Purification Of Virgin Cocunut Oil Using Help Soursop Enzym And Chemical Ultrasonography With Natural Zeolite Adsorben

Mustafa, Alwathan, Faisyal, Andri Kurniawan

Abstract: Coconut agribusiness development opportunities with high economic value products are very large. Coconut products that have been developed in the country are virgin coconut oil (VCO). VCO has a context of products that can improve health and high-value natural cosmetic raw materials. The purpose of this study was to purify Virgin Coconut Oil using natural zeolite, utilizing ultrasonic wave equipment in the process of making Virgin Coconut Oil (VCO) by comparing the results of enzymatic VCO yields (Soursop fruit enzymes) with the help of ultrasonic and without ultrasonic assistance, as well as knowing the effect ultrasonic time on the yield and VCO content produced and analyze the physical and chemical properties contained in Virgin Coconut Oil that conform to the SNI method. Making VCO was done by ultrasonic method using a temperature of 30 ° C and a frequency of 42 kHz with ultrasonic time variations of 0, 10, 20, 30, 40, 50, 60 and 70 minutes. VCO made by ultrasonic method has the highest yield compared to without ultrasonic assistance. Operating conditions that produce VCO with increasing ultrasonic time, the water content gets smaller, the density increases, the free fatty acid gets smaller, the saponification rate increases and the yield increases with the most optimum enzymatic ultrasonic time to make Virgin Coconut Oil (VCO) with 4 ml Soursop extract and the best 200 ml coconut milk cream is 60 minutes which has a yield of 64.5%. For purification of VCO using Natural zeolite with a variation of 10, 20, and 30, 40, 50 and 60 grams of zeilite in 20 ml of VCO. The results showed that the enzymatic VCO making (Soursop fruit enzyme) with the help of chemical ultrasonigraphy which provided the appropriate quality for the comparison of 30 grams of natural zeolite could reduce the moisture content to 96.15% and increase the Iod number by 50.84%

Keywords: Ultrasonic, VCO, time, yield

1 INTRODUCTION

The business of smallholder coconut plantations in a wide expanse is found in several areas of the province of East Kalimantan with the area of coconut people of East Kalimantan in 2016 recorded at 29,804 Ha with a total production of 26,134 tons. The production of the community coconut trees mentioned above is entirely marketed to meet the needs of the community's consumption of fresh coconut. (Dinas Perkebunan Samarinda, 2016). Coconut agribusiness development opportunities with high economic value products are very large. Coconut products that have developed in the country are CCO and its derivatives, virgin coconut oil (VCO), desicated coconut (DC), coconut milk / cream (CM / CC), coconut charcoal (CCL), activated carbon (AC), and coconut fiber (CF). These four products have a very good development context. VCO has a product context that can improve health (the body's immunity to various degenerative diseases) and high-value natural cosmetic raw materials. To modify the running headings, select View | Header and There are various VCO manufacturing technologies, namely centrifugation, fermentation, enzymatic, and pumping.

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Some of the methods that are used still have weaknesses, namely the yield that is produced is still low and the quality of VCO is poor because of contaminants. The advancement of science and technology encourages the creation of modifications and innovations in the field of process technology. Chemical ultrasonication is a modification of the technology used in this study in order to optimize the process of making VCO. The advantages of ultrasonication techniques include: a fast and easy process, does not require the addition of chemicals, does not result in significant changes in the chemical structure of the particles, and the compounds used. The process of making VCO with an enzymatic system and chemical ultrasonication techniques is expected to be more efficient and produce VCOs that meet quality standards. The objectives of this study include: making Virgin Coconut Oil (VCO) from coconut meat, combining coconut grated equipment directly into coconut milk for raw material making VCO, to determine the effect of time on the comparison of water with coconut on soursop enzyme by using ultrasonic waves in the process of making Virgin Coconut Oil (VCO), and analyzing physical and chemical properties contained in the SNI Virgin Coconut Oil method. Research related to the making of VCO was carried out by Budiman, et al. (2012), Effect of Fermentation Time and Comparison of Volume of Coconut Milk and Pineapple Juice on the Making of Virgin Coconut Oil (VCO), by varying the variables of fermentation time and volume of coconut milk and pineapple juice. The optimum condition was obtained at 3 days fermentation, with a comparison of pineapple fruit juice volume and 10% coconut milk with a yield of 20.6%. Making Coconut Oil Enzymatically Using Ginger Rhizome as a Catalyst conducted by Jannah, et al (2014), by varying fermentation time and enzyme volume. optimum conditions were obtained at 48 hours fermentation, 4 ml enzyme volume with yield of 25.5%. In the previous study Making Coconut Oil Enzymatically Using Ginger Rhizome as a Catalyst conducted by Jannah, et al (2014), the resulting yield still needs to be improved. By adding the centrifugation process it is expected that the yield can increase. Therefore, it is necessary to develop the previous

