

# The peroxide in fatty acid biology essay



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Oils or fats including edible oil are in great demand everyday as the principal materials for foods, cooking and so forth, therefore, a determination of the degree of oxidation or deterioration of oils or fats is a daily requirement from the viewpoint of hygiene and sanitation, tastes and odors of foods manufactured or cooked.

The peroxide value is a measure of those substances in sample, expressed in terms of milliequivalents of active oxygen per kilogram which oxidize potassium iodide under condition of the test. High peroxide values are a definite indication of a rancid fat, but moderate values may be the result of depletion of peroxides after reaching high concentrations.

Procedures:

Into the 250mL flask, the sunflower oil is weighted to the nearest 0.1 mg, 5.00±0.05g.

30mL of acetic acid-chloroform solution is added.

The flask is swirled until sunflower oil is dissolved in the solution.

0.5mL of saturated potassium iodide is added with a graduated pipette.

The solution is swirled for 1 minute and 30mL of distilled water is added. For freshly produced oils, a few drops of starch solution are added.

0.01 N sodium thiosulphate solution is titrated is added gradually and with constant and vigorous shaking. The titration is continued, the flask is shake vigorously near the end point to liberate all the iodine from the chloroform layers.

The thiosulphate solution is added drop wise until the blue color just disappears.

For sunflower oil with high peroxides, 0. 01 N is titrated until the yellow iodine color has almost disappeared. 0. 5mL of starch indicator is added and continues until the blue color just disappears.

Blank test in parallel with determination is carried out. The blank titration must not exceed 0. 1mL of the 0. 01 n sodium thiosulphate.

Step 1 to 9 is repeated by using the canola oil.

### **Results:**

Weight of canola oil and sunflower oil = 0. 22g

Initial reading

Final reading

Sunflower oil

77. 8

83. 6

Canola oil

74. 8

77. 8

Peroxide value of sunflower oil =  $N \tilde{A} - (V_s - V_b) \tilde{A} - 1000$

W

$$= 0.01 \times (83.6 - 77.8) \times 1000$$

0.22

$$= 263.64$$

$$\text{Peroxide value of canola oil} = 0.01 \times (77.8 - 74.8) \times 1000$$

0.22

$$= 136.36$$

### **Discussion:**

In chemistry, fatty acid is a carboxylic acid with long hydrocarbon chain. It is also any of a large group of monobasic acids, especially those found in animal and vegetable fats and oils, it also plays roles outside the body. Furthermore, it has a general formula of  $C_nH_{2n+1}COOH$ . When it is not attached to other molecule, it is called “ free” fatty acid. Fatty acid is essential as a source of fuel because of its metabolism yield large quantities of ATP. Characteristically made up of saturated or unsaturated aliphatic compounds with an even number of carbon atoms, this group of acids includes palmitic, stearic, and oleic acids. One of many molecules that are long chains of lipid-carboxylic acid found in fats and oils and in cell membranes as a component of phospholipids and glycolipids.

Peroxide is a compound containing an oxygen-oxygen single bond. The simplest stable peroxide is hydrogen peroxide. The O-O group is called the peroxide group or peroxy group. In contrast to oxide ion, the oxygen atoms

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in the peroxide ion have an oxidation state of -1. Peroxide can be classified into organic and inorganic whereas the inorganic peroxides have an ionic, salt-like character. The organic peroxides are dominated by the covalent bonds. The oxygen-oxygen chemical bond of peroxide is unstable and easily split into reactive radicals via homolytic cleavage.

Sunflower oil is the non-volatile oil expressed from sunflower seeds.

Sunflower oil is commonly used in food as frying oil, and in cosmetic formulations as an emollient. Canola oil is made at a processing facility by crushing the rapeseed. Canola is a key ingredient in many foods. Its reputation as a healthy oil has created high demand in markets around the world. Canola oil has many non-food uses, and often replaces non-renewable resources in products including candles, lipsticks, newspaper inks, industrial lubricants and biofuels. The average density of canola oil is 0.92g/ml.

The peroxide value of an oil and fat is used as a measurement of the extent to which rancidity reactions have occurred during storage. Other methods are available but peroxide value is the most widely used. The double bonds found in fats and oils play a role in autoxidation. Oils with a higher degree of unsaturation are most susceptible to autoxidation. The best test for autoxidation (oxidative rancidity) is the determination of the peroxide value. Peroxides are intermediates in the autoxidation reaction. Autoxidation is a free radical reaction involving oxygen that leads to deterioration of fats and oils which forms off-flavors and off-odors. Peroxide value, concentration of peroxide in an oil or fat, is useful for assessing the extent to which spoilage has advanced. The peroxide value is the number that expresses in <https://assignbuster.com/the-peroxide-in-fatty-acid-biology-essay/>

milliequivalents of active oxygen the quantity of peroxide contained in 1000 g of the substance. Peroxide Value is one of the most widely used tests for oxidative rancidity in oils and fats, peroxide value is a measure of the concentration of peroxides and hydroperoxides formed in the initial stages of lipid oxidation. Milliequivalents of peroxide per kg of fat are measured by titration with iodide ion. Peroxide values are non static and special care must be taken in handling and testing samples. It is difficult to provide a specific guideline relating peroxide value to rancidity. High peroxide values are a definite indication of a rancid fat, but moderate values may be the result of depletion of peroxides after reaching high concentrations. Therefore the peroxide value of canola oil is lower than sunflower oil.

### **Precaution step:**

There are several precaution steps that must be considered in this experiment. Firstly, our eyes must be perpendicular to the scale of instrument when recording the value to avoid parallel error occurs. Secondly, we must also avoid or minimize the zero error existed in the experiment. Thirdly, during the titration, we must add the sodium thiosulphate gradually or drop by drop, with constant and shake it vigorously to avoid inaccurate value taken. Besides that, we must avoid solution being oxidized or carbon dioxide; CO<sub>2</sub> being dissolved in the solution because it will affect the actual result.

### **Conclusion:**

The peroxide value of sunflower oil is 263. 64 while the peroxide value of canola oil is 136. 36.