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Topic

Edible oil Analysis

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ABSTRACT

Edible oils consist of about 96% triacylglycerides, composed of different fatty acids. Some other compounds or groups of compounds, such as free fatty acids, phospholipids, phytosterols, tocopherols, other antioxidants or waxes, can also be found. Fatty acids, free or bound to glycerol are susceptible to oxidative processes resulting in a wide range of volatile and non-volatile degradation products. Therefore one of the major challenges for the oil processing industry is to maintain the high quality of the product after processing until use by the consumer. However, the oxidative stability of edible oils not only depends on conditions during storage, but also the history of the raw material and the processing steps involved.

The pathway of the oxidative degradation of edible fats and oils results in many physical changes in the product, such as increased viscosity, changes in composition, and the formation of degradation products. To measure and assess these changes, a wide range of methods is available for describing the oxidative state of edible oils. Additionally, some methods can be applied to assess the oxidative stability of the product. Oxidative state and oxidative stability should be clearly distinguished: the first describes the product at the present time, and the latter tries to give information about the possible behavior of the product during further storage. In this context, it must be taken into consideration that the measurement of a parameter is one thing, while the interpretation and usefulness of that parameter to describe the real situation are other tasks

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CHAPTER -1

INTRODUCTION

Fats are the main constituents of the storage fat cells in animals and plants and are the important food reserves of the organism.

Chemically, fats are carboxylic esters derived from the single alcohol, glycerol and are known as glycerides. More specifically, they are triacyl glycerols. Each fat is made up of glycerides derived from many different carboxylic acid.

The proportions of the various acids vary from fat to fat. Each fat has its characteristic composition. Which does not differ very much from sample to sample.

Oils and fats are same that is both are of glycerides of higher fatty acids. Those which are liquids at ordinary temperature are called oils. Oils and fats may be of animals or vegetable origin.

Eg: Whale oil (an oil), and tallow (a fat), have an animal origin, while linseed oil (an oil), ground oil, cotton seed oil coconut oil have vegetable.



Edible oils are vital constituents of our daily diet which provide energy, essential fatty acids and serve as a carrier of fat soluble vitamins. 10% or fewer of calories consumed daily should be from saturated fat and 20-35% of total daily calories come from polyunsaturated and monounsaturated fats. Small amounts of saturated fats is common in diets, meta-analyses found a significant correlation between high consumption of saturated fats and blood LDL concentration, a risk factor for cardiovascular diseases. Saturated fats be replaced with polyunsaturated and monounsaturated fats. Oils having higher value of the moisture content can be used for food texturing, baking, and frying and industrially in the manufacture of soaps, detergents, cosmetics and oil paints. The higher the saponification value, the shorter the average chain length of the fatty acids and the lower the average molecular weight of the fatty acids and vice versa. Higher acid value indicates that triglycerides of oil are converted into fatty acids and glycerol which cause rancidity of the oil. So, the cooking oils must have lower acid value otherwise the oil can damage human health. They are divided into three types:

1. Mineral oils:-

They have a mineral origin and usually are a mixture of hydro carbons kerosene is a mineral oil. Mineral oil is any of various colorless, odorless, light mixtures of higher alkanes from a mineral source, particularly a distillate of petroleum, as distinct from usually edible vegetable oils. The name 'mineral oil' by itself is imprecise, having been used for many specific oils over the past few centuries.



2. Essential oils:-

They are found in various plants. These are highly volatile, pleasant-smelling liquids. Clove oil, lemon oil and turpentine are examples of essential oils. An essential oil is a concentrated hydrophobic liquid containing volatile chemical compounds from plants.



3. Edible oil

Ground nut oil, cotton seed oil, palm oil, coconut oil, sun flower oil. Cooking oil is plant, animal, or synthetic liquid fat used in frying, baking, and other types of cooking. It is also used in food preparation and flavoring not involving heat, such as salad dressings and bread dips, and may be called edible oil.



STATEMENT OF THE PROBLEM

Now a days edible oils have been contaminated with dyes and minerals which is not good for health which causes disease. Vegetable oils are rich in omega 6, that causes accelerated growth of cancer cells, blood clotting and increased inflammation in the body. The imbalance of omega 3 and 6 leads to heart diseases, autoimmune diseases, neurodegenerative diseases and even cancer.



CHAPTER – 2

AIM

Our aim is to find adulteration of edible oils.

OBJECTIVE

Our objective is to study some simple tests of edible oils.

REVIEW OF LITERATURE:-

Vegetable oils have become more attractive recently because of its environmental benefits and the fact that it is made from renewable resources. More than 100 years ago, Rudolph Diesel tested vegetable oil as fuel for his engine. Vegetable oil has that potential to replace a fraction of the petroleum distillates and petroleum- based petro chemicals in the near future. Vegetable oil fuels presently do not compete with petroleum based fuels, because they are more expensive. However, with the recent increase in petroleum prices and uncertainties surrounding petroleum availability, vegetable oil is used in diesel engines as an alternate fuel.

