Quality Test of Cooking Oil Used by Fried Chicken Sellers in the Ciamis Market Based on Peroxide Value

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ABSTRACT

Oil is a source of energy for humans that produces energy of 9 kcal / gram. One way to show oil quality can be seen based on peroxide numbers. According to the 2013 Indonesian National Standard regarding cooking oil quality requirements, the peroxide number limit is 10 meq O2/kg. The purpose of this study was to determine the quality of cooking oil in fried chicken traders in the Ciamis market. The factor that influences changes in peroxide numbers in oil is the duration of heating. The method used to find out the peroxide number is iodometric titration. The results obtained are the volume of the titrant and the weight of the sample used. Analysis of the data generated using the peroxide number formula. Based on research, the quality test of cooking oil shows that cooking oil in 5 fried chicken traders in Ciamis Market exceeds the maximum limit of peroxide numbers, namely with a sample average of A 31.89 mek O2 / kg; sample B 48.88 mek O2 / kg; sample C 34.67 mek O2 / kg; sample D 46.11 mek O2 / kg; and sample E49.23 mek O2 / kg. So the conclusion of this study, the cooking oil used by 5 traders of fried chicken in Ciamis Market does not meet SNI standards so that it can have a negative impact on health.

Keywords : Peroxide Numbers, Cooking oil, Fried Chicken.

INTRODUCTION

Cooking oil is one of the ingredients that is widely used in cooking food processing, is liquid at room temperature and consists of three units fatty acid (Dewi and Ulfah 2021). Cooking oil is a food ingredient with the main composition triglycerides that come from plants, for example olive oil, corn oil, coconut oil and sunflower seed oil (Ishak et al. 2016). Vegetable oils contain essential fatty acids such as linoleic, lanolenic and arachidonic acids can prevent narrowing of blood vessels due to cholesterol buildup(Rahmah Kurnia Ramdan 2019). Cooking oil can produce energy of 9 kcal/gram, compared to carbohydrates and proteins which only produce energy of 4 kcal/gram. Apart from functioning as a source of energy, Oil is also a solvent for vitamins A, D, E and K. Lipid oxidation can produce primary and secondary oxidation compounds that can cause harmful effects on the body (Bou et al. 2008).

Cooking oil functions as a medium for conducting heat, enhancing savory taste, increasing nutritional value and calories in food. Repeated use of cooking oil causes the oil to become damaged because unsaturated fats oxidize to form lipid peroxide (Jiang et al. 2021). Cooking oil will experience damage, decrease in quality and nutritional value which is characterized by a change in color from clear yellow to brown and black. This oil, which is dark brown to black in color, is often referred to as used cooking oil. The use of used cooking oil in food processing can affect the taste and appearance of food ingredients interesting. Apart from that, the use of used cooking oil also has negative impacts on health, for example, cancer and lowers the digestibility of fats, in addition to experiencing pilomerization (clumping) and free radicals (free radicals).

Oils with saturated fatty acids are fatty acids that contain single bonds in the hydrocarbon chain. It is stable and not easy react or change into other types of fatty acids. Generally it consists of octanoic acid, decanoic acid, lauric acid, myristic acid, palmiic acid and tamarind stearate.

The determination of peroxide value (PV) is one of the most important quality control measurements oil because it is an indicator of the primary oxidation status of the product (Pizarro et al. 2013). The peroxide number is the number of milliequivalents of peroxide in 1000 grams of fat. The peroxide number is the most important value for determining the degree damage to oil or grease (Dermiş, Can, and Doru 2012). Unsaturated fatty acids can bind oxygen on the double bond to form peroxide. This peroxide can be determined by the iodometric method (Zhang et al. 2021).

The products resulting from fat oxidation include peroxides, fatty acids, aldehydes and ketones. Rancid or rancid odors are mainly caused by aldehydes and ketones. For knowing the level of oil damage can be expressed as a peroxide numberor thiobarbituric acid (TBA) number. To calculate the peroxide value you can use the equation:

$$\text{Peroxide value} = \frac{1000 \; x \; V \; x \; N}{W \; (g)}$$

Where, N is Normality of 0.1 N Sodium Thiosulfate Standard Solution (N), V is Volume of 0.1 N Sodium Thiosulfate Solution required for titration sample (ml) and W is Sample Weight (g)

TOOLS AND MATERIALS

The tools and materials used in this research were laboratory glassware, analytical scales, burettes, cooking oil from fried chicken sellers, chloroform, acetic acid, potassium iodide solution, N2S2O3, 1% starch.

