

# Analysis of free Fatty Acid Levels (as Lauric Acid) Pure Coconut Oil (Virgin Coconut Oil / VCO) for sale in Kediri City

*by IJMR IIKNU*

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## Analysis of free Fatty Acid Levels (as Lauric Acid) Pure Coconut Oil (Virgin Coconut Oil / VCO) for sale in Kediri City

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### ABSTRACT

Pure Coconut Oil (Virgin Coconut Oil / VCO) is a vegetable oil that contains medium chain saturated fatty acids. The medium-chain saturated fatty acid that has the highest content in virgin coconut oil is lauric acid. Lauric acid can be directly absorbed by the liver and used as an energy source. This study aims to determine the levels of free fatty acids (as lauric acid) in virgin coconut oil (Virgin Coconut Oil/VCO) according to SNI Standard 7381: 2008. The samples used in this study were pure coconut oil from various brands on the market in Indonesia, Kediri city. This study used an alkalimetry method to identify the free fatty acid levels in the sample. From the results of the analysis on 5 (five) brands of virgin coconut oil, it was found that all samples met the requirements of SNI 7381: 2008 which is a maximum of 0.2%. The results of the analysis of the levels of free fatty acids as lauric acid, the smallest 0.1643% and the largest 0.1988% according to the requirements of SNI.

**Keywords:** Virgin Coconut Oil, Free Fatty Acids, SNI 7381 : 2008

### INTRODUCTION

Oils are esters of a glycerol molecule and three fatty acid molecules, therefore they are also called triacyl glycerol or triglycerides. The fatty acids contained in triglycerides have a great effect on the properties of the oil and are a determinant of the physical and chemical properties of the oil. Fats containing fatty acids with low melting points are usually liquid at room temperature, and fats containing fatty acids with high melting points tend to be semisolid or solid at room temperature. The fatty acids that are bonded to form triglycerides are straight chain organic acids which usually contain between 16 and 24 carbon atoms per molecule. Based on the presence or absence of carbon-carbon double bonds in fatty acids, unsaturated fatty acids and saturated fatty acids are known. Unsaturated fatty acids are fatty acids that have a carbon-carbon double bond, while saturated fatty acids are fatty acids that do not contain double bonds in the bonds between the carbon atoms that make up the fatty acid. (Darmoyuwono, 2006).

The oil that has strong antioxidant properties is coconut oil. One of the coconut oil products that is now getting a wide market is virgin coconut oil (VCO). Pure coconut oil, or better known as virgin coconut oil (VCO) is a modification of the coconut oil manufacturing process so that it produces products with low water content and free fatty acid levels, clear in color, smells good, and has a long shelf life of more than 12 month The content of short and medium chain fatty acids (caprylic, capric and lauric) in coconut oil is known to have certain biological functions for the human body. (Ulfa, Retnaningsih and Aufa, 2017)

VCO oil is also able to dispel diseases caused by free radicals, anti-wrinkle, premature aging, and for pharmaceutical purposes. In the pharmaceutical field, virgin coconut oil is usually used for medicines and cosmetics. For example, in telon oil, hand body, and facial moisturizers. In addition, VCO is also able to improve the digestive system. This is because



the fatty acids in VCO are MCFA which can be directly absorbed through the intestinal wall, without having to undergo hydrolysis and enzymatic processes so that they are directly metabolized in the liver to be produced into energy. (Darmoyuwono, 2006)

The free fatty acids produced by the hydrolysis and oxidation processes are usually combined with neutral fats and at concentrations up to 15% do not yet produce an unpleasant taste. Free fatty acids, even in small amounts, cause an unpleasant taste. This applies to fats containing non-volatile fatty acids, with the number of C atoms greater than 14. Free volatile fatty acids, with the number of carbon atoms C4, C6, C8, and C10, produce a rancid odor and unpleasant taste in the food. fatty foods. (Irmawati, 2013)

