 100 grams. Red betel leaf that has been weighed was cut into pieces. Conducted pretreatment by immersion using ethanol 80% (ethanol 96% which has been diluted) of 500 mL for 10 minutes. Red betel leaves yield crushed with a *juicer*. The result was irradiated using *microwave* for 1 minute, with a moderate temperature of 40 O C and then filtered with filter. After being irradiated and filtered red betel leaf is evaporated using *a rotary evaporator* with the temperature of 40 C[6]

2.5 VCO flavanoid producing

red betel leaf extract 300 ml supplemented with 700 ml of coconut cream to a total mixture volume of 1000 ml (concentration of 30% red betel leaf extract in plastic container stirring.) The mixture is stirred and idle for 18 hours. Furthermore, separation between water on the layer Bottom with oil and blondo on the top layer, by opening on the container part. To separate the oil from the blondo is done centrifugation at a speed of 3000 rpm, for 15 minutes. The result blondo settles on the bottom of the tube while the oil is on the top layer. The oil obtained in the form of VCO containing flavanoid is used for the manufacture of solid soap bath.[5]

2.6 Acid Score Determining

A total of 0.1 g of oil was added to 200 ml beaker, then added 95% ethanol as much as 25 ml. The mixture is heated on temperature of 65°C while stirring to form solution. The solution was titrated with 0.1 N KOH with a 1% fenolphthalein indicator until it appears pink. Once it is done calculation of the amount of mg KOH used to neutralize free fatty acids in 1 gram oil sample[5]

2.7 Saponification Determining

2.5 grams of VCO which contain flavanoidred betel leaf in erlenmeyer 250 ml, added 25 NaOH0.5M. The form was made (the process is the same from the beginning, but without using oil samples). Neither experimental materials norformmade duplo (2x replicates). Then reflux up perfect sampling (approximately 30 minutes). The saponification reaction is complete if the drip results reflux in a test tube containing clear colored water. After cooling, the reflux results added 2 drops of phenoltalein indicator and was subjected to HCl until the color was correct lost[5]

2.8 Soap making

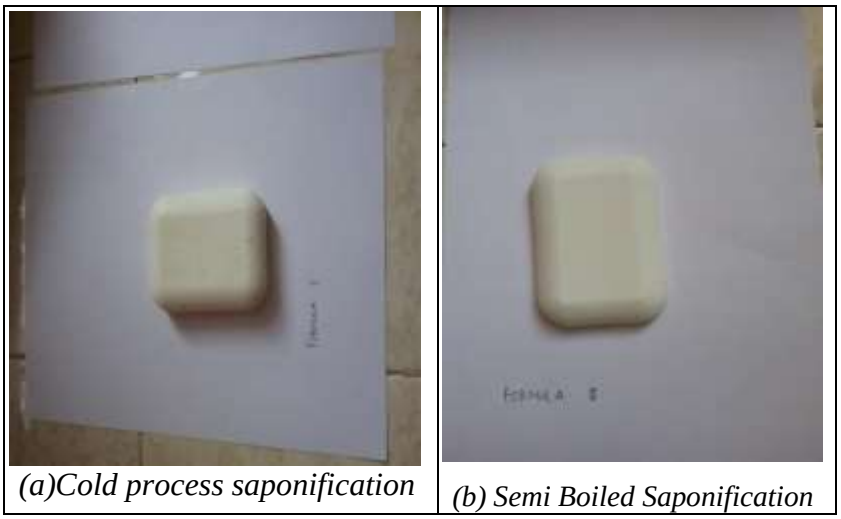
20 grams of flavanoid reacted VCO with NaOH. The amount and concentration reacted, determined based on the saponification number of VCO containing flavonoid of red betel leaf. The products of soap are made in 3 variations of NaOH concentration, ie 25%, 30%, 35%, calculated based on the number of saponification and the amount of water required for making each of the concentrations of NaOH. Each treats NaOH concentration. Every treatment of NaOH concentration made 3 replications. After the VCO is reacted with NaOH, The mixture is stirred slowly until thickened and homogeneous. The soap produced in a clean container that has been prepared and allowed to stand for 4 weeks. Furthermore, the resulting bath soap is tested for its quality based on SNI no. 06-3532-1994[5]

2.9 Peroxide Score determination

1 g sample of the oil was added 30 ml mixture solvent, consisting of glacial acetic acid and chloroform with a ratio of 3: 2 (v / v). Then heated under the boiling point for 2 minutes. Added 0.5 ml KI saturated and reheated for 2 minutes. Then added distilled water and titrated with Na 2 S 2 O 3 of 0.1 N or 0.01 N by using a 0.5% starch indicator. The same thing is done toward the blank. The results dictated in meq O 2/1000 g sample