METHODS

Solvent for Cooking Oil The solvent for cooking oil is made by taking 18 ml of glacial acetic acid and 12 ml of chloroform. Preparation of 20% Potassium Iodide solution Making a 20% potassium iodide solution is done by dissolving 20 grams of KI crystals in an Erlenmeyer flask, adding 100 ml of aqua distillate then stirring until dissolved.

Preparation of 0.1 N N2S2O3 Titrant Solution

The titrant N2S2O30.1 N was weighed as 24.9 grams of sodium thiosulfate then distilled water was added to the glass beaker until the powder was completely dissolved and homogeneous. Then the solution is transferred to a 1 liter measuring flask, add aqua distillate to the mark.

Preparation of 1% Amylum Indicator

Amylum indicator is made by weighing 1 gram of amylum powder and adding it to 100 ml of aqua distillate, then heating it on a hotplate until it boils, then cooling it.

Standardization of 0.1 N sodium thiosulfate solution

Weigh 0.05 grams of dry potassium iodate (KIO3), dissolve it in a 250 ml Erlenmeyer flask with 50 ml of aqua distillate, stir until homogeneous. Then add 10 ml of 20% potassium iodide and 2.5 ml of 4 N HCl, then titrate with 0.1 N sodium thiosulfate solution until the

solution is yellow, add 2 ml of 1% starch solution and continue titrating until the blue color disappears.

Determination of Peroxide Number

The oil is weighed as much as 5 grams then put in Erlenmeyer flask, then add 18 ml of glacial acetic acid and 12 ml of chloroform then shake the solution until all the ingredients are dissolved. Add 0.5 ml of 20% KI solution and leave for 1 minute then add 30 ml of shaken distilled water and titrate with 0.1 N sodium thiosulfate until the yellow color almost disappears. Then add 0.5 ml of 1% starch indicator then titrate with 0.1 N Na2S2O3 until the solution changes from blue until the blue color disappears.

RESULTS

Sampling of Cooking Oil

The sample from this research was cooking oil obtained from 5 fried chicken sellers at Ciamis Market, by providing informed consent for their willingness. There were 7 fried chicken sellers, but only 5 fried chicken sellers were willing to take cooking oil as samples. Sampling was carried out for 6 consecutive days from each seller. The samples to be studied were taken from frying pans of 15 grams from each fried chicken seller.

Standardization of 0.1 N Sodium Thiosulfate Solution

Standardization of the Sodium Thiosulfate solution was carried out to determine concentration of Sodium Thiosulfate and determine its exact level of purity, usually expressed in units Normality. Normality of a solution is the number of gram equivalents of solute contained in 1 liter of solution. Standardization was carried out by dissolving 0.05 grams of potassium iodate (KIO3) with 50 ml of distilled water until dissolved, then adding 10 ml of 20% potassium iodide and 2.5 ml of 4 N HCl, then titrating with sodium thiosulfate solution until the solution was yellow. Add 1% starch solution and titrate again with sodium thiosulfate until the blue color disappears. The results of standardizing the Sodium Thiosulfate solution n obtained a volume of 13 ml, with the following calculations:

$$N = \frac{50 \, mg}{13 \, m \, x \, 35{,}67} = 0{,}1 \, N$$

Tabel 1. The Result of Peroxide Number

Sample	Peroxide value (Meq O2/kg)						Average
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	
A	50	50	60	60	50	40	51,67
B	70	50	70	60	60	60	61,67
C	60	60	50	40	50	60	53,33
D	60	50	60	40	60	60	55
E	50	40	40	60	40	60	48,33

Information :

