UNIVERSITY OF MUMBAI

A PROJECT REPORT ON

ANALYSIS OF VEGATABLE OILS BY SAPONICATION VALUE AND BLENDING OF OILS

SUBMITTED BY: **SHRUTIKA**

SAINATH JADHAV

SEAT NO: - 1178473

MASTER OF SCIENCE IN

(ORGANIC CHEMISTRY)

2023-2024

UNDER THE GUIDANCE OF TEACHER: -

ASSISTANT PROF. MISS BENAZIR SHAIKH

GOKHALE EDUCATION SOCIETY'S

N. B. Mehta (V) SCIENCE COLLEGE

ACHARYA BHISE VIDYANAGAR, BORDI

TAL. DAHANU, DIST. PALGHAR, 401701, TEL. 02528 – 254357

DEPARTMENT OF CHEMISTRY

Certificate

This is to certify that **MISS. SHRUTIKA JADHAV (Seat No.1178473)** of M.Sc. II (Organic Chemistry) Sem-IV class has successfully completed the required Project on "**ANALYSIS OF VEGATABLE OILS BY SAPONICATION VALUE AND BLENDING OF OILS**" and has got her Project duly signed in the laboratory course during the academic year 2023-24 as per the prescribed syllabus by the University of Mumbai.

INDEX

Abstract

The quality and stability of traditionally processed palm, sunflower and sesame oils and their blends as affected by temperature were evaluated by analysing their physicochemical properties which included acid, saponification, peroxide, iodine values and refractive indices. The initial quality of traditionally processed oils studied was found to be within the specifications of TZS and Codex requirements. The results further indicate that the quality of both unblended and blended traditionally processed vegetable oils deteriorate significantly at elevated temperatures ($p < 0.05$). However, the blends showed relatively better quality and stability than the unblended ones whereby the formulations of palm oil (PO) and sesame oil (SSO) appeared to be more stable than those of PO and sunflower oil (SO). This work suggests that blending of traditionally processed PO, SO and SSO improves the quality and stability of these oils.

Keywords: Palm, sunflower, sesame oil, blends, traditionally processed, physicochemical properties.

Introduction

1.1 Introduction to essential oils:

Oils and fats are the essential component of human diet. The term fats and oils is applied to the esters of fatty acids with glycerol. Palmitic, stearic, oleic and linoleic are the common fatty acids. The fatty acids are divided into two groups saturated fatty acids and unsaturated fatty acids. Myrstic, palmitic, stearic etc. belongs to the first group, while oleic, linoleic etc. represent the other properties of oils vary according to the of the acid present. Thus, liquid fats or oils as they are generally called, contain more of unsaturated acids.

Oils generated from plants are called vegetable oils that are composed of triglycerides. These lipid materials tend to be liquid at temperature. Seeds are the primary source of vegetable oil. Natural vegetable oils are not homogenous in nature. Oils contain fatty acids, mono- and di-glycerides and unsaponifiable lipids. Oils can edible and non-edible in nature.

Vegetable Oil Picture

- **Uses of Vegetable oil:**

Edible oils and fats are used for making foodstuffs and some of them use in manufacture of bakery and confectionary products.

The required for oils and fats used for the different purposes vary for frying purposes raw or refined oils are used to improve the shelf life of oils and foodstuffs prepared from them and also to enhance the pan life of the oils, the oils are partially hydrogenated under selective conditions and used.

Vegetable oil can be used for culinary purposes where they directly or indirectly form he ingredients of food. Oils with high flash points are usually used in cooking other foods. Eg: Sunflower oil, palm oil, coconut oil, rice bran oil.