3. Result and Discussion

The process of soap making is done by two processes, namely, *cold saponification process* and *Semiboiled saponification.* From both methods are done to make the soap like the picture above obtained conclusions about the characteristics of the soap made:



(a)Cold process saponification *(b) Semi Boiled Saponification*

Figure 1. The soap made by (a)*Cold Process Saponification* (b) *Semi Boiled Saponification.*

The comparison of physical characteristic of soaps can be shown in Table 1.

Table 1. The comparison of physical characteristics of soaps toward both methods used

Physical Parameters	Method	
	Cold Process Saponification	Semiboiled Saponification
Color	White	White
Texture	Rude	Smooth
Smell	Rancid	No smell

Measurements of saponification rates on VCO are performed before the soap is made by using the oil. The saponification rate obtained from the calculation were11.12 mg / g. Further testing of soap that has been made, the following is the test data shown in Table 2.

Table 2. The Result of Soap Quality Test

No	Test	Test result	SNI 06-3532-1994
1	Water content	10%	Max 15%
2	Degree of Acid	9.33%	70%

The method used in the process of soap making in this study is Batch Method. According to Wasitaadmadja on batch process, the tool used is a large container that serves as a boiling place for raw materials[7]**.** This boiling place is also called as a kettle, so the batch process on soap making is called as the boiler process. This round kettle is equipped with a heating coil. Raw materials are fed from top tool along with caustic soda (NaOH) and water for the process of making soap. Heating done for several hours, so that obtained pure soap that can be processed into various forms of soap. In batch process there are 2 (two) process developed, that is *Cold-Process saponification* and *Semiboiled saponification.* In this process the soap is produced containing impurities (impurities) of fatty residues[8]**.** Fat is simply melted in a vessel equipped with a stirrer andan amount of NaOH solution as the additional with rapid stirring. After the emulsion process and coagulation, the product is poured on the printing tool. The saponification process is enhanced by way of cooling and hardener. This process is a batch system saponification is the simplest way, because it does not require much equipment.

This method is adapted for making soap added with glycerin as well red betel leaf extract. Glycerin serves as a softener and betel leaf extract used to improve the quality of soap as an antimicrobial. Study that had done can be seen that the soap products are made with semi-boiled saponification process obtained better results if compared with cold process saponification. As shown in figure 1 and 2, the soap texture of the semi boiled method more refined when compared with cold process. The rancid smell coming from the saponification reaction is noticeably sharp on the soap by the cold process method. Probably caused by the amount of impurities or impurities contained in the soap, thus affecting the texture and aroma produced.

The addition of red betel leaf extract on the process of making soap is done with boiling technique. This technique is done by boiling red betel leaves to water thick red stew. Stew technique is chosen because it is simpler inside workmanship other than the reason unavailability of supporting laboratory instruments for doing maceration techniques that are considered to extract better. From research expected to be perfect. But in the study did not proceed with Photochemical testing to ensure the content of red betel leaf extract. Class of glycoside compounds, steroids, triterpenoids, flavonoids, tannins and antrakinonin red betel leaf extract by maceration technique[9]**.** Therefore, it is suspected that in red betel leaf extract produced in this study also contains the compounds. The addition of red betel leaf is done to improve soap quality because of the content of triterpenoid compounds, flavonoids and tannins shows that red betel plants have activity as an antimicrobial able to fight some gram positive and negative bacteria.

The antibacterial and antimicrobial effects of red betel extract soap are underestimated to originate from flavonoid content, alkaloids, saponins, tannins and essential oils. Flavonoids act as Antibacterial by forming complex compounds against extracellular proteins, which is disturbing the integrity of bacterial cell membranes. Alkaloids also have the ability as antibacterial, by interfering with the peptidoglycan component of the bacterial cell. While tannin works as antibacterial with its effect as astringent so can induce complex formation between tannin with microbial substrate. Saponinis one of the content in red betel extract that has antibacterial and antifungal activity. Research by Soetan in Farida Zubirshows that saponins have pharmacological activity against *Staphylococcus aureus* and *Candidaalbicans*[1].In the clinical assessment of Farida Zubir, red betel leaf soap was significant reducing the total score (skin redness, odor, mucus, edema and squamous). As well as subjective judgment by the patient shows that red betel soap extract can be reduced the whiteness score on usage for 1 week. Thus, it can be concluded that red betel leaf is recommended to be used as an antibacterial effect. However, clinical testing of red betel leaf soap effect was not performed in this study.

