Chelo Journal of Technology and Innovation for Community Service

Vol. 1, Issue 2, March, 2024, pp. 66 – 74

ISSN (print): 3026-3336 ; ISSN (online): 3026-474X

Use of Jernang Fruit (Dragon's Blood) as an Additive in the Manufacture of Transparent Solid Soap for Skin Regeneration

Muhammad Raihan Nur[1]*, Saifuddin[1], Nahar[1]

[1]Chemical Engineering Department, Lhokseumawe State Polytechnic, Jl. Banda Aceh-Medan Km. 280, Buketrata, Punteut Mosque, Blang Mangat, Lhokseumawe City, Aceh 24301, Indonesia
*Email: mraihannur1207@gmail.com

ABSTRACT

The use of jernang fruit (Dragon's Blood) as an additional ingredient for making transparent solid soap for skin regeneration has been widely used. This research aims to determine the effect of jernang extract and NaOH used on the characteristics of the soap produced including the pH value, water content, free fatty acid value, free alkali value based on the requirements of SNI 06-3532-1994, as well as knowing the organoleptic figures and antioxidant activity. With the presence of transparent solid soap from jernang extract, it can optimize the use and use of jernang which is rarely processed in the surrounding environment and can improve the economy of the Simpang Keramat village area, Aceh Utara. Making transparent solid soap was carried out by varying the volume of jernang extract 2 ml, 4 ml, 6 ml, 8 ml, 10 ml with a volume of 30% NaOH of 20 ml, 25 ml, 30 ml, 35 ml and 40 ml.

Keywords: Antioxidants, Dragon's Blood, NaOH, Transparent Solid Soap.

CETICS: Chelo Journal of Technology for Community Service
Vol. 1, Issue 2, March, 2024, pp. 66 – 74
ISSN (print): 3026-3336 ; ISSN (online): 3026-474X

INTRODUCTION

Soap is an ingredient that functions to clean dirt and bacteria from the skin. With this, the use of soap as a skin cleanser is increasing and diversifying. The diversity of soap sold commercially can be seen in the type, fragrance, color and benefits offered. Bath soap is divided into two types, namely liquid soap and solid soap. Solid soap consists of 3 types, namely opaque, translucent and transparent soap. Opaque soap (ordinary solid soap) is soap that is used every day, translucent soap is soap that is between opaque and transparent soap, while transparent soap is soap that is often used for facial beauty soap and skin health soap [1]. Jernang is a resin which is the result of the secretion of jernang rattan fruit. The resin sticks to and covers the outside of the rattan fruit, which requires a fruit extraction process to obtain it. Communities around the forest harvest jernang from natural forests, by hunting in groups or individually. Jernang hunting season is in September – December[2]. Jernang (dragon's blood) is a red resin produced by the secretion of rattan fruit (Daemonorops family Aracaceae). This type of jernang generally comes from Indonesia and the Malaysian peninsula, but there are also jernangs that come from other types, namely Dracaena (Dracaenaceae) from the Canary Islands, Croton (Euphorbiaceae) from South Africa and Pterocarpus (Fabaceae).[3].

The use of jernang in industry is as a coloring agent for varnish, ceramics, marble, tools made of stone, wood, rattan, bamboo, paper, paint and so on. However, jernang has been used as traditional medicine since several centuries ago as an antiseptic, stimulates blood circulation, antimicrobial, antiviral, antitumor, wound medicine, etc.[4].Soap is a mixture of sodium or potassium compounds with fatty acids from animal oils or vegetable fats, in solid, soft or liquid form and is foamed and then added with fragrance or antiseptic, the result can be used as a body cleansing agent and does not cause body irritation. Soap is made in two ways, namely the saponification process and the oil neutralization process[5].The saponification process, namely the hydrolysis reaction between triglycerides and alkali, produces products in the form of soap and glycerol as a by-product under alkaline conditions. The neutralization process is a process that occurs by reacting free fatty acids with alkali to produce soap without the by-product glycerol.[6].Transparent solid soap is one of the soap innovations that makes soap more attractive. Transparent soap has finer foam compared to opaque soap, non-transparent soap.[7].Factors that can influence the transparency of soap are the alcohol, sugar and glycerin content in the soap. When soap is to be made clear and transparent, the most important thing is the quality of the sugar, alcohol and glycerin. The glycerin content is good for the skin because it functions as a moisturizer on the skin and forms a gel phase in soap[8].Collagen in the process of making transparent solid soap can be very useful for treating sensitive and irritated skin, for example acne or itching. In addition, collagen can restore skin moisture so that the skin becomes firmer, more elastic and less wrinkled. People use collagen very often because it maintains healthy skin[9].In soap making, a UV-VIS spectrophotometer is used to analyze antioxidant activity using the