- Linseed oil, Tung oil and castor oil that are used in paints, cosmetics, lubricants etc are inedible in nature.
- Saturation of oils causes hydrogenation that helps in resisting any changes in physical characteristics of the oil. This helps in increase of viscosity and the melting points of oils as the saturation increases. Eg: Margarine from saturated oils can be spread easily.
- Vegetable oils find great use in the making of cosmetic products like soaps, skin products, perfumes, candles, pharmaceuticals, medicines and other personal care products.
- Oils that are used in making of paints and other products that are used in treating of on boats act as drying agents. Eg: Dammar oil which is a mixture of linseed oil and dammar resin.
- Vegetable oils due to their features like being non- toxic, bio degradable and having high flash and fire points make them suitable to act as insulators in the electrical industry, lubricants and hydraulic fluids. Common vegetable oil has also been used experimentally as a cooling agent in PCs.
- Oils from seeds and fruits can be processed and made edible and can be used in the production of pet foods.
- Oils can be processed to form biodiesel that can be used as conventional diesel.

LITERATURE REVIWE

Ngassapa, F. N., S. S. Nyandoro, and T. R. Mwaisaka (2012)

The quality and stability of traditionally processed palm, sunflower and sesame oils and their blends as affected by temperature were evaluated by analyzing their physicochemical properties which included acid, saponification, peroxide, iodine values and refractive indices. The initial quality of traditionally processed oils studied was found to be within the specifications of TZS and Codex requirements. The results further indicate that the quality of both unblended and blended traditionally processed vegetable oils deteriorate significantly at elevated temperatures ($p < 0.05$)

Toscano, G., (2012)

Vegetable oil and fats can be considered as an important renewable source for the energy production. There are many applications where these biofuels are used directly in engines. However, the use of pure vegetable oils causes some problems as consequence of its chemical and physical characteristic. Viscosity is one of the most important parameters affecting several physical and mechanical processes of the operation of the engine.

Siddique, Bazlul Mobin, (2010)

Palm oil (olein) was blended with other edible oils for the enhancement of its market acceptability in terms of melting point depression and shelf life. The physico-chemical properties like viscosity, density, melting behavior, peroxide value (PV), saponification value (SV) and iodine value (IV) of four different binary blends with four vegetable oils were evaluated. Palm olein was found to be more stable against rancidity than the other oils. For the stability against oxidation and melting point depression the palm olein-canola (PO/CO) blend was found to be better than the others.

M. C. Dwivedi, Smita Sapre (2015)

Total vegetable oil greases are those in which both the lubricant and gellant are formed from vegetable oil. Vegetable oil may be used as a lubricant as such or, with appropriate structural modification, as an ester or alkylated ester. Total vegetable oil greases have the advantage of good biodegradability and conform to the requirements for high performance.

- **For analysis of essential oils, different vegetable of oils are used. The information of the vegetable oils is given below:**

❖ INFORMATION OF VEGETABLE OILS:

1) COCONUT OIL:

The coconut tree cocos nucifera is one of the most beautiful and most useful trees of tropical coastal districts. One of the lavish gifts of nature to man. The main producers are the Philippines. Indonesia, India and Ceylon. plays a big role in kitchen of tropical countries grated coconut meat being an indispensable ingredient of many delicious dishes.

In coconut oil the yield of oil up to 64% copra is one of the richest raw materials for vegetable oil extraction.

Among world ingredients exports of fats and oils, coconut oil takes the first place with I .3 million tons.

The health benefits of coconut products, particularly coconut oil. Coconut oil is rich in lauric acid, which is known for being anti-viral, antibacterial and anti-fungal. Coconut oil is also used by thyroid sufferers to increase body metabolism, and to lose weight. Virgin coconut oil is also used for making natural soaps and other health products, as it is one of the healthiest things one can put on their skin. The American Oil Chemical Society recommended standard for coconut oil.

l) Specific gravity at 15.5 C : 0.869-0.874

2) Refractive index at 400 C : 1.448- 1.450

3) Iodine value : 7.5-10.5

4) Saponification value : 250 - 264

5) Unsaponificable matter (%): below 0.5

2)GROUNDNUT OIL:

Peanut oil means Groundnut oil. Arachis oil or earthnut oil is one of the two or three most important edible oil in the world with an annual production of about 5 billion pounds. It is obtained from the kernels (oil content 45-55%) of the plant. Archis hypogaea which is grown in large quantities in Africa, India and China. The United States production is relatively small, amounting to 2% of the world output. The oil is pale yellow and has the characteristic odour and flavour of compared with the other seed particularly cottonseed oil, it is relatively free of phosphates and non-oil constituent. Peanut oil is used mainly for edible purposes in the preparation of shortening margarine and mayomaise and cooking and salad oil.