In this research, the manufacture of VCO is not done, considering the time and limited cost. The oil used to make soap in this study is VCO commercials oil that can be purchased at Pharmacies. VCO or Virgin Coconut Oil is coconut oil containing high fatty saturated acid content, especially lauric acid About 44-52%, so that coconut oil is resistant to odor-causing oxidation rancid. Coconut oil also contains 13-19% fatty myristic acid, palmitic acid 8-11%, 6-10% capric acid, 5-9% caprylicacid, 5-8% oleic acid, 1-3% stearic acid, and 2% linoleic acid[8]**.**

In the research, there were 11.12 mg / g saplings, which means 11.12 Mg KOH to powder one gram of fat or oil. This number does not match allegations which supposedly because saponification numbers also explain the large amount of fatty acids, which are bounded as triglycerides or fatty acids in the oil. The shorter of the acid chain Fat, then the greater of number of saponings as well as vice versa. In fact, VCO has a carbon chains ≥ 20 in the form of tristerin so it should have a small sampling number. Here's a picture of the tristerin compound.[2]

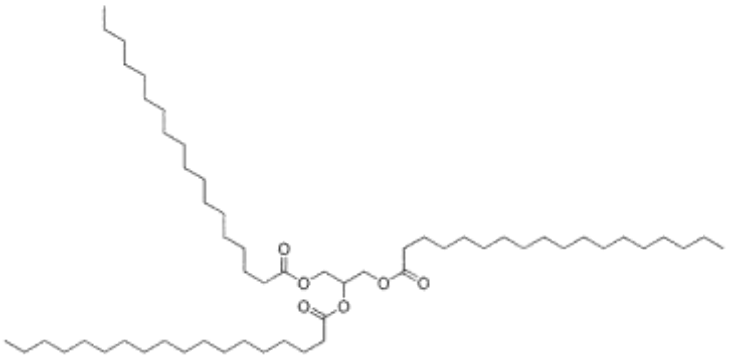


Figure 2. Structure of Tristerin Compound

The magnitude of this saponization value occurs possibly because of the small level purity of the VCO used. This cannot be ascertained because of the VCO used in the study are VCO purchased.
Table 2 is the result of testing of soaps made by the semiboiled saponification method. From the test results can be seen that the water content in soap is 10% while the SNI standard is a maximum of 15%. Water content will affect the hardness of soap. It can be concluded that the soap made in this study has moisture content, which is good because if more than 15%, the resulting soap will be so hard inefficient in use and the soap becomes easily soluble in water.

In table 2 also can be seen the amount of acidity of produced soap products. Amount the acidity of soap obtained was 9.33%. The amount of fatty acids is the total amount of all fatty acids in soap that have or have not yet reacted with alkali. This value is still far from expectation because of the quality standard for the amount of acidity of the perfect soap is 70% this means there are 70% fatty acids and ingredients added As a filler in soap making less than 30%. The goal is to improve the efficiency of

cleaning process of dirt in the form of oil or fat when using the soap. Commonly added fillers are honey, perfume, glycerol, water glass, milk protein and so forth. The purpose of adding a filler to provide a compact and solid form, moisturizes, adds a nutrient required by the skin[10]**.** The amount of fatty acids in the soap produced is only 9.32% and the rest consists of other fillers. In fact, a good soap should have more fatty acids so that saponification reactions can be maximized.

Thus, it can be concluded that the soap made not requires the soap quality based on SNI 06-3532-1994. This is probably due to a reaction Sapling does not run perfect. There are some conjectures about the results of research that have not fulfilled SNI 06-3532-1994, including *semi-boiled saponification* procedure did not take place is perfect because should the heating process in this procedure should be kept constant. However, this case cannot be done due to lack of supervision on work procedures. Imperfection of saponification reaction will cause the resulting glycerol to be less than 10.33%. Although no testing of glycerol is done, it can be seen in quantities low fatty acids.

4. Conclusion

The solid soap has made from VCO oil with red betel leaf extract. By involving five quality standards specified under SNI 06-3532-1994 are only two standards of quality can be done that is water quality and amount of acidity. The percent water quality that obtained is 10% while the amount of acidity obtained is 9,32%. From the data, it can be concluded that the solid soap made not yet fulfill SNI 06-3532-1994.

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