

**Ministry of Education  
Department of Higher Education  
Yangon University of Distance Education**

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Distance Education  
Research Journal**

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## Decolorization of Sesame Oil using Prepared Activated Charcoal

Thazin Win

### Abstract

The sesame oil is one kind of food and it can also be used as a component of drug. During this research, the color of sesame oil was found to change from yellow to reddish yellow after storage. The decolorization by using activated charcoal based on the carbon dosage method was presented in this paper. The activated charcoal used was prepared using commercial charcoal by calcination method. It was obtained 18g of activated charcoal was the selected value for decolorization of the 50g of sesame oil. Before and after the decolorization process, the sesame oil was characterized such as color density, pH, refractive index, ash percent, specific gravity, acid value, saponification value and iodine value were studied. The results indicate that the pH value of before decolorization of sesame oil was 6.0 and which has slightly acidic. The pH value of after decolorization was found to be in the range of 6.4-7.0. It was observed that the sesame oil becomes neutral after decolorization and the acid value, saponification value and iodine value were reduced after decolorization of sesame oil.

**Key words:** Sesame oil, Activated charcoal, Decolorization.

### Introduction

The oil extracted from sesame seed is used in cooking as salad oil and in making margarine. Sesame oil carries a premium relative to other coloring oils and is considered more stable than most vegetable oils due to contain antioxidants in the oil. Sesame oil is least prone, among coloring oils to turn rancid. This is because it has a very high boiling point. In effect, sesame oil retains its natural structure and doesn't break down even when heated to a very high temperature.

Activated carbon also widely known as activated charcoal or activated coal is a form of carbon which has been processed to make it extremely porous and thus to have a very large surface area available for adsorption or chemical reaction. Activated carbons are widely used as adsorbents for the removal of organic chemicals and metal ions of environmental or economic concern from air, gases potable water, wastewater and many other applications. Activated charcoal is able to reduce levels of the bad cholesterol LDL, while simultaneously increasing the amount of HDL or good cholesterol present in the blood.

### Materials and Methods

The sesame oil sample was collected from a local market (City mart). The brand was "A May Htwar Sesame Oil" from Magwe Myo, Magwe Division. It was stored in a stoppered bottle (Capacity 1 L or 1000 ml).

### **Preparation procedure of activated charcoal**

The various amount of commercial charcoal was taken and grinded with motor and pestle, then sieved with (60 mm) mesh to get the fine powder. The fine powder was heated at 800 °C for an hour to obtain the activated charcoal. Finally, the powder was stored in polyethylene bags for bleaching studies.

### **Decolorization procedure of sesame oil**

The various amounts of activated charcoal grams of (5, 10, 12, 14, 16, 18, 20 and 22) were placed in each beaker and 50 g of sesame oil added to each beaker. The beakers were gently shaken with the mechanical shaker for two hours and the samples were filtered. The decolorized sesame oil samples were obtained and physico-chemical properties were determined.

### **Physico-chemical analysis of sesame oil**

Before and after decolorization, the physico-chemical properties of oil samples were determined using Tintometer for colour density, hydrometer for specific gravity, pH meter for pH values, an Abbe refractometer for refractive index at 27 °C. Before and after decolorization, the acid value, saponification value and iodine value were determined.

### **Determination of ash content**

About 50g of oil samples (before and after decolorization) were placed in a porcelain crucible and then heated in a furnace at 1073 K for an hour to get the oil sample form ash completely. The crucibles containing the white ashes were cooled to room temperature and reweighed in desiccators.

## **Results and discussion**

The decolorization of sesame oil by activated charcoal powder was studied in this work. It was found that after the decolorization process, the color of sesame oil was changed from reddish yellow to pale yellow as presented (in Figures 1 and 2). The some physico-chemical properties of sesame oil samples before and after decolorization are presented in Table 1. The color density of sesame oil was changed from 62.2% to 6.3% yellow after decolorization. The pH of original sesame oil was found to be 6.0, it has the slightly acidic and 7.0 for decolorized sesame oil were found. Therefore, the decolorized sesame oil become neutral due to the adsorption of fatty acid contained in sesame oil by the activated charcoal.