research. In this study to increase yield in the manufacture of Virgin Coconut Oil (VCO) by varying the time of centrifugation to determine the effect on yield. Centrifugation in the manufacture of Virgin Coconut Oil (VCO) aims to break the emulsion, or in other words damage the stability of lipoproteins so that finally oil and water can be separated quickly. The bond between the oil and the damaged protein causes the oil molecules to separate more easily into smaller molecules (Hariyanti Sri, 2006). In the process of producing Virgin Coconut Oil, the VCO produced still contains a lot of water content and has poor characteristics. Therefore the level of purity and quality is still low. One of the cheaper and easier methods of purifying VCO is by adsorption method through porous media. Potential media which is quite potential are natural zeolites. Natural zeolite is a rock that is found in Indonesia, such as Central Java, West Java, Yogyakarta, East Java and East Nusa Tenggara. Therefore, zeolite can be obtained quite easily and cheaply to be used as an adsorbent. One of the uses of zeolite for purification is a type of Natural zeolite.Purification using Natural zeolite to produce high quality VCO products that meet the requirements for cocozone oil raw materials. Natural zeolite used was obtained from Gunung Kidul, Yogyakarta.

2 RESEARCH METHODS

2.1 Time and Place of Research

The time of this study began from March 2018 to December 2018. The process of making Virgin Coconut Oil (VCO) and the analysis of the chemical properties of VCO (water content, iodine number, free fatty acids, peroxide numbers, and metal contamination in VCO) and the analysis of physical properties VCO (color, taste and odor) is carried out in the Chemical Engineering Laboratory of Samarinda State Polytechnic.

2.2 Research Tools and Materials

The tools used in this study include: A set of ultrasonic devices, Basins, 500 mL chemical cups, large reaction tubes, 1000 mL chemical cups, 250 mL volumetric flask, magnetic stirrer, 40 Whatmann filter paper, 25 mL burette, 100 mL measuring cup, Erlenmeyer 1L, Stopwatch, Stirring Rod and 100 oC scale Thermometer. While the materials used in this study, among others: Old coconut (Cocos Nucifera L.), Aquadest, Cyclohexane, NaOH, concentrated acetic acid, potassium iodide, sodium thiosulfate, 95% ethanol, glacial acetic acid, analysis pro, Fenolftalen , Pro analysis Chloroform, Sisak Fruit, and Natural Zeolite.

2.3 Analysis Plan of Research Results

The plan of analysis of the results of this study is to analyze the physical and chemical properties contained in Virgin Coconut Oil (VCO) with the SNI method, as follows: (a). Analysis of Physical Properties of VCO includes odor, taste and color, and (b). Analysis of Chemical Properties of VCO, including water content, iodine numbers, free fatty acids and peroxide numbers. The plan of analysis of the results of this study is to analyze the physical and chemical properties contained in Virgin Coconut Oil (VCO) with the SNI method, as follows: (a). Analysis of Physical Properties of VCO includes odor, taste and color, and (b). Analysis of Chemical Properties of VCO, including water content, iodine numbers, free fatty acids and peroxide numbers.