CETICS: Chelo Journal of Technology for Community Service
Vol. 1, Issue 2, March, 2024, pp. 66 – 74
ISSN (print): 3026-3336 ; ISSN (online): 3026-474X

DPPH method. DPPH is an abbreviation for the organic chemical compound 2, 2-diphenyl-1-picrylhydrazyl, which is a dark-colored crystalline powder consisting of stable free radical molecules. The working principle of the DPPH method is the presence of hydrogen atoms from antioxidant compounds which bond with free electrons in radical compounds, causing a change from free radicals (diphenyl picrylhydrazyl) to non-radical compounds (diphenyl picrylhydrazine). This is characterized by a color change from purple to yellow, which means free radical compounds are reduced by the presence of antioxidants[10].

METHOD

Materials used include;

Coconut Oil, Stearic Acid, 30% NaOH Solution, 96% Ethanol, Glycerin, Granulated Sugar, Jernang, Kojic Acid, Citric Acid, Aquades, NaCl, Fragrance Oil, Collagen, Arbutin.

The tools used include;

Vessel, rotary evaporator, incubator, digital scale, 500 ml volumetric flask, beaker glass, Erlenmeyer, measuring cup, volume pipette, burette, oven, pH meter, thermometer, dropper pipette, stir bar, metal spoon, soap molder, test tube , tube clamps, tube racks, burettes, statives and clamps.

Making Transparent Soap

Coconut oil is put into a glass beaker and heated on a hot plate to a temperature of 70℃.Add stearic acid, then stir until homogeneous. Then add the NaOH solution (according to the research variables) and stir until homogeneous using a magnetic stirrer at a speed of 500 rpm for 30 minutes.then add other supporting ingredients, add Ethanol 96% Glycerin, sugar solution, Aquades, citric acid, Kojic Acid, Arbutin, Collagen (according to research variables) while continuing to stir for 15 minutes until homogeneous, then add jernang extract (according to research variations) while continuing to stir. Stir until homogeneous, then put the soap into a silicone mold with a volume of 36 cm3 and let it rest for 24 hours. The soap is cured for 2 – 4 weeks, this aims to reduce the free alkali content and pH so that the quality of the soap becomes better. Then organoleptic testing, antioxidant activity, water content, free fatty acid content, free alkali content, pH value were carried out.

Experiment Procedure

The test procedures carried out in this research were water content test, free fatty acid test, free alkali test, pH value test, organoleptic test, and antioxidant activity test.

RESULTS AND DISCUSSION

This research on making transparent solid soap uses coconut oil as raw materials and 30% NaOH solution as well as extract from jernang as an antioxidant in this

CETICS: Chelo Journal of Technology for Community Service
Vol. 1, Issue 2, March, 2024, pp. 66 – 74
ISSN (print): 3026-3336 ; ISSN (online): 3026-474X

transparent solid soap by varying jernang extract 2ml, 4ml, 6ml, 8ml, 10ml and 30% NaOH solution 20ml, 25ml, 30ml , 35ml, 40ml and the parameters tested are water content test, free fatty acid test, free alkali test, pH value test, antioxidant activity test and organoleptic test.