According to quality requirements   : < 10 Meq O2/Kg

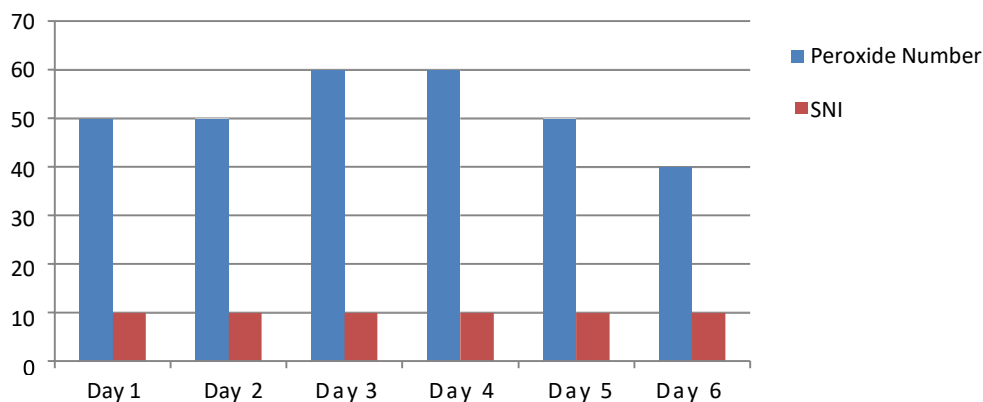Does not meet quality requirements : > 10 Meq O2/Kg
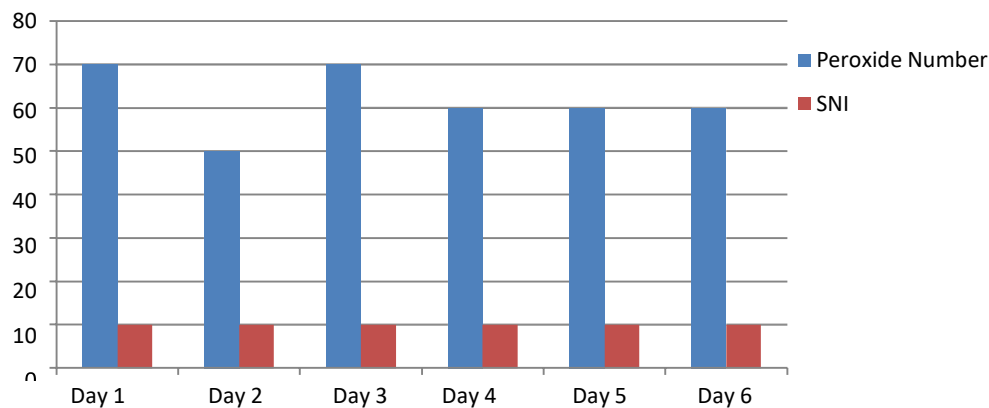

Figure 1. Diagram of Peroxide Number Sample A
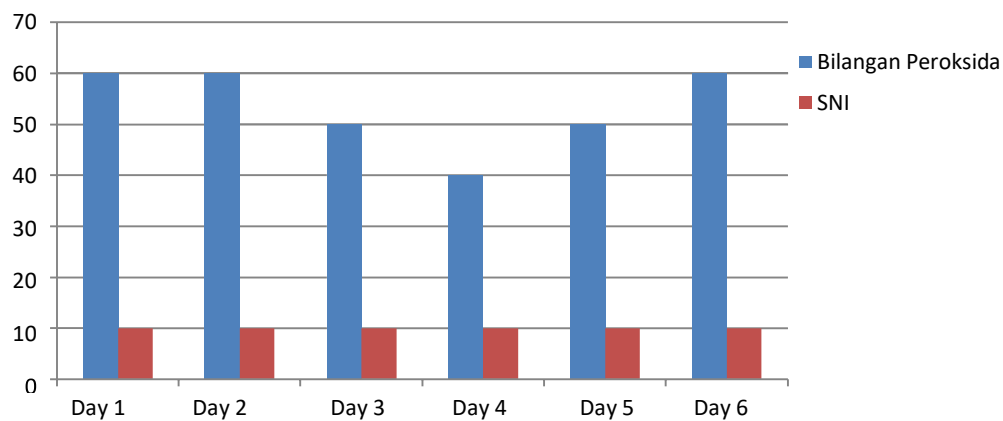

