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# Decrease of Free Fatty Acid Levels in Cooking Oil Using Sugar Cane

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## Abstract

Corresponding author: nasukwadalbarbasi@gmail.com Received: 21 April 2019, Revised: 27 May 2019, Accepted: 25 June 2019. Edible Oil has a fairly high economic value. Cooking oil is generally used for cooking. With the condition of oil prices increasing so many times it is necessary to recycle again so as not to pollute the environment. Used cooking oil has a lot of high free fatty acid content, so it is necessary to reduce fatty acids by using absorbent ingredients. Sugarcane bagasse can be used as a purification ingredient of used cooking oil by soaking. This study aims to determine the level of soaking bagasse against free fatty acid numbers. Variable immersion for 0 hours, 24 hours, 48 hours, and 72 hours. The results of the percentage of Free Fatty Acid (ALB) levels after done, soaking time for 0 hours is 0.36%, 24 hours is 0.34%, 48 hours is 0.33%, and 72 hours is 0.29%.

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Keywords: Free Fatty Acid (ALB), Sugar Cane Waste, Used Cooking Oil.

### 1. Introduction

According to Ramdja et al (2010), cooking oil is one of the needs commonly used in the household. Basically, cooking oil comes from a variety of plants such as palm oil, corn, and samin oil, the results of which will be used as cooking oil. Oil is one of the groups included in the lipid group. One characteristic that is characteristic of lipids (including oil) is its solubility in organic solvents (eg ether, chloroform) benzene, or vice versa irregularities in water solvents. In food technology, oil and fat play an important role. Because oil and fat have high boiling points (around 200°C) it is usually necessary to fry

food so that the fried material loses most of the water it contains and becomes dry.

Oil that has been used for frying is commonly called used cooking oil. Most used cooking oil is actually oil that has been damaged. Oils that are high in unsaturated fat have added value only to the first fry, while those with high saturated fatty acids can last longer, although they will eventually be damaged too. By the frying process some of the double bonds will become saturated. Prolonged and repeated use can cause oxidized double bonds, form peroxide groups and cyclic monomers.

Now the cooking oil crisis is almost in all cities in the country which is one of the biggest

palm oil producers in the world. With the condition of cooking oil prices soaring, making a number of people think creatively to recycle used cooking oil or commonly called cooking oil. A recycling technology has been found to process cooking cooking oil into a proper cooking oil back clean by using sugarcane bagasse as an absorbent material.

Sugar cane absorbent material that has been made into particles can be directly used easily by housewives to process used cooking oil into suitable oil. Sugarcane bagasse in the analysis serves as a good absorbent material (Ramdja, 2010). Therefore, we are trying to examine the process of refining used cooking oil so that re-used cooking oil is used by knowing the levels of free fatty acids that are processed using bagasse absorbent absorbent material.

## 2. Experiments Procedure

### Object of research

In this study, the variables used were soaking time on bagasse in used cooking oil, namely: 0 hours, 1x24 hours, 2x24 hours, and 3x24 hours. As for waste cooking oil, one sample taken with a duration / intensity of 4 hours, then for bagasse particles is the same, which is approximately  $\mu$ m. Before taking sugarcane bagasse is dried first, then washed thoroughly.

### Tools and Materials

Equipment and materials used are: titration tools, balance sheets, pipettes, funnels, hot plates, used oil NaOH, alcohol, bagasse and PP indicators.

# Soaking Sugarcane Bagasse

- Puree the Sugarcane Bagasse first, then weigh 5 grams.
- Mix sugarcane bagasse powder into used cooking oil that has been prepared 100 ml into a reaction tube, then shake until evenly mixed.

 Pulp powder that has been mixed with used cooking oil is immersed with time variations (0 hours, 24 hours, 48 hours and 72 hours).

The process of reducing levels of free fatty acids

- A sample of 5 grams of oil is dissolved in 2 ml alcohol, then heated.
- Next, to determine the levels of free fatty acids (FFA) in oil by titration.
- After being cooled the sample is titrated with a 0.1 N NaOH solution marked by a change in guava color with the addition of 3 drops PP indicator.
- Then free fatty acids use the formula equation:

$$\% FFA = \frac{BM Asam Lemak Bebas x V x N}{W} x 100 \%$$
 (1)

## 3. Results and Discussions

The results of this study, based on the parameters of free fatty acid levels of sugarcane bagging reduction on cooking oil. The immersion treatment was varied into 0 hours, 24 hours, 48 hours and 72 hours. Of the four variations given the same oil quality. That is, the same oil has been used for frying the same food ingredients.

The fried food ingredients are the first tempe, then tofu and the last is used for chicken frying. After that the measurement of free fatty acid levels is only carried out. Measurements were made by free fatty acid titration. The titration uses 3 drops of PP indicator and NaOH volume.

**Table 1.** Variation of NaOH volume to immersiontime

	Immersion	Volume (L)		
No	time	Ι	II	III
1	0 hour	0,0005	0,0008	0,0006
2	24 hour	0,0005	0,0006	0,0007
3	48 hour	0,0007	0,0007	0,0006
4	72 hour	0,0006	0,0005	0,0005

The table above shows that each variation is carried out three times the test, then the average of the three is taken.

**Table 2.** Relationship of Free Fatty Acid Levels

 to the soaking time of used cooking oil

No	Immersion time	FFA Percentage
1	0 hour	0,36%
2	24 hour	0,34%
3	48 hour	0,33%
4	72 hour	0,29%

The table above shows that, the highest levels of free fatty acids in used cooking oil are not soaking. Then for one day immersion is only 0.2 difference, then soaking for 48 hours is 0.33%. Immersion with a duration of 72 hours or equivalent to 3 days showed the lowest FFA levels among the previous 0.29%.



**Figure 1.** Graph of the relationship between fatty acid levels and immersion time

The graph above shows the relationship between free fatty acid levels and the duration of immersion done with time variations (0 hours, 24 hours, 48 hours, and 72 hours).

For the time without immersion (0 hours) the highest percentage of fatty acid levels is produced compared with the soaking time of 24 hours, 48 hours and 72 hours. The longer the immersion time, the lower the level of free fatty acid levels produced.

### 4. Conclusions

The research conducted, it can be concluded that to reduce the levels of free fatty acids in used cooking oil can be done by soaking bagasse on oil. The longer the immersion is done, the free fatty acid levels will decrease.

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