Test Results Data Table

NaOH (ml)	Jernang Fruit Extract (ml)	Indigoi pH	Water Content (%)	Free Fatty Acid (%)	Free Alkali (%)	Indigoi Organoleptic average	Uji Antioxidant Activity (%)
1	2	3	4	5	6	7	8
20	2	10.05	38.7	1,353	0.008	3.8	
	4	9.94	38	1,230	0.008	3.9	
	6	9.75	38	1,148	0.008	3.89	
	8	9.69	39	1,025	0.016	3.53	
	10	9.56	39.2	0.902	0.016	2.84	
25	2	10.07	37	1,230	0.016	3.79	
	4	9.91	37.2	1,189	0.016	4.03	
	6	9.91	37.6	1,025	0.024	3.96	
	8	9.85	38.6	1,025	0.024	3.28	
	10	9.75	39	0.943	0.024	2.85	
30	2	10.30	27.4	1,025	0.032	3.75	6.28
	4	10,12	27.8	0.943	0.032	3.95	
	6	10,10	27.8	0.820	0.032	4.13	8.56
	8	9.99	28.8	0.738	0.04	3.35	
	10	9.98	29.4	0.656	0.04	2.79	11.36
35	2	11.56	27	0.902	0.048	2.95	
	4	11.55	27.4	0.82	0.048	3.13	
	6	11.53	27.4	0.697	0.056	3.17	
	8	11.46	28	0.656	0.056	2.52	
	10	11.31	28	0.574	0.064	2.01	
40	2	11.66	21.4	0.861	0.064	2.96	
	4	11.64	22.4	0.779	0.072	3,2	
	6	11.64	23.2	0.697	0.08	3.11	
	8	11.59	23.2	0.615	0.094	2.47	
	10	11.55	23.6	0.533	0.104	2.01	

CETICS: Chelo Journal of Technology for Community Service
Vol. 1, Issue 2, March, 2024, pp. 66 – 74
ISSN (print): 3026-3336 ; ISSN (online): 3026-474X

1. Water Content Test

Water content testing is carried out to find out what % of water is contained in this liquid soap. The method used is by using an oven at 105°C for 2.5 hours and then cooling it and weighing it again.

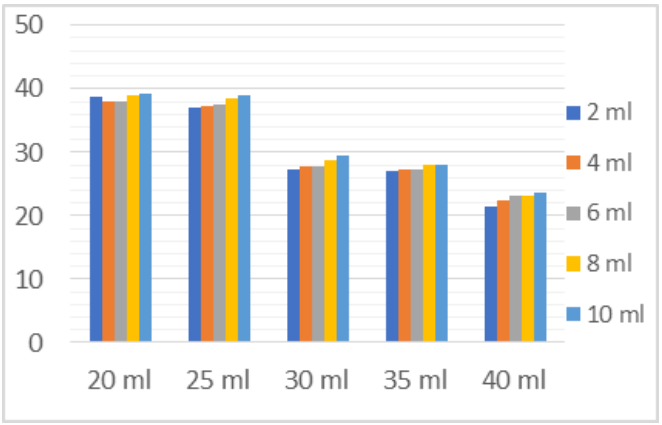


Figure 1. the effect of variations in Jernang extract and NaOH on water content

Based on the analysis results in the figure above, the water content value in solid soap decreases as the volume of NaOH used increases. This is because the higher the volume of NaOH used, the less water added. The results of testing the water content of solid soap showed that the highest water content was 39.2%, which was produced by soap with a volume of 20 ml of NaOH and the addition of 10 ml of jernang extract, while the lowest water content was 21.40%, which was produced by soap with a volume of 40 NaOH. ml and adding 2 ml jernang extract.

2. Free Fatty Acid Test

Free fatty acids are fatty acids in soap that are not bound as sodium compounds or triglyceride compounds (neutral fat). The high level of free fatty acids in soap will reduce the cleaning power of soap, because free fatty acids are undesirable components in the cleaning process.