Figure 2. Diagram of Peroxide Number Sample B

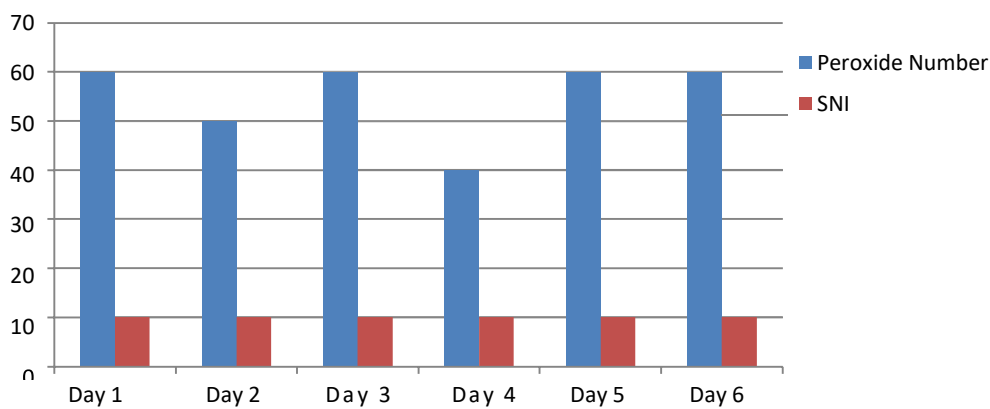**Figure 3.** Diagram of Peroxide Number Sample C

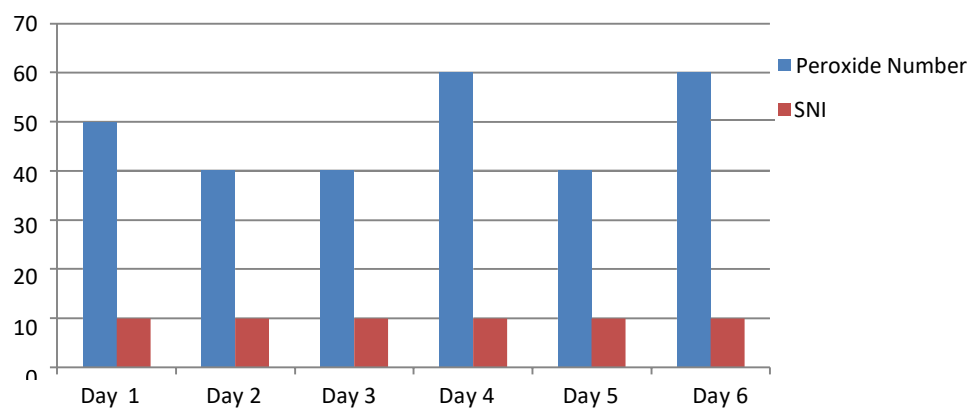

Figure 4. Diagram of Peroxide Number Sample D

Figure 5. Diagram of Peroxide Number Sample E

DISCUSSION

The value of the cooking oil quality test calculation is based on numbers peroxide in cooking oil taken from 5 chicken traders fried at the Ciamis market, sample A average was 51.67 meq O_2/kg; sample B 61.67 meq O_2/kg; sample C 53.33 meq O_2/kg; sample D 55 meq O_2/kg; and sample E 48.33 meq O_2/kg. The quality test results of the five cooking oil samples studied did not meet quality standards based on SNI-01-3741-2013 because they exceeded the maximum limit of 10 meq O_2/kg. This shows that the cooking oil used is of poor quality. From the first to the sixth day of sampling cooking oil, the peroxide value decreased or increased. The difference in peroxide value obtained is caused by various factors including the possibility of adding new cooking oil, repeated use of oil, high temperatures when frying which triggers oxidation.

High peroxide levels cause rancidity in cooking oil. Hydrolysis rancidity occurs because there is a certain amount of water in the oil, so the oil is converted into free fatty acids, glycerol. Meanwhile, oxidation rancidity occurs because fatty acids experience hydrogen reduction, thus forming free radicals (Ramdan and Wulandari 2023). In the presence of oxygen, free radicals become free radical peroxide fatty acids and then become hydro peroxide fatty acids (Lee and Choe 2012). If hydroperoxide is allowed to form, the substance will continue its decomposition by breaking down into various kinds of aldehydes and ketones, the size of which depends on the number and position of the double bonds that have undergone peroxide. This research can be of interest to both consumers and sellers. Consumers are expected to be careful when buying food, especially fried chicken, to choose sellers who use oil that is still clear. for sellers not to use cooking oil repeatedly with high heating.

CONCLUSION

From this research it can be concluded that the results of cooking oil quality tests are based on numbers peroxide shows that the oil used by fried chicken traders at Ciamis Market is not good and does not meet the established standards, because it exceeds the maximum limit which should be 10 meq O_2/kg.

ACKNOWLEDGEMENTS

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