Flow Research procedure:

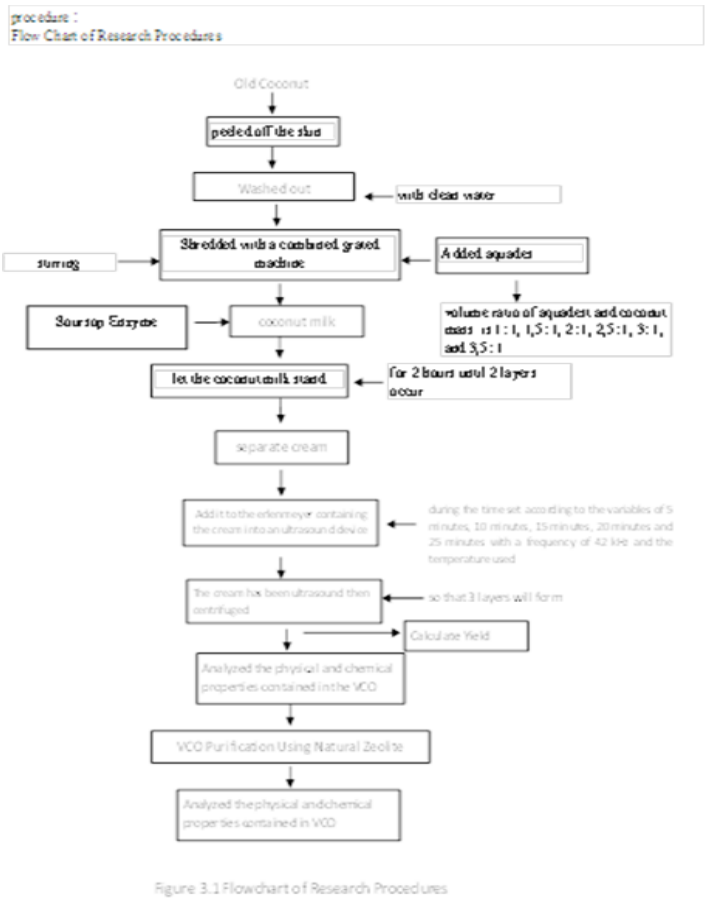


Figure 3.1 Flowchart of Research Procedures

3 RESULTS AND DISCUSSION

3.1 Research Result

The following is the result of the research that has been done:

Table 1.
Data of VCO Analysis Results Enzymatically Obtained with Ultrasonic Assistance

No	Variation (menit)	VCO Analysis				
		Yield (%)	VCO Moisture (%)	Free Fatty Acids (%)	Saponification(mg KOH/g oil)	Density (Kg/m^3)
1.	0	27,3	0,16	0,47	196,1029	915,8
2.	10	44,7	0,02	0,31	235,5591	916,9
3.	20	49	0,02	0,23	240,4221	917,3
4.	30	54	0,02	0,19	238,6116	917,6
5.	40	59	0,01	0,16	242,2347	917,9
6.	50	62	0,01	0,17	243,3778	918,2
7.	60	66,7	0,01	0,15	246,3669	919,2
8.	70	60,5	0,05	0,19	246,4479	918,3

Table 2.
Indonesian National Standards (SNI 7381:

Parameter	Value
Moisture content	maximum 0,5 %
Free Fatty Acids	maximum 0,2 %
Saponification of Number	250-260 mg KOH/gr oil
Density	915,0 - 920,0 kg/m3

Table 3.
VCO Characteristics Data from Enzymatic VCO Production with Ultrasonic Assistance and VCO Purification with Natural Zeolite

No.	Parameter	Analysis results
1.	color	Clear (colorless)
2.	smell	Typical fresh coconut and not rancid
3.	Taste	Tend to be Typical of Coconut Oil
4.	Viscosity(cps)	50 - 90
5.	Density (gram/cm$^{3)}$	0,9158 – 0,9190