Groundnuts, also known as are tasty as well as healthy. They are beneficial in the treatment of hemophilia and other such inherited blood disorders. People suffering from nose bleeding also benefit from eating groundnuts and it is also helpful in reducing excessive menstruation bleeding in women. Groundnut is rich in protein, phosphorous, thiamin and niacin which are needed to maintain and repair the bodily tissues. They are also rich in vitamins and minerals like calcium. iron, zinc, boron. etc, that help in brain function and development as well as strong bones. They have anti-oxidants and a chemical called resveratrol. These help in reducing the risk of contracting cardiovascular diseases, cancer risk and also help in anti-ageing.

The American Oil Chemical Society recommended standard for Groundnut oil

l) Specific gravity at 250C : 0.910-0.915

2) Refractive index at 250 C : 1.467- 1.470

3) Iodine number : 84-100

4) Saponification number :188-195

5) Unsaponificable matter % : not over 1.0

3) Palm oil:

Oil palm Elaeis guineensis, with coconut palm is one of the most productive oil trees in the world. The fruit is unusual in yielding two distinctly different oils. Palm kernel oil obtained from the kernel. Palm oil is by far the more important. Palm oil is used largely5 for edible purposes in the country of origin and most of the remainder is exported to Europe and England. It is used in making shortening, margarine and soap.

The oil is isolated by various methods including boiling the fruit, centrifugation and processing. Since Palm fruits are subject to strong enzymatic (hydrolysis) during harvesting and handling prior to expression of oil. Some Palm oil may contain as high as 50% free fatty acid. especially that obtained by crude native methods. Even the better grades of palm oil contain higher free acid content than to most oils. Palm oil collared a deep orange by large amount of carotene it contains (0.05-0.20%).

Benefits of Palm oil

Unrefined palm oil is a rich red-orange colour. In this state it is one of the riches! natural sources of carotenoids and helps to provide energy efficiently. Palm oil supplies the necessary fat-soluble vitamins A, D and E. Because these vitamins are not naturally stored by the body consistently, it is important to have a daily intake, which the oil can provide. Used as a dietary fat, palm oil has been shown to increase the "good" HDL cholesterol. Further, it was shown to decrease undesirable "bad" LDL cholesterol.

Following are the American Oil Chemical Society recommended standard for Palm oil.

1) Specific gravity at 250 C : 0.8980901

2) Refractive index at 400 C : 1.453-1.456

3) Iodine value : 44-58

4) Saponification value : 195-205

4) Sunflower oil:

Sunflower oil is obtained from the seed (oil content-22-36%) of the plant. Helianthus annus. It is grown in large quantities in the U.S.S.R. Argentina and Hungary and to a small extent in the United States. Its world production exceeds 3 billion pounds. The oil is obtained by hydraulic or screw pressing or solvent extraction of decorticated seed. It is used almost exclusively for edible purposes as a cooking and salad oil and in the manufacture of margarines and shortenings.

Crude sunflower oil is light amber in colour the refined oil is pale yellow and similar to other vegetable oils. The crude oil contains some phosphatides and mucilaginais matter but less than cottonseed or corn oil. Its free fatty acid content is similar to that of most other seed oils. Sunflower oil has distinctive not altogether unpleasant odor which is removed by steam deodorization.