The specific gravity of original and decolorized sesame oil were found to be 0.9213 and 0.9123 and the refractive index values were found to be 1.4712 and 1.4633. It was found that the values of specific gravity and refractive index were not quite different from original and decolorized sesame oil.

The ash percent of sesame oil sample before and after decolorization were found to be 0.0307 % and 0.0730 %, the greater value found after decolorization was due to the imperfect filtration of activated charcoal.

The acid value, saponification value and iodine value of original and decolorized sesame oils with various weight of activated charcoal were observed in Tables 2, 3 & 4. From Tables 2, 3 & 4, the minimum acid value (1.1345 mg/g) of decolorized sesame oil was found to be 18g of activated charcoal in 50 g of sesame oil, the minimum saponification value 78.49 mg/g of decolorized sesame oil was found to be 18 g of activated charcoal in 50 g of sesame oil. These tables indicate that 18 g of optimum value, very low acid value and saponification value (1.1345 mg/g and 78.49 mg/g) for after decolorization indicate the good quality of sesame oil. But the minimum iodine value 41.86 mg/g of decolorized sesame oil was found to

be 18 g of activated charcoal in 50 g of sesame oil. In literature, the higher the iodine value improves the quality of sesame oil. The decolorization of sesame oil by activated charcoal is the convenient method for human consumption.

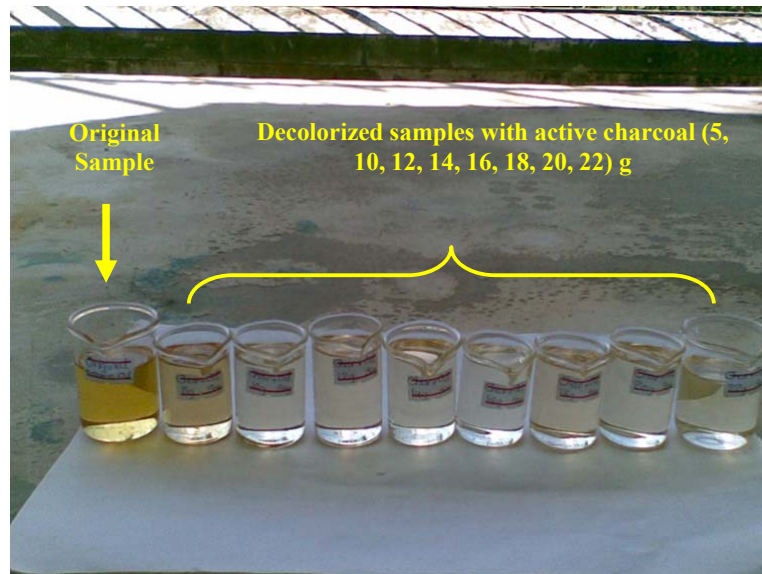


Figure 1. Comparative diagram of original sesame oil and decolorized sesame oil with (5, 10, 12, 14, 16, 18, 20, 22) g of activated carbon

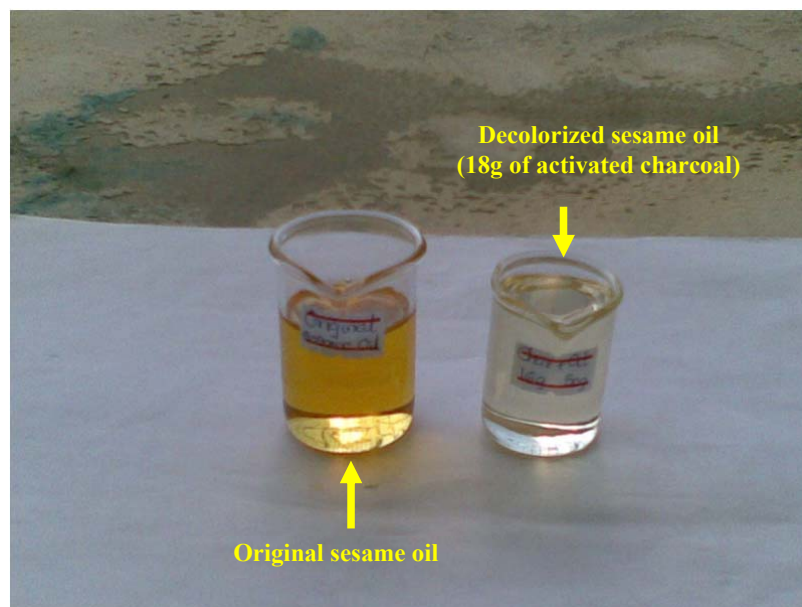


Figure 2. Comparative diagram of original sesame oil and decolorized sesame oil with 18g of activated carbon