## METHOD

### A. Tools and Materials

The equipment used in this study were analytical balance, Erlenmeyer, measuring flask, measuring cup, volume pipette, beaker, burette. The main ingredient used in this research is virgin coconut oil (VCO) of various brands. While the chemicals are 95% neutral alcohol, phenolphthalein (PP) indicator, oxalic acid pa, 0.1 N NaOH, aquades (Rohman, 2007)

### B. Standardization of 0.1 N NaOH solution with 0.05 N Oxalic Acid

Preparation of standard solution of 0.5 N Oxalic Acid as much as 100 ml. Weighed 0.3151 g Oxalic Acid and dissolved with CO<sub>2</sub>-free distilled water in a 100 ml volumetric flask. Added aquadest until the marking line and shaken until homogeneous. Making a solution of 0.1 N NaOH as much as 500 ml with weighed 2 g Asam Oksalat and dissolved with CO<sub>2</sub>-free distilled water in a 500 ml volumetric flask. Added aquadest until the marking line and shaken until homogeneous.

Standardization of NaOH solution with standard solution of 0.05 N Oxalic Acid. Pipette 10 ml of standard solution of oxalic acid and put in an Erlenmeyer then add 10 ml of CO<sub>2</sub>-free distilled water and 1-2 drops of PP indicator. Titrate with NaOH until a constant pink color.

### C. Determination of free fatty acid levels

Weighed 30 grams of the sample was put into an erlenmeyer then added 50 ml of 95% neutral ethanol and 3-5 drops of PP indicator. Titrate with 0.1 N NaOH solution until the pink color is constant. Calculate the free fatty acid content in the sample (SNI, 2008)

$$\text{Free fatty acid levels (\%)} = \frac{V_{\text{NaOH}} \times N_{\text{NaOH}} \times 200}{\text{sample weight (g)} \times 10}$$

## RESULTS AND DISCUSSION

The results of standardization of NaOH with 0.0496 N Oxalic Acid obtained NaOH normality which is shown in Table 1.

Table 1. Standardization Results of NaOH with Oxalic Acid

Titration	Volume NaOH	Normalitas NaOH
1	5,1	0,0973
2	5,0	0,0992
3	5,2	0,0954
	Average	0,0973

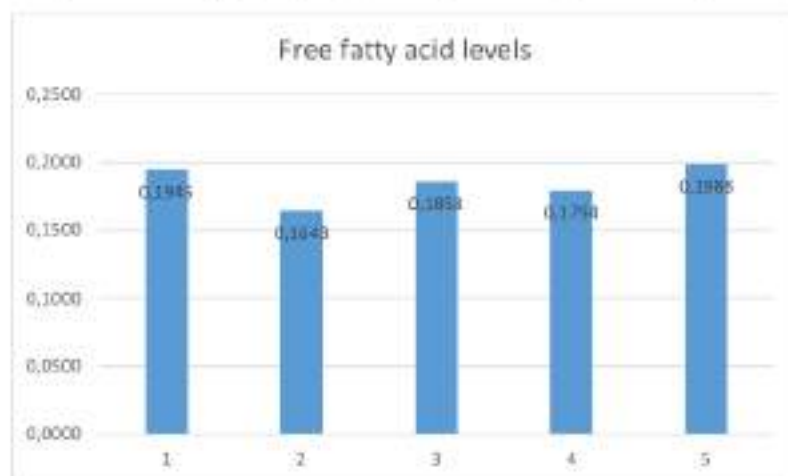
With the results of the analysis of the free fatty acid content as follows::