Nutrition Benefits of Sunflower Oil

- Sunflower oil acts as an antioxidant since it is rich in Vitamin E. This of sunflower oil helps in neutralizing cancer-causing free radicals. Vitamin E in sunflower oil also prevents rheumatoid arthritis, asthma and colon cancer.
- The Vitamin E present in sunflower oil also acts as a moisturizer which helps the body cells to retain water within them. This makes sunflower oil useful in various cosmetic products as well.
- Sunflower oil is rich in certain phytochemicals such as choline and phenolic acid, which are heart. There are polyunsaturated and monounsaturated fats present in sunflower oil, along with vitamins. Which makes it one of the healthiest oil to consume.

The American Oil Chemical Society recommended standard for Sunflower oil.

1) Specific gravity at 25^0 C : 0.915-0.919

2) Refractive index at 25^0C : 1.472-1.474

3) Iodine value : 125-136

4) Saponification value : 188-194

5) SESAME OIL:

Sesame oil is another oil which has known for thousands of years. It is obtained from the seeds (oil content 44-54%) of the plant Sesamum indicum largely by pressing method. The annual world production of oil is about 1.5 billion pounds mainly in China about (50%), India (25%). The crude oil of high quality and used as a salad oil with little or no wintering. It is pale yellow when refined. Sesame oil is consumed largely as a cooking and salad oil and is hydrogenated for margarine and shortening use sesame oil is relatively high in unsafonicable substances. Which are removable by refining. It is relatively low in other non-oil materials.

Health Benefits of Sesame Seeds:

1. Sesame seeds contain sesamin and sesamolin, substances that is believed to prevent high blood pressure and protect the liver against damage.
2. Sesame seed is a good source of Vitamin E, that is why it can help strengthen the heart and the nervous system.
3. Sesame oil can help remove wrinkles and other skin diseases when applied externally.
4. The oil is also used to remove the milk like crust form on the face and head of an infant.
5. A large amount of sesame seed can help in increasing weight it is high in calories.

The American Oil Chemical Society recommended standard for sesame oil.

l) Specific gravity at 250 C : 0.914-0.919

2) Refractive index at 250 C :1470-1.474

3) Iodine number :103-116

4) Saponification number :188-195

6) MUSTARD OIL:

The term mustard oil is used for three different oils that are made from mustard seeds:

- A fatty vegetable oil resulting from pressing the seeds,
- An essential oil resulting from grinding the seeds, mixing them with water, and extracting the resulting volatile oil by distillation.
- An oil made by infusing mustard seed extract into another vegetable oil, such as soybean oil.

This oil has a strong sinus-irritating aroma, like that of horseradish or wasabi, a hot nutty taste, and is often used for cooking in Uttar Pradesh, Gujarat, orissa, Bengal, Bihar, Jharkhand, Chhatisgarh, Assam and other areas of India and Bangladesh. In north India, it is mainly used in frying fritters. In Bengal, it is the traditionally preferred oil for cooking, although nowadays neutral-flavoured oils like sunflower oil are also extensively used. The oil makes up about 30% of the mustard seeds. It can be produced from black mustard (Brassica nigra), brown Indian mustard (Brassica nigra), and white mustard (Brassica hirta).

The use of mustard oils in traditional societies for infant-massage has been identified as risking damaging skin integrity and permeability.

Health benefit of Mustard oil:

• **Cordial:** The feeling of warmth that this oil gives makes it a cordial. It warms up the internal systems such as the respiratory system and protects it from formation and accumulation of phlegm. It also warms up the body in winter to some extent. This again, may be due to its stimulating and mild irritating effects.

• **Diaphoretic:** It promotes sweating both when consumed and applied externally. It stimulates sweat glands to produce more sweat as well as enlarges the openings of the on skin. This property is helpful in lowering body temperature as well as removing toxins and excess salts and water from the body.

• **Tonic:** This oil serves as an all-rounder tonic for the health. It tones up all the systems operating in the body, gives strength and boosts up immunity.

• **Anti Rheumatic & Anti Arthritic:** It gives good relief in rheumatism and arthritis and for long has been in use as a rub in such cases.