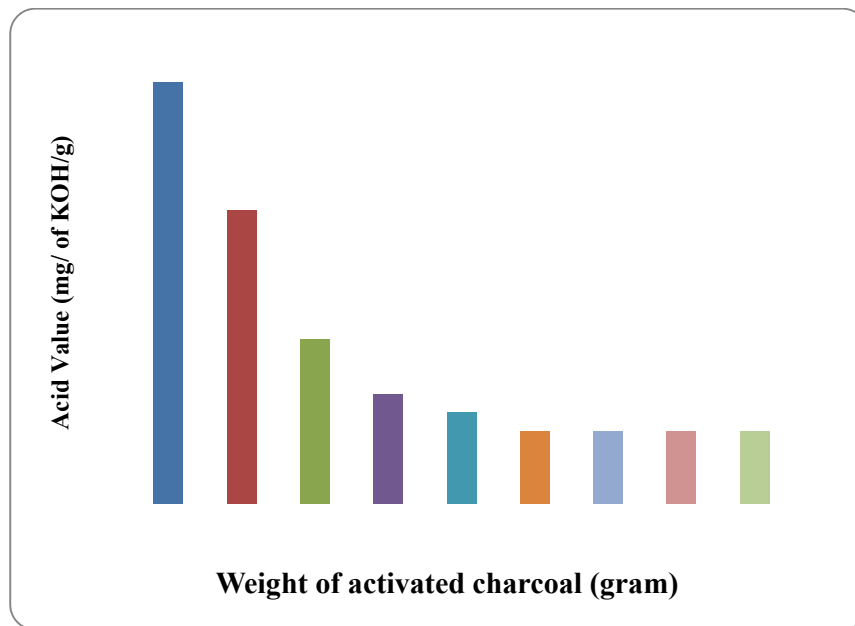
Table 1. The color density, pH value, specific gravity, refractive index and ash percent of sesame oil before and after decolorization with 18g of activated charcoal

<b>Properties</b> \ <b>Sample</b>	<b>Original Sesame Oil</b>	<b>Decolorized Sesame Oil</b>
Color density (%)	62.2	6.3
pH	6.0	7.0
Specific gravity	0.9213	0.9123
Refractive index	1.4712	1.4633
Ash percent (%)	0.0307	0.0730

Table 2. The acid values of before and after decolorization of sesame oil with activated charcoal.

<b>Various Weight (g) of charcoal in 50g of sesame oil</b>	<b>Acid value (mg/g)</b>
Original (O)	6.5895
5	4.5839
10	2.5783
12	1.7199
14	1.4324
16	1.1345
18	1.1345
20	1.1345
22	1.1345





**Figure 3. Acid values of before and after decolorization of sesame oil**

**Table3.** The saponification values of sesame oil sample before and after decolorization with activated charcoal.

<b>Various Weight (g) of charcoal in 50g of sesame oil</b>	<b>Saponification value (mg/g)</b>
Original (O)	191.55
5	160.65
10	120.56
12	100.68
14	88.68
16	78.49
18	78.49
20	78.49
22	78.49