Table 2. Coconut Oil Free Fatty Acid Content

Sample	Sample weight	Volume NaOH (ml)	Free fatty acid (%)
1	30,0285	3,2	0,2074
	30,0032	2,8	0,1816
	30,0120	3,0	0,1945
		Average	<b>0,1945</b>
2	30,0115	2,7	0,1751
	30,0005	2,3	0,1492
	30,0183	2,6	0,1686
		Average	<b>0,1643</b>
3	30,0253	2,8	0,1944
	30,0215	2,4	0,1556
	30,0155	3,1	0,2075
		Average	<b>0,1858</b>
4	30,0210	2,8	0,1815
	30,0085	2,4	0,1556
	30,0122	3,1	0,2010
		Average	<b>0,1794</b>
5	30,0020	3,0	0,1946
	30,0123	3,1	0,2010
	30,0210	3,1	0,2009
		Average	<b>0,1988</b>

The data in Table 1 shows the results of the standardization of NaOH, the actual NaOH concentration is 0.973 N. This concentration is used to calculate the free fatty acid levels in the sample.

Analysis of free fatty acid levels as lauric acid in samples of Pure Coconut Oil (VCO) of various brands is shown in table 2. The average free fatty acid content in the five samples is the smallest in sample no 2 with 0.1643% being the largest level in sample no 5 with a level of 0.1988%. The five samples met the requirements of SNI 7381: 2008 which is a maximum of 0.2%. The average free fatty acid levels in the five samples are depicted in graph 1.



Graph 1. Average free fatty acid levels in 5 (five) samples of VCO

The VCO oil samples that have been tested have levels of Free Fatty Acids that meet SNI requirements. Free fatty acid levels that do not meet the requirements can be caused by the storage time before the coconut is processed, the conditions for selecting raw materials to be used as VCO, and the method chosen at the time of making VCO. Changes in water content occurred during storage due to coconut still carrying out metabolic activities which are still living structures. This reaction is accelerated by bases, acids, and enzymes such as lipase enzymes found in oil. (Lem, 2014)

Planting location and delay time before coconut processing has an effect on water content, free fatty acid number, peroxide number and yield of oil produced. The lowest free fatty acids were found at a one-week delay and the highest free fatty acids were found at a three-week delay. The longer the delay before processing, the lower the water content and free fatty acids contained in the oil. This is due to the increased water content and the presence of lipase enzymes that play a role in the process of forming free fatty acids. (Sopianti, DS; Herlina; Saputra, 2017)

The occurrence of changes in free fatty acids during the delay before the process is due to both enzymatic and non-enzymatic hydrolysis of the fat contained. The process of hydrolysis of fats or oils can produce free fatty acids due to the presence of water in food tissues that contain fat or oil. Therefore, the process delay must be taken into account so that the VCO damage in this case, namely the increase in the number of free fatty acids can be avoided.

VCO oil is also able to dispel diseases caused by free radicals, anti-wrinkle, premature aging, and for pharmaceutical purposes. In the pharmaceutical field, virgin coconut oil is usually used for medicines and cosmetics. For example, in telon oil, hand body, and facial moisturizers. In addition, VCO is also able to improve the digestive system. This is because the fatty acids in VCO are MCFA which can be directly absorbed through the intestinal wall, without having to undergo hydrolysis and enzymatic processes so that they are directly metabolized in the liver to be produced into energy. (Sutarmi dan Hartin, 2005).

As a cure for diseases caused by viruses, microbes, protozoa, fungi, and worms. In the body, lauric acid which is the main component of virgin coconut oil (about 50%) will be

partially converted into monoglyceride compounds called mono-laurin. This compound is an ingredient in the immune system and functions to destroy germs whose cell walls are made of lipids. Diseases that can be cured by coconut oil are viral diseases such as mononucleosis, influenza, HIV/AIDS, bacterial diseases such as pneumonia, tuberculosis, asthma, earaches, throat infections, fungal diseases such as ringworm, *Candida albicans*, and rashes. (Gani, Z., Harlinawaty, 2005; Darmoyuwono, 2006)

## CONCLUSION

1. The results of the determination of free fatty acid levels in 5 (five) samples of VCO for sale in the city of Kediri with different brands obtained that the five samples according to the requirements of SNI 7381: 2008
2. The average free fatty acid content of the VCO sample was obtained the smallest 0.1643% and the largest 0.1988%.

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