Chemically speaking, vegetable oils and animal fats are triglyceride molecules, in which the fatty acid groups or esters attached to one glycerol molecule[38]. Fats and oils are primarily water-insoluble, hydrophobic substances in the plant and animal kingdom that are made up of one mole of glycerol and three moles of fatty acids are commonly referred as tri-glycerides.

The filter clogging problems were not encountered with peanut oil as observed by Basic and Humke (6). But with the sunflower oil the clogging problems were observed. Heating the sun flower oil to temperature between 70 to 90 centigrade eliminated the clogging problems by causing the waxes to dissolve .

RESEARCH METHODOLOGY

Common methods are employed for the extraction of oils and fats are

Melting:-

Animal fats are generally separated from animal tissue by heating when the fat melts and flow down.

Crushing:-

Vegetable oils Eg: cotton seed oil, ground nut oil are extracted from oil seeds by crushing followed by pressing in a hydraulic press. The residue called oil cake is used as cattle feed.

Extraction with solvents:-

Oils are largely used

1. as articles of food,
2. for toilet purposes,
3. in medicine,
4. as lubricants
5. in manufacture of soap, glycerin and paints.

In market several types of edible oils are for example ground nut oil, sun flower oil, palm oil, sesame oil etc. The quality of edible oils was analyzed by evaluating physicochemical properties such as density, moisture content, boiling point, peroxide acid, iodine and saponification values using standard methods.

Various physical tests involves the determination of its physical constants such as melting points, specific gravity and refractive index. Various chemical tests which give on indication of the type fatty acid present in the factor oil.

1. Acid value:-

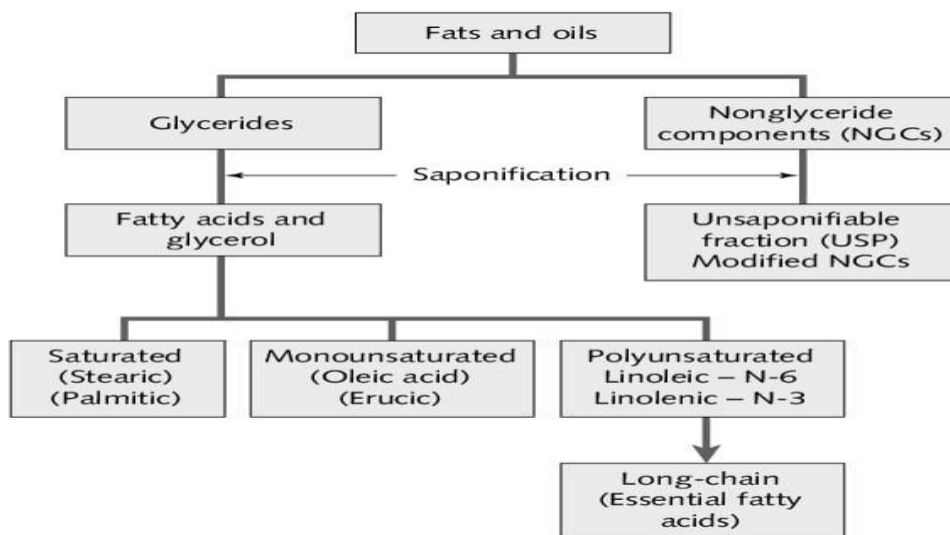
It is the number of milligrams of potassium hydroxide required to neutralize. 1gm the fat or oil. The acid value indicates the amount of the free acid present is the fat or oil.

To determine the acid value, a weighed quantity of the fat is dissolved in alcohol and fat filtered against standered alkali using phenophthaline as indicator. Acid value was calculated as mg of KOH per gm of oil.

2. Saponification value:-

It is the number of milligrams of potassium hydroxide required to neutralize the fatty acids resulting from the completed hydrolysis of 1gm of the oil or fat.

To determine the saponification value, a weighed quantity of the given fat is refluxed with a known volume of standard alcoholic potash solution. The unused alkali is then titrated against some standard acid saponification value of coconut oil is about 250, while for olive oil is about 200.



3. Iodine value:-

It is the number of gm of iodine which combine with 100 grams of oil fat. It indicates the degree of unsaturation of acids in the fat.

In Habi's method for the determination of iodine value, a known weight oil or fat is dissolved in carbon tetrachloride and treated with a known volume of standard iodine and mercury chloride in ethanol. The unused iodine is titrated against a standard thio sulphate solution.

Iodine value of some common oils are coconut oil =10;

Olive oil =88 and linseed oil =108.

4. Reichert-Meissl value (RLM value):-

It is the number of milli liters of 0.1N potassium hydroxide solution required to neutralize the 5 gm of hydrolysed fat. It represents the amount of steam volatile fatty acids present in the oil.

5 grams of the fat is hydrolysed with sodium hydroxide and the mixture is acidified with dilute sulphuric acid and steam distilled when acids with carbon content up to being volatile in steam distil over the distillate is cooled and filtered and titrated against 0.1N alkali.