Table 4.
Data of VCO chemical and Physical Characterization testing results

❖ *Data of VCO Physical Characterization testing results*

NO	Variabel (number of Zeolites /gram)	VCO Volume after being passed Zeolite (ml)	acid number (mg KOH/g VCO)	peroxide number (mgrekO2 aktiv/kg VCO)	Iod Number (g halogen / g VCO)	Moisture Content %)
1	0	20	3,15	23,87	38,75	0,26
2	5	18,5	3,06	23,36	42	0,125
3	10	16	2,37	22,73	45	0,015
4	15	14,4	1,89	21,6	51,6	0,016
5	20	12,7	2,49	20,92	57	0,013
6	25	11,3	1.31	11,98	63,4	0,012
7	30	9	1,12	3,60	78,82	0,01
8	35	7,5	1,54	8,68	68	0,05
9	40	5,8	1.32	7,65	66	0,05

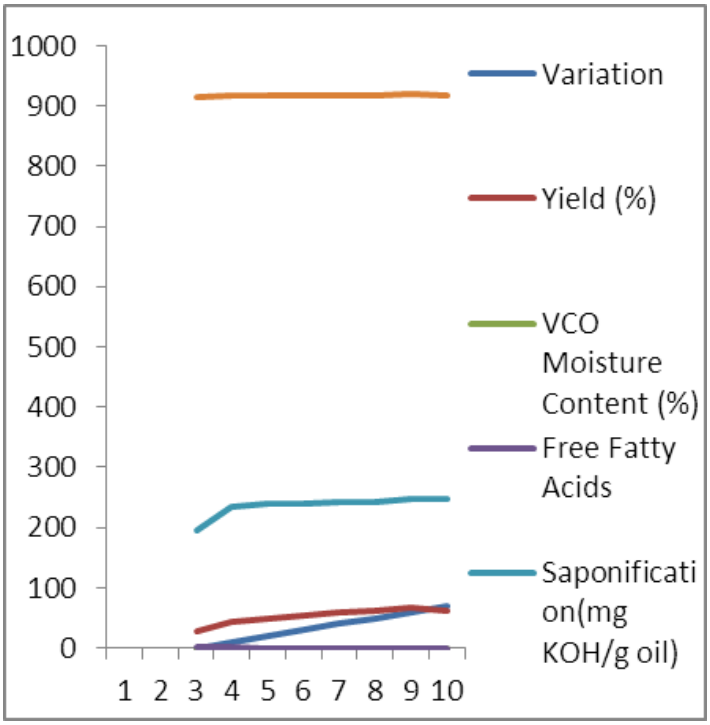
❖ *Data of VCO chemical Characterization testing results*

No.	Parameter	Analysis Results
1.	Iod Number (gr Iodin/ gr VCO)	78,82
2.	Acid Number (mg KOH/gr VCO)	1,12
3.	Perokside Number (mgrek O2 aktiv/kg VCO	3,60
4.	pH (universal)	4 - 6
5.	Maisture content (%)	0,01

4 DISCUSSION

Effect of time on enzymatically produced VCO yields by ultrasonography. The method used to damage the emulsion system is the ultrasonic method. In the ultrasonic method there is a cavitation effect that breaks down lipoprotein bonds. The cavitation effect is characterized by a burst of micro bubbles in the liquid medium, sudden bursts of micro bubbles causing the formation of shock bubbles until the protein breaks down. If the lipoprotein bond breaks down, the oil can get out of the emulsion system.

