

# Recycle of Edible Oil by Frying and Study Its Properties for Use in Soap Industry

Salah Murghani Mutwkel<sup>1</sup>, Mansour Ahmed Elsenousy<sup>2</sup>, Abdul Hakim Ahmed Abdullah<sup>2</sup>

<sup>1</sup>Red Sea University – Faculty of Applied Science Sudan

<sup>2</sup>Sabha University – Faculty of Science – Libya

## 1. Introduction

Vegetable oils have been known for thousands of years and were extracted from vegetable oils and oily fruits in different primitive ways (1). Vegetable oils and fatty substances are essential constituents of all animal, plant and animal organisms, (2) and play an important role in human and animal life, energy-rich food, which produces more than twice as much as similar proteins or carbohydrates, One gram of fat produces about 9 calories, while a gram of protein produces about 4 calories and one gram of carbohydrate about 3.7 calories (3). Vegetable oils and fats of all kinds play an important role in supplying the human body with the energy needed by the body to grow and maintain. (4) Hence the importance of economic oils and the benefits of food oils that they provide a number of essential vitamins, In reducing the incidence of cancer, as well as vitamin A and we all know the importance of sight, and some types of vitamins important for vitality and activity (5).

Oil seeds are also the main source of income production, which is the richest animal feed used in the development of livestock production, as well as oils in other industries such as soap industry (1, 2), medicines, cosmetics, lubricants and other industries. Oils and fats of plant or animal origin, which are the acetate of triglycerides called glycerol called glycerol with fatty acids. It is called the glycerides, and generally the word fat is called on solid and semi-solid compounds at normal temperatures, while the word oil is called liquid substances under the same conditions, so there is no boundary between the two words except in the case of liquid or fatty solids. Oils and fats can also be defined as substances that do not dissolve in ether and hexane and contain carbon, hydrogen and oxygen, some of which contain phosphorus and nitrogen.(5) The lipid fraction is composed of the fatty acid union with the glycerol and the water is formed as a result of this reaction. Thus, the lipid fraction when dissolved by acids or enzymes leads to the neutralization of the corresponding fatty acid as well as glycerol.(6) Vegetable oil and fatty substances provide about one third of the daily energy needs of human beings(7). These oils contain many other substances necessary for human safety and health, and the

adult human need ranges from 60 to 100 grams of fatty substances between 20 and 25 grams in the form of vegetable oils (8, 9).

### Samples:

It is a sample of six samples of oil collected regularly in clean and dry bottles and the size of each sample 200 ml and all samples of oil used for the purposes of cooking and cooking a mixture of (sunflower oil + oil bean) and this oil contains anti-oxidant and anti-foam and used in All cafeterias, restaurants and also houses.

### Sample Processing

First: Remove impurities:

Use a centrifuge to separate the impurities from the oil by placing 100 ml of the oil used for frying in the machine at 60 cycles for 10 minutes, so that the impurities are deposited and separated from the oil.

### Second: Remove color:

Using a whitening soil, which is a bentonite and has a natural absorption force for the colors, we used the bleaching soil at 1: 2 of the oil weight at 60-90 ° C with stirring. The whitening soil changes from white to Then leave the oil for 24 hours to settle the whitening dust and separate it afterwards.

### Third: Remove odor:

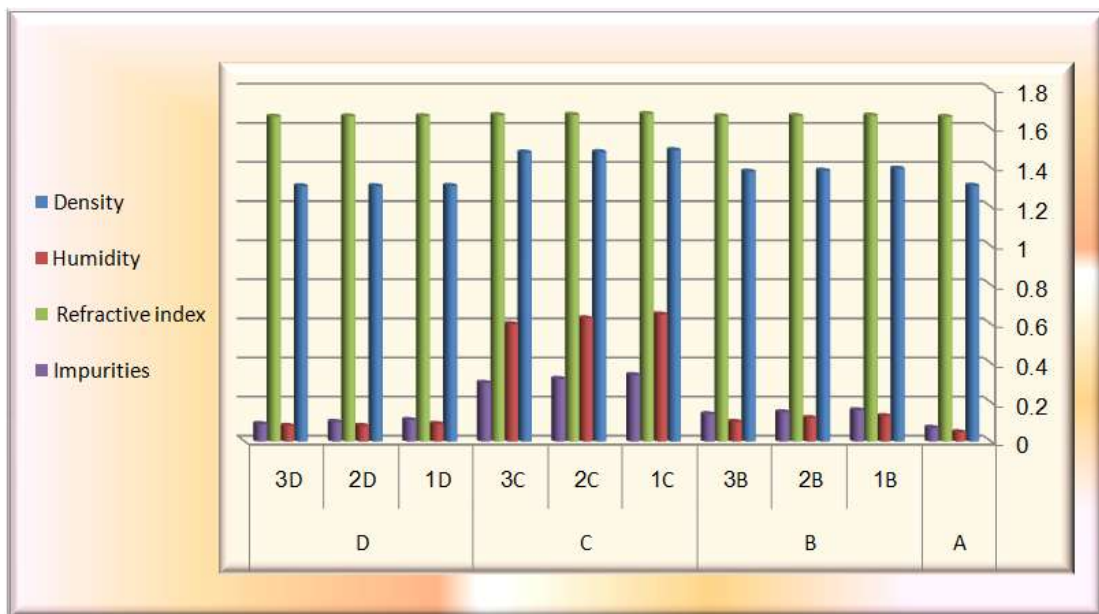
Use activated charcoal parts of 15 g of Extra Pure activated charcoal with 50 ml of oil and leave for 24 hours and then separated 3.3Tests conducted on samples as shown below