• **Other Benefits:** It is beneficial in treating cold & cough, headache, congestion resulting from cold, aches and body-pain and for muscular growth. It is also used to rub on gums for strengthening them. This also protects teeth from germs. This oil also contains good percentage of OmegAlpha3 and OmegAlpha6 fatty acids, anti-oxidants and vitamin-E which have their own benefits.

The AOCS recommended standard for Mustard oil.

1) Specific gravity at 20^0 C : 0.914-0.923

2) Refractive index at 40^0 C : 1.465-1.467

3) Iodine value : 98-108

4) Saponification value : 169-176

❖ SAPONIFICAT.IQN VALUE OF OIL:

Definition: The saponification value (S. V.) is the number of mg of potassium hydroxide required to saponify l gm of fat.

R COOH + KOH R COOK + H_2O

KOH + HCI + H_2O

When a fat is boiled with an excess of potassium hydroxide in ethanol, the triglycerides hydrolyse, and glycerol and soap are formed. The amount of alkali necessary for this saponification is a measure of the saponification value and of the mean molecular weight of the fatty acids originally bound as triglycerides. It is customary to express the saponification value in the number of mg. of KOH necessary for the saponification equivalent of the fat is This value is 1/3Vd of the mean molecular weight of the fat.

This value gives a clear idea of the mean molecular weight of the glycerides present. A greater number of oils and fats are saponification value between 190 to 200 and chiefly between 192 to 197. The value higher than 200 are possessed by the coconut oil. On the other hand, the values for castor oil fall below 190 for rape oil group fall below 180.

The lower saponification value of these oils finds their explanation in the large proportion of erucin they contained. Similarly, castor oil may be differentiated from other oils by its lower saponification value due to the presence of ricinoleic acid. The higher saponification values are characteristic of fats containing preponderantly myristic acid and especially of the members of the coconut oil.

Saponification of a triglyceride with sodium Hydroxide

Saponification is a chemical process that produces soap from fatty acid derivatives.

Traditionally, saponification involves hydrolysis of esters under basis conditions to form an alcohol and the salt of a carboxylic acid (carboxylates). Saponifiable substances are those that can be converted into soap.

Vegetable oils and animal fats are the usual materials that are saponified. These greasy materials, trimesters called triglycerides, are mixtures derived from diverse fatty acids. Triglycerides can be converted to soap either in a one or a two-step process. In the traditional one-step process, the triglyceride is treated with a strong base, which accelerates cleavage of the ester bond and releases the fatty acid salt and glycerol. This process is the main industrial method for producing glycerol. If necessary, soaps may be precipitated by salting it out with saturated sodium chloride. The saponification value is the amount of base required to saponify a fat sample. For soap making, the triglycerides are highly purified, but saponification includes other base hydrolysis of impurified triglycerides. For example, the conversion of the fat of a corpse into adipocere, often called "grave wax." This process is

more common where the amount of fatty tissue is high, the agents of decomposition are absent or only minutely present, and the burial ground is particularly alkaline.

Steam hydrolysis

Triglycerides are also saponified in a two-step process that begins with steam hydrolysis of the triglyceride. This process gives the carboxylic acid, not its salt, as well as glycerol. Subsequently, the fatty acid is neutralized with alkali to give the soap. The advantage of the two-step process is that the fatty acids can be purified, which leads to soaps of improved quality. Steam hydrolysis proceeds via a mechanism similar to the base-catalysed route, involving the attack of water (not hydroxide) at the carbonyl centre. The process is slower. hence the requirement for steam.

Knowledge of saponification is relevant to many technologies and many aspects of everyday life.

Soft vs bard soap

Depending on the nature of the alkali used in their production, soaps have distinct properties. Sodium hydroxide (NaOH) gives "hard soap", whereas when potassium hydroxide (KOH) is used, a soft soap is formed.