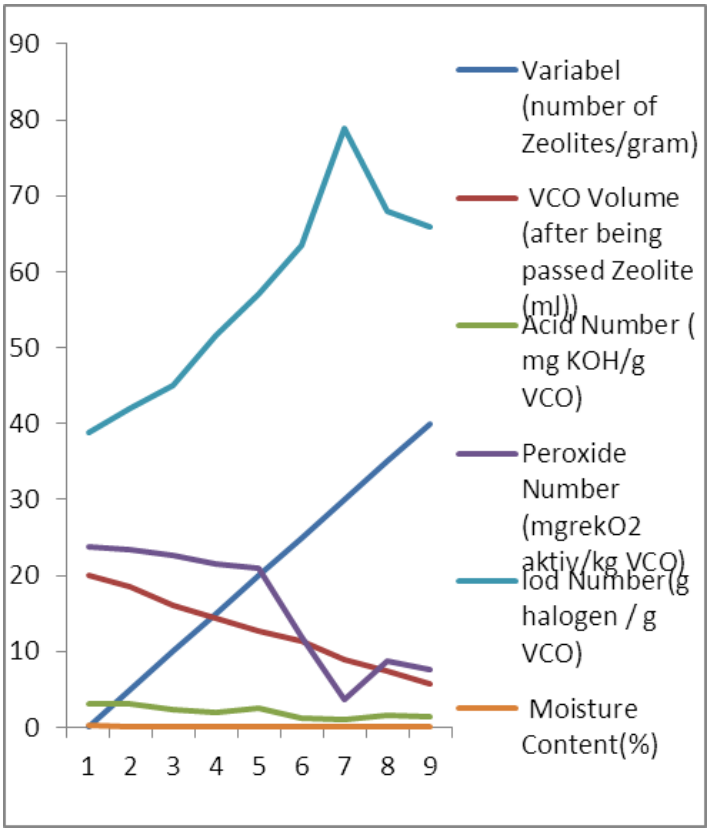
1). Data of VCO Analysis Results obtained with soursop extract with the help of ultrasonic devices



Graph 1. *VCO Analysis Results Data obtained with soursop extract with the help of an ultrasonic device.*

In graph 1. shows that the optimum time was obtained in 66.7% yield with 60 minutes ultrasonic time. At optimum ultrasonic time (60 minutes) the bond between oil and protein has been damaged so that the oil molecules are more easily separated into smaller molecules. However, at ultrasonic time above 60 minutes the yield of VCO oil produced is reduced by 60.5%. From the results of the analysis of the protein content of coconut milk cream on average by 10.42% and protein content for VCO by 1.43%. The high level of protein in coconut milk cream when compared with the book Ketaren (1986) 3.4%, is due to different analysis processes such as the method used and the treatment for the coconut milk cream. In this study before analyzing the protein of coconut milk cream on ultrasonic so that the fat and protein breakage occurs which causes the breakdown of protein in coconut milk cream. The protein content in VCO 1.43% is low. Low protein levels in the VCO are good because they are not easily rancid.

2). Data of VCO characteristics from the results of making VCO with soursop extract and ultrasonic aid and purification of VCO with natural zeolite adsorben.



Graph 2. *VCO Characteristics Data from the Results of the Making VCO with Soursop Extract and ultrasonic aid and purification of VCO with Natural Zeolite Adsorben.*

In graph 2. it can be seen that the effect of the use of natural zeolite as an adsorbent for VCO purification from the VCO manufacturing results shows that the VCO characterization after passing the adsorption process using natural zeolite adsorbent decreased acid number, peroxide number and moisture content, and increased iod number. The results of the characteristics, the best VCO purification occurred at 30 g of Natural Zeolite with 20 ml of VCO with a decrease in acid number of 64.44%, peroxide number of 84.92% and moisture content of 96.15%, and an increase in Iod number of 50 , 84%. This is due to the large number of Natural Zeolite, the greater the amount of acid, water and peroxide adsorbed on the surface of the Zeolite, so that the VCO becomes purer. The increase in Iod number is needed because with increasing Iod number shows the more double bond needed for raw materials in the process of making cocozone oil.

5 CONCLUSION

In this study the difference in yield and quality of Virgin Coconut Oil (VCO) made with ultrasonic time variation resulted in several things which can be concluded as follows: With increasing ultrasonic time, the water content gets smaller, the density increases, free fatty acids get smaller, the higher saponification rate and yields increased with the most optimum enzymatic ultrasonic time to make Virgin Coconut Oil (VCO) with 4 ml Soursop extract and the best 200 ml coconut cream was 60 minutes which had a yield of 66.7%. The results showed that VCO without and with the help of ultrasonic waves yielded yields of 20.6055% and 25.33371%. And the results of the characteristics, the best VCO purification occurred at 30 g of Natural Zeolite with 20 ml of VCO with a decrease in acid number of 64.44%, peroxide number of 84.92% and moisture content of 96.15%, and an increase in Iod number of 50.84%.

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6 ACKNOWLEGMENTS :

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