Sample (A): pure oil.

Sample (B): Once used oil (frying chicken - falafel - potatoes).

Sample (C): The oil used 5 times (to fry the chicken - falafel - potatoes) Sample (D): Processed oil.

The Sample	A	B			C			D		
		B1	B2	B3	C1	C2	C3	D1	D2	D3
Density	1.308	1.395	1.385	1.380	1.49	1.48	1.478	1.307	1.306	1.306
Humidity	4.70%	13%	12%	10%	65%	63%	60%	9%	8%	8%
Refractive index	1.66	1.667	1.665	1.664	1.675	1.671	1.669	1.664	1.663	1.661
Impurities	7%	16%	15%	14%	34%	32%	30%	11%	10%	9%



**Note from Table (4.1)**

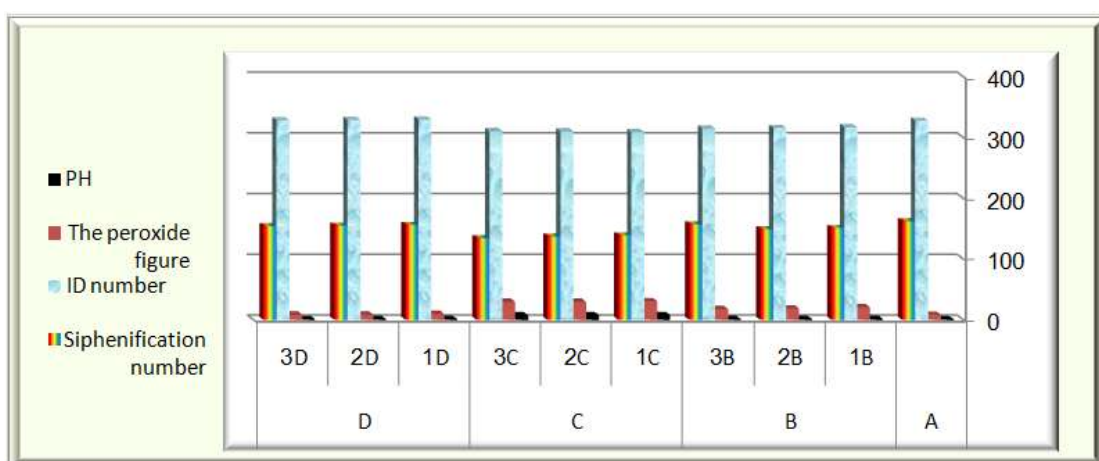
- Graduation of properties when we use oil on chicken - falafel - potatoes when we use it once and also five times
- The density of oil processed (1.306) and the pure oil density (1.308). This difference is due to the increase in hydrocarbons found in pure oil.
- Moisture ratio in treated oil 8% and pure oil 4.7%

Increased moisture in boiling oil is due to its use on the foods that contain a percentage of water.

- Refined Oil Refractometer 1.663) and Pure Oil (1.660) this difference is due to the presence of impurities in the oil.
- The percentage of impurities in processed oil (10%) and pure oil (7 %)

**Table of Chemical Experiments (4.2)**

The Sample	A	B			C			D		
		B1	B2	B3	C1	C2	C3	D1	D2	D3
PH	1.1	1.7	1.6	1.4	8.1	7.9	7.8	1.5	1.4	1.3
The peroxide figure	8.6	21	19	18	31	30	30	10	9	9
ID number	328.1	317.6	316.1	315.5	309.5	310.8	311.1	330.2	329.5	328.8
Siphenification number	162	151	149	157	139	137	134	156	155	154



From Table (4-2) we observe the following:

- Graduation of the chemical properties when we use oil on chicken - falafel - potatoes when used once and also five times.
- Acid number of processed oil (1.4) and pure oil (1.1)

and increased acidity in processed oil resulting from breaking some of the links in oil.