Saponification in art conservation

Saponification can occur in oil paintings over time, causing visible damage and deformation. The ground layer or paint layers of oil paintings commonly contain heavy metals in pigments, such as lead white, red lead, or zinc white. If those heavy metals react with free fatty acids in the oil medium that binds the pigments together, soaps may form in a paint layer that can then migrate upwards to the painting's surface.

❖ BLENDING OF LIQUID OILS:

Composition and properties of individual fats and fat fractions can be Significantly

Modified by blending with other fats or fat fraction having specific compositions and properties. This kind of blending results invariably in the products displaying compositions and properties functionally more desirable suited and tailored to making value — added products to cater to edible and industrial consumptions. Blending of fats or fat fraction has been extensively examined and formulated for making cocoa butter substitutes, margarines and shortenings blending of vegetable oils to obtain nutritionally better oils at relatively cheaper price and fulfil the consumer's acceptability and recognized. Certain additives are also blended with edible oils, fats and their product to improve their characteristics such as shelf life, frying character, crystallization behaviour nutritional character etc.

In many countries vegetable oils are blended by simple mixing in definite proportions to meet the preference of consumers and to provide edible oils of improved shelf life, frying characteristics nutritional value and above all at relatively cheaper prices.

A number of examples can be cited here to indicate the scope of blending of oils. Palmolein can be blended with rapeseed, mustard, soyabean, groundnut, sunflower, seasame etc. to meet a frying for cooking oil specification. In a country like Malaysia, palmolein is blended with seasame oil or groundnut oil to meet the preference of many Malaysian people. The amount of seasame oil or groundnut oil is mixed in very small proportion (l%) in Palmolein. In India also a number of combinations of binary blends of vegetable oils at 20% by weight have been allowed by the government of India to meet the preference of consumers and to provide nutritionally balance edible oils and price wise cheaper oils to the vast majority of As usual like the individual edible oils, the blended oils should confirm to specifications normally laid down with, perhaps one or two exceptions when one of the oils in the blends gas special features.

The health effects of Vegetable oils:

In general, we consider vegetable oils to be healthier than fats derived from animals. this is largely thanks to the efforts of commercial vegetable oil producers to link the modern problems of cancer and heart disease with animal fat (especially saturated fat) consumption. The truth is somewhat different.

Pure vegetable oils, such as olive oil have been in use for thousands of years, and their benefits as part of a balanced diet are well understood. In fact, most vegetable oils are probably alright as part of a balanced diet and would certainly be unlikely to do any harm (except in excessive amounts) if it were not for the fact that they are chemically altered before they are used.

These oils now form a massive proportion of all the vegetable oils used worldwide, but particularly in the Western world and more especially North America. While many liquid oils, such as sunflower oil are largely unadulterated, the solid forms of vegetable oils, such as margerine, shortening and some liquid oils are chemically altered forms of the natural oils, commonly known as hydrogenated vegetable oils.

Hydrogenation changes these oils from their natural state to a dangerous, unnatural one which has major detrimental effects on health.

Office going personnel mostly prefer healthy food as there is more of sedentary work and no exercise. By reducing the consumption of oil in the diet, least fatty tissues are not vigorously developed that lead to various health discrepancies and heart disorders. Add to this a handful of stress, which in now inevitable in everyone's life and health problems then become rampant. Hence curbing the proportion of oil and fatty acids is a good long-term solution.

The different types of oils that are there in the market include vegetable oils like soybean oil, pumpkin seed oil, olive oil, palm oil, canola oil, sunflower oil, peanut oil, safflower oil, sesame oil, rice bran oil, argan oil, corn oil, palm oil and more.

The oils that are considered healthy are those that have lowest amount of saturated fats acids and highest measures of unsaturated fats, that is preferable mono-saturated fats.

Hence olive oil is considered good for cooking as it increases good HDI cholesterol, that keep the heart healthier than other oils. Also, one has to be careful while using oil seeds as some have allergies to it. They could lead a strong infection or can even fatal in nature. Hence be twice as sure when you take cooking oil home. Vegetable oils also have negative effects on human body. It can cause breast cancer in women who are in must menopausal stage. Palm oil and coconut oil have negative effects on cholesterol levels and are a risk to cardiovascular factors. Olive oil. oil can be used to avoid these issues.