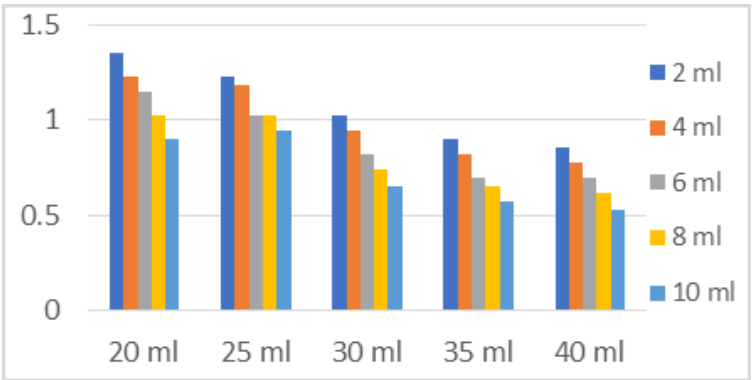


Figure 2. the effect of variations in Jernang extract and NaOH on ALB

CETICS: Chelo Journal of Technology for Community Service
Vol. 1, Issue 2, March, 2024, pp. 66 – 74
ISSN (print): 3026-3336 ; ISSN (online): 3026-474X

The solid soap test shows that the free fatty acid content in solid soap is 0.533 – 1.353%. The best free fatty acid content was obtained in soap with the addition of 10 ml extract and 30 ml NaOH of 0.656%. Free fatty acids are formed due to the hydrolysis process of fat caused by water, heat and enzymes that occur in oil, resulting in glycerol and free fatty acids. Fatty acid levels in oil will increase if hydrolysis takes place for a long time, the hydrolysis process can be accelerated by heating and water so that changes in color and odor will occur.

3. Free Alkali Test

The maximum standard for free alkali content set by SNI in 1996 for solid soap with NaOH is <0.1%. Alkaline testing is important to determine the quality of the soap.

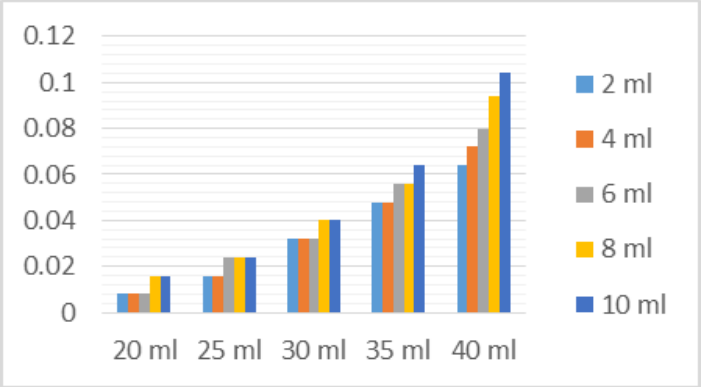


Figure 3. the effect of variations in jernang extract and NaOH on free alkali

Based on the results in Figure 4.5 above, it can be seen that the free alkali content calculated as NaOH content is in the range of 0.008 – 0.104%. In this study, the results showed that the addition of NaOH and jernang extract as an antioxidant contained free alkali after 2 weeks of storage in all 35 ml and 40 ml NaOH samples, where the color of the soap solution changed to pink after adding the phenolphthalein indicator. This is because the excess NaOH in the solid soap produced causes the alkali content contained in it to also increase.

4. Test the pH Value

pH testing is carried out to find out how much base the soap contains by using a pH meter. The pH permitted by SNI in 1994 is in the range of 9-11, because excess or lack of pH will have an adverse effect on the skin.