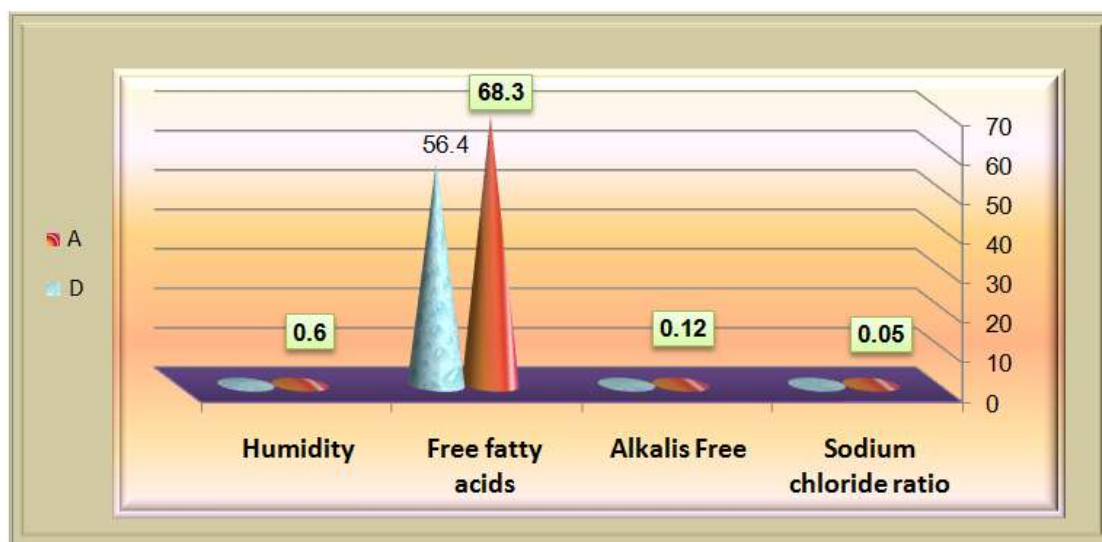
- Peroxide of processed oil (9) and pure oil (8.6.)
- The ionic number of the processed oil (329.9) and the pure oil (328.0) the iodine number increases with the continuity of the hydrogenation process.

- Sulfurization number of processed oil (155) and pure oil (162) The shortage in the saponification number is due to the breakdown of fatty acids due to the high temperature resulting from the repeated use of oil. It is known that an increase in food causes cardiovascular disease

- From the above we conclude that the difference between the physical and chemical results resulting from oil exposure to high temperature and the circumstances surrounding the experiment

Table of soap experiments (4-3)

The Sample	A	D
Sodium chloride ratio	0.05	0.07
Alkalis Free	0.12	0.34
Free fatty acids	68.3	56.4
Humidity	0.6	0.8



From Table (4-3) we observe the following:

For tests on soap, the alkali ratio of the processed sample (0.34) and the pure sample (0.12) and its increase are used to draw the water from under the surface of the skin and adversely affect the use if it is a large percentage

- Test the determination of the proportion of sodium chloride for the two samples vary in proportion, which is not bad because the high proportion of sodium chloride in the soap is adversely affecting its effectiveness.
- Moisture testing for the two lab-made samples was high and may be due to non-drying them fully.
- Foam test in treated soap sample, high calcium deposition ratio (5 cm) and pure soap sample (2 cm) less than the treated soap sample.
- DNA test for treated soap sample (56.4) and pure soap sample (68.3) within the international specifications.

## 2. Recommendations

After studying and analysis of the fat oils can also recommend the following;

- The development of the treatment of oil, which makes it suitable for use again in various fields
- Develop the soap industry of kale oil, which reduces its impact on the environment and reduce the material cost of soap produced
- Recommended mechanism for the collection of oils used for recycling, processing and use in the manufacture of

soap

## References

- [1] Ismail Mohamed Omar - technology of manufacturing soap and detergents, Cairo (2002).
- [2] Fouad Abdul Aziz Ahmed Sheikh - soap industry, the first edition (1990)
- [3] Mohammed Ahmed Ismail Khalil - small chemical industries, first edition (2009)
- [4] Limea Naim Sheikh Othman - Oil and Fat Technology - First Edition, Dar Alaeddin Publishing Syria, Damascus (2007)
- [5] Mohamed Ismail Omar oils and fats, the House of Scientific books for publication and distribution, Cairo.
- [6] Mohamed Magdy Wasel - Foundations of Industrial Chemistry, Al-Azhari University, Dar Al-Fajr Publishing and Distribution, First Edition (2005)
- [7] Mahmoud Shaker Abdul-Hussein and Fadel Bandar Issa - Chemical Industries, Arabic edition (2006).
- [8] Mamdouh Helmi El-Halbouni and Mohamed Magi Mostafa -Kimia Technology, oils and fats, Ain Shams University, Osiris Library (2005)
- [9] Mustafa Hussein Youssef - the best methods of analysis of oils, fats and soap - first edition Egypt - Publishing House of universities - (2001)