Negative health effects:

A high consumption of omega-6 polyunsaturated fatty acids (PUFAs), which are found in most types of vegetable oil (e.g., soybean oil, com oil - the most consumed in USA, sunflower oil, etc.), may increase the likelihood that women will develop breast cancer. A similar effect was observed on prostate cancer in mice. Plant based oils high in Monounsaturated Fatty Acids, such Olive oil, peanut oil, and canola oil are relatively low in omega-6 PUFAs and can be used in place of oils. However, palm oil and coconut oil, even as hydrogenated "natural" oils, are high in saturated fatty acids (lauric and myristic acid) that have demonstrated negative effects upon plasma cholesterol and risk factors. In fact, they are used in animal studies to induce atherosclerosis to investigate the possible causes of the disease.

EXPIRIMENTAL PROCEDURE

Materials and methods

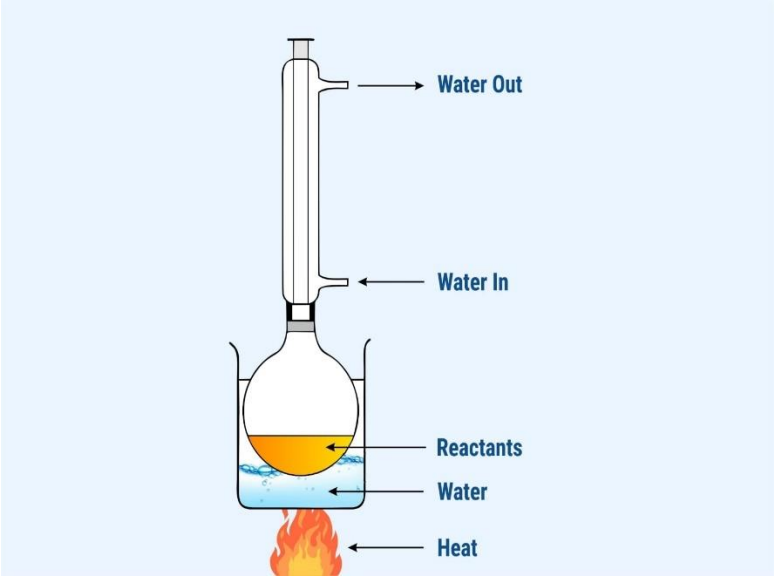
Before start explain the experiment, must describe that the technique which we used in this experiment. Reflux and titration.

The term reflux is very widely used in industries that utilize large scale distillation columns, fractionators such as petroleum refineries, petrochemical and chemical plants and natural gas processing plants.

In that context, reflux refers to the portion of the overhead liquid product from a distillation column or fractionators that is returned to the upper part of the column as shown in the schematic diagram of a typical industrial distillation column. Inside the column, the down flowing reflux liquid provides cooling and condensation of the up flowing vapours thereby increasing the efficiency of the distillation column.

The more reflux provided for a given number of theoretical plates, the better is the column's separation of lower boiling materials from higher boiling materials. Conversely, for a given desired separation, the more reflux is provided, the fewer theoretical plates are required.

Reflux to apply energy to chemical reactions



A liquid reaction mixture is placed in a vessel only at the top. This vessel is connected to a Liebig or Vigreux condenser, such that any vapours given off are cooled back to liquid, and fall back into the reaction vessel. The vessel is then heated vigorously for the course of the reaction. The purpose is to thermally accelerate the reaction by conducting it at an elevated (i.e., the solvent's boiling point).