Reichert-Meissel value of some common fats and oils are Butter=20; coconut oil=80; cotton seed oil=less than 1

FINDINGS:-

Intentional addition of harmful material to or to deliberately remove some of the essential constituents of food stuff or contamination of foods during cultivation, transportation and distribution is called adulteration. Examples for intentional addition of harmful materials include introduction of animal fat in vanaspathi, prohibitive coloring of ice creams and syrups, addition dyes and mineral oils to vegetable oils, contamination of cereal flour with sand etc.

Adulteration is food items can be tested according to the prescribed. Some of the common adulterants in oil are done.

Sample No :1	Palm oil
Sample No :2	Sunflower oil
Sample No :3	Til oil

Detection of Dyes and Oils:

Mix one gram of the given fat with one ml of mixture of Conc H₂SO₄ and glacial acetic acid (in 1:1) ratio and heat the mixture to boil. Appearance of pink or red colour indicates the presence of dyes.

Detect ion of mineral oils in a fat or oil:-

About 2ml of the oil is taken in the test tube and 2ml of N/2 Nitric acid is added to it.Heat the test tube on water bath. Turbidity in the contents of the test tube indicates the presence of mineral oils in a given sample of vegetable oil.



Fitelson's Test:-

Mix acetic anhydride (1ml) chloroform (1.5 ml) and concentrated sulphuric acid [4 drops] in a dry test tube and cool the mixture to room temperature. Add 6-7 drops of the sample of vegetable oil to be tested.If the resultant solution becomes turbid, add drop wise acetic anhydride, till the solution clears up. Heat the resultant mixture on a water bath for five minutes and shake the contents well.

Add 10ml of dry ether into the solution after cooling shake the contents well. If the solution turns brown, the change to red in about one minute and finally becomes colourless, the presence of teaseed oil in a vegetable oil is confirmed.



CHAPTER - 3

RESULTS:-

We found that all the three samples of oils are adulterated with dyes (-test). All the oils are mixed with mineral oils (-test).

S.no	Name of oil	Dyes	Mineral oil	Fitelson's test
1	Palm oil	+	+	-
2	Sunflower oil	+	-	-
3	Til oil	+	+	-

Out of three samples all samples i.e. palm oil sunflower oil and til oil are contaminated with dyes and minerals.

These adjustments not only involve cheating in terms of prices but also pose a serious threat to human life. Oil with dye can cause cancer, and constant use of they oils with dyes and mineral oils develop ulcer. Acidity in intelfine which leads to ulcer, in seveir cases it leeds to cancer.

The project work shows that the oil with dye free, and mineral free are good for health. The sun flower oilis good for health.



CHAPTER- 4

SUMMARY

The major sources of dietary lipids are edible oils, which include both vegetable and fish oils. Crude oil extracted from vegetable and fish sources contain mono-, di-, triacylglycerols along with impurities, which necessitates refining. The main objective of refining is to remove the contaminants that adversely affect the quality of oil, thereby reducing the shelf life and consumer acceptance. However, this refining process needs to be tailored as the composition of crude oil is highly variable, depending upon the plant/fish species, geographical location of the source and method of oil extraction. Recently, extensive efforts have been made to develop refining technology, using either conventional physical/chemical processes or several unconventional processes including biological and membrane processes. The first section of this review gives a brief description of general composition of some commonly used vegetable and fish oils, followed by the review of various refining methods and their effects on the oil constituents. Finally, an effort is made to understand the technological gaps in the existing methods and possible directions of research to overcome the said gaps.

CONCLUSION

The study consumer behavior and perception towards edible oil user has been challenging and interesting one. The researcher has attempted to study not only the personal profile factors or characteristics of the respondents but also the perception of the sample of consumers and the relate the same to the branded edibleoil like sun flower oil, gingili oil, ground nut oil and other oil.

To conclude, the awareness among the consumers about theconsumer rights, existence of consumer forums,etc., is very low.

SUGGESTIONS

Based on the findings drawn from the study, the following suggestions are made for the betterment of consumer behavior and perception.

- There had been increasing no of diseases among the human beings every day owing to oil and oil products.
- Adults are less resistant to more diseases and they suffer from blood pressure of various forms.

Therefore the oil manufacturers should pay keen interest while producing their oil keeping in mind about their health position. It is here by suggested that the information shown in the advertisements would not be true in some circumstances. They just motivate the buyers to buy oil and the information in the advertisements some times found to be untrue.

- It would be better, if the oil manufacturers sell the same oil product with different product line on the basis of colour, size, flavor and utility. It can be on the basis of usage.
- Each and every oil manufacturer should adopt "Green marketing". This implies that they make oil container that should not be any harmful to environment.

It is suggested that consumer have to check all the standards while making their purchase. Such as "Agmark", and other quality and quantity standards prescribed by the concerned agencies.

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