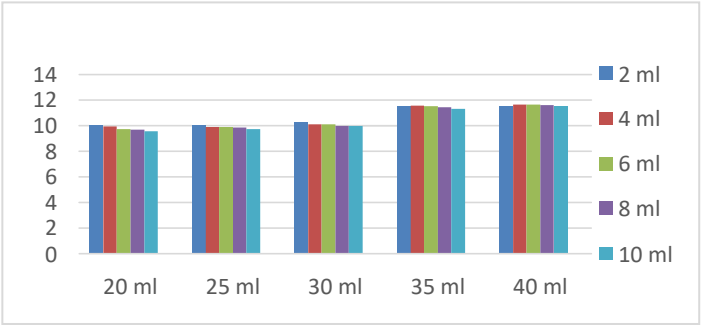
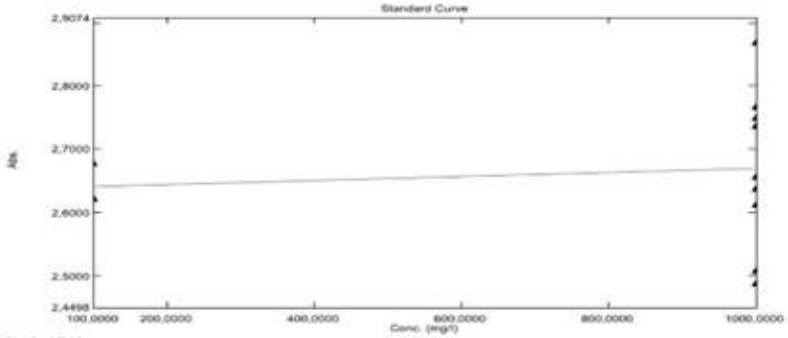


Figure 4. the effect of variations in jernang extract and NaOH on pH

CETICS: Chelo Journal of Technology for Community Service
Vol. 1, Issue 2, March, 2024, pp. 66 – 74
ISSN (print): 3026-3336 ; ISSN (online): 3026-474X

Based on the analysis results in the figure above, the pH value of solid soap obtained in this study ranged from 9.56 - 11.66. Thus, the pH value of the soap from the research results is partly in accordance with SNI and partly not in accordance with SNI. The optimum pH value for solid soap in this study was a sample with a NaOH volume of 20 ml and an extract content of 10 ml, because the resulting pH was 9.56, where the pH met SNI requirements.



Standard Table

	Sample ID	Type	Ex	Conc	WL517.0	Wgt.Factor	Comments
9	DPPH ...	Standard		100.0000	2.6212	1.0000	
10	spl 1	Standard		1000.0000	2.6119	1.0000	
11	spl 2	Standard		1000.0000	2.4880	1.0000	
12	spl 3	Standard		1000.0000	2.7501	1.0000	
13							

PaIn the picture it can be seen that the highest pH value was produced at a volume of 40 ml of NaOH, namely 11.66, while the smallest pH value was produced at a volume of 20 ml of NaOH, namely 9.56. This is because the pH value of solid soap which contains antioxidants tends to decrease with the addition of antioxidants which have a pH of 6-7[11].

5. Organoleptic Test

The average organoleptic test is the entire test, namely texture, smell and color. The average value of the texture, odor and color tests for each sample is then added and then divided by 3, thus obtaining the following data.