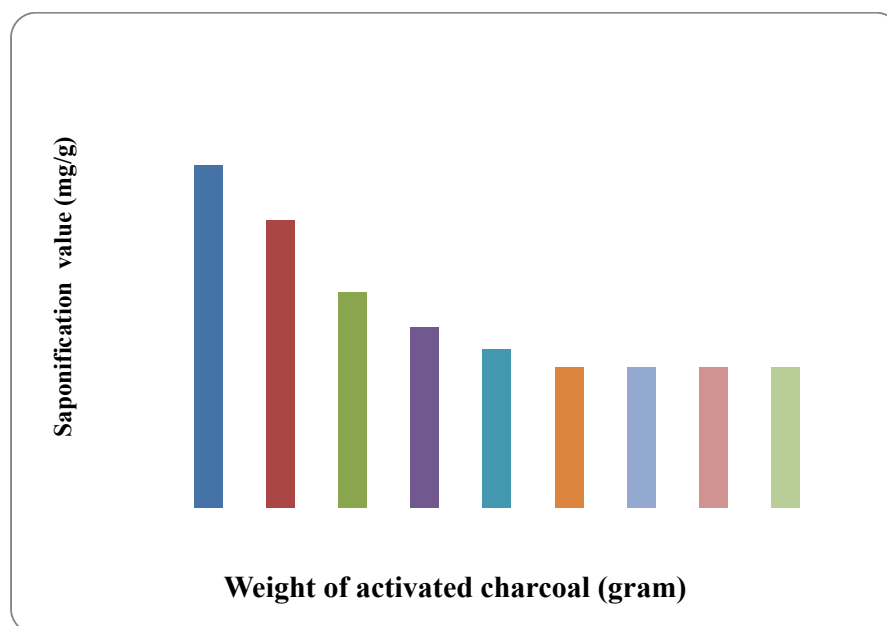


Figure 4. Saponification values of before and after decolorization of sesame oil

Table4. The iodine values of before and after decolorization of sesame oil with activated charcoal.

Various Weight (g) of charcoal in 50g of sesame oil	Iodine value (mg/g)
Original (O)	107.98
5	58.25
10	47.59
12	45.30
14	43.39
16	41.86
18	41.86
20	41.86
22	41.86

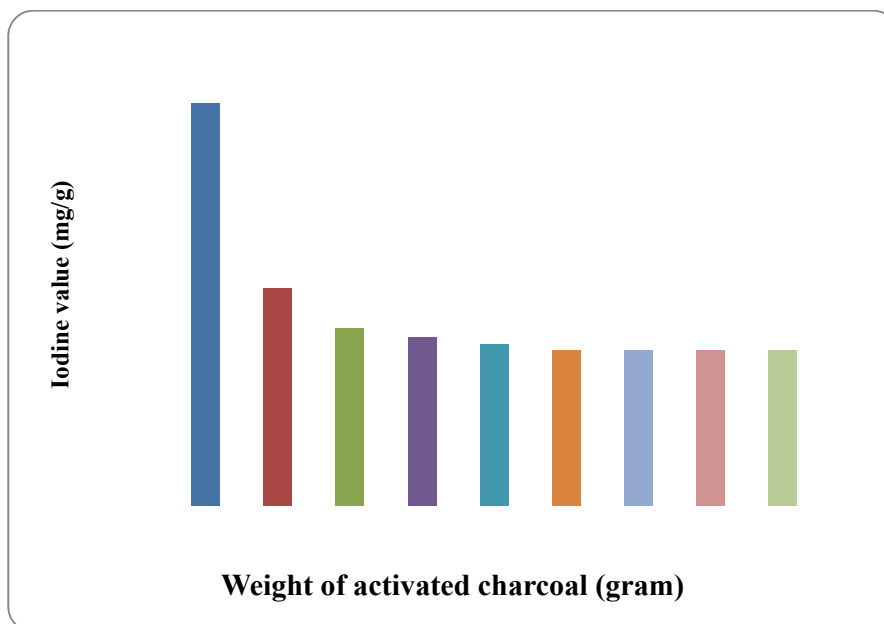


Figure 5. Iodine values of before and after decolorization of sesame oil

### Conclusion

In this experimental work, the decolorization of sesame oil by activated charcoal powder was studied. It was observed that 18g of activated charcoal was the optimum value for decolorization of the 50g of sesame oil sample. The color density of sesame oil was changed from 62.2% to 6.3% yellow after decolorization. The pH of original sesame oil was found slightly acidic and the decolorized sesame oil becomes neutral. From the results, acid value and saponification value of decolorized oil samples indicated the good quality of sesame oil.

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### Online Materials

<http://www.hort.purdue.edu/newcrop/crops/Sesame.html>

[http://www.bulleoil.com/scripts/oiltype\\_item.asp](http://www.bulleoil.com/scripts/oiltype_item.asp)