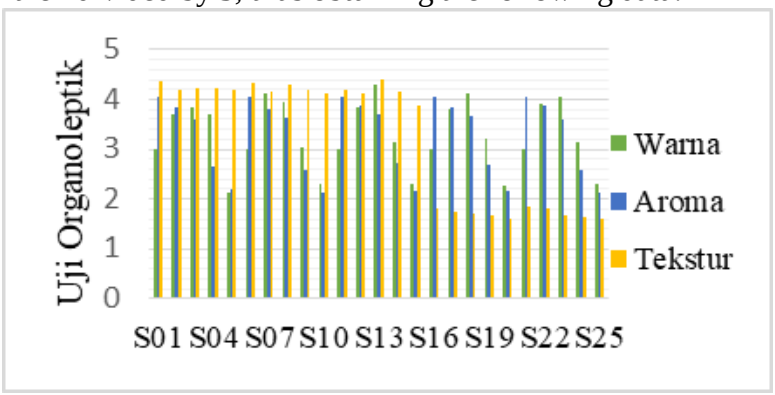


Figure 5. Organoleptic Charts for Color, Aroma and Texture

Hasil organoleptics regarding color, aroma and texture can be seen in the picture above, the scale of values contained in the organoleptic graph for color is between 2.12 - 4.28. The scale contained in the organoleptic graph for aroma is 2.12 – 4.04. The scale contained in the organoleptic graph for texture is 1.6 – 4.4. From the graphic results above, it can be seen that the influence of color, aroma and texture in solid soap is significantly different for each treatment. The best

overall results of the panelists' preferences in the organoleptic test were sample 13 with 6 ml of jernang extract and 30 ml of NaOH..

6. Antioxidant Activity Test

Antioxidant activity testing was carried out using a UV-Vis spectrophotometer with a wavelength of 517 nm. The method used was DPPH. the sample to be tested by dripping 1 ml of sample and then mixing it with 3 ml of blank solution. Based of the results of antioxidant activity testing on the first sample, a value of 11.36% was obtained, a value of 8.56% was obtained on the second sample, and a value of 6.28% was obtained on the third sample.

CONCLUSION

1. The more NaOH solution, the higher the value of the degree of acidity and free alkali content produced, while the more NaOH solution, the lower the water content contained.
2. The more jernang extract is added, the higher the water content and free alkali content, while the more jernang solution is added, the lower the acidity level

ACKNOWLEDGEMENTS

The authors express their gratitude and thanks to the Education, Culture, Research and Technology Ministry of the Republic of Indonesia.

REFERENCES

[1] Lilis Sukeksi, D. (2018). Making transparent soap based on coconut oil with the addition of noni fruit extract (Morinda citrifolia) as an antioxidant. Medan: USU Chemical Engineering Journal, Vol 7, No. 2.
[2] Elvidayanti and D. Erwin. 2016. Hunting jernang: from village communities to inland tribes. Gita Buana. Edition 2 : 22-23.
[3] Mulyaningsih, T. (2021). Traditional paradigm in the use of agarwood in Japan. Nas Media Library.
[4] Gupta, D., & Denton, B. (2008). Appointment scheduling in health care: Challenges and opportunities. IIE transactions, 40(9), 800-819.
[5] Widyasanti, AS (2017). Effect of Concentration of Virgin Coconut Oil and Castor Oil on the Physicochemical and Organoleptic Properties of Liquid Bath Soap. Indonesian Journal of Agricultural Technology and Industry. Vol. 09, No. 01.
[6] Sukeksi, L., Sianturi, M., & Setiawan, L. (2018). Making transparent soap based on coconut oil with the addition of noni fruit extract (Morinda citrifolia) as an antioxidant. USU Journal of Chemical Engineering, 7(2), 33-39.
[7] Qisti, R. (2009). Chemical Properties of Transparent Soap with the Addition of Honey at Different Concentrations. Bogor: Thesis, Faculty of Animal Husbandry, Bogor Agricultural Institute.

[8] Rahadiana, p. A. (2014). Transparent soap factory with therapeutic aroma from castor oil using a continuous triglyceride saponification process. Sambas: D3 chemical engineering study program fti-its.sambas: poltesa.
[9] Nurhayati, A. (2013). Analysis of the sustainable potential of capture fisheries in the Pangandaran area. Journal of Aquatics, 4(2).
[10] Setiawan, F., Yunita, O. and Kurniawan, A. (2018). Test of antioxidant activity of ethanol extract of secang wood and FRAP', Media Pharmaceutica Indonesiana, 2(2), pp. 82–89.
[11] Dandari, DS, Nahda, NA and Dian, AP (2017). Formulation of Jernang Extract in the Dosage Form of Transdermal Liposome Cream', Proceedings of the National Seminar on Biology for Life Gowa, (November), pp. 19–25.