The advantage of this technique is that it can be left for a long period of time without the need to add more solvent or fear of the reaction vessel boiling dry as any vapour is immediately condensed in the condenser. In addition, as a given solvent will always at a

certain temperature, one can be sure that the reaction will at a constant temperature. By careful choice of solvent, one can control the temperature within a very narrow range. The constant action also serves to continuously mix the solution, although a magnetic stirring mechanism is often used to achieve a uniform solution, this technique is useful for performing chemical reactions under controlled conditions that require substantial time for completion.

The diagram shows a typical reflux apparatus for applying energy to chemical reactions. It includes an optional beaker of water between the reactants and the heat. This is Often used as a safety precaution when using flammable reactants and a Bunsen burner in order to keep the flame away from the reactants. In modern laboratories, open flames are avoided due to the many flammable solvents often in use, and electrical heating, (i.e., with a hot plate or mantle) is preferred. Furthermore, a high boiling, thermally stable silicone oil is generally used to immerse the reaction vessel, rather than water which evaporates too readily to be useful for lengthy reactions. Using an oil bath, temperatures of up to several hundred degrees can easily be achieved, which is higher than the boiling point of most commonly used solvents. If even higher temperatures are the oil bath can be replaced with a sand bath.

Glassware

'Borosil' make glassware's were used for experimental work. Glassware was washed thoroughly with water. These were then rinsed with acetone and then dried in oven at 110^0-120^0C and were cooled in or assembled hot and protected from atmospheric moisture by anhydrous calcium chloride guard.

Materials

The analytical grade (AR) chemicals were used in all experiments. Wherever AR grade quality chemicals were not available, laboratory reagent (LR) grade chemicals were used after purification. All the solvents used during the present investigation were dried and purified according to standard methods. Analysis was carried out using deionised distilled water, which was obtained by distilling water containing alkaline potassium permanganate.

Reagents

l) preparation of (0.5 N) KOH: - 14.02 g of KOH was dissolved 500 mL 95% (V/V) ethanol, use a solution prepared at least 5 days previously and decanted into a bottle of Amber colour provided with rubber stopper, the solution should be colourless.

2) preparation of (0.5 N) succinic acid: - 7.38 g of succinic acid was dissolved in 250 mL of distilled water.

3) Preparation of (0.5 N) NaOH: - 5g of NaOH was dissolved in 250 mL of distilled water.

4) Preparation of (0.5 N) HCL: - 43.6 mL of HCI in 1000 mL standard volumetric flask and dilute with distilled water up to the mark.

5) 10% of phenolphthalein indicator-10 g of phenolphthalein in 95% (V/V) alcohol.

6) 95% (V/V) Ethanol

Saponification:

Principle: Boiling of the sample under reflux condenser with alcoholic potassium hydroxide solution and titration of the excess potassium hydroxide with HCl acid in presence of a phenolphthalein indicator.

Procedure:

l) In round bottom flask weigh to about 2 g of the oil sample.

2) With the pipette add 25 mL of 0.5 N ethanolic potassium hydroxide solution and some Porcelains pieces.

3) Fit the reflux condenser, boil gently with occasional shaking.

4) After 60 min stop heating.

5) Add to hot solution 0.5 to 1.0 mL of phenolphthalein indicator then solution turns pink in colour

6) Titrate hot solution against standard HCl solution until the colour of the indicator changes to colourless.

7) Carry out three determinations with the same oil sample.

8) Carryout blank test in the same way. (Without oil sample)

A) For BLANE

l) Solution in burette : (0.492 N) HCl solution

2) Solution in flask : 25 mL (0.452 N) KOH solution

3) Indicator : Phenolphthalein

4) End Point : pink to colourless

B) Sample titration table:

1) Solution in burette : (0.492 N) HCI solution

2) Solution in flask : 2.5 g mustard oil + 25 mL KOH reflux for I hr.

3) Indicator : Phenolphthalein

4) End point : pink to colourless

CALCULATION:

Saponification value = $56.1 * T * (V_o - V_L)/m$

T = Normality of HCI

V_o =Volume required for blank

V = Volume of HCI required for sample

M = mass of oil (weight of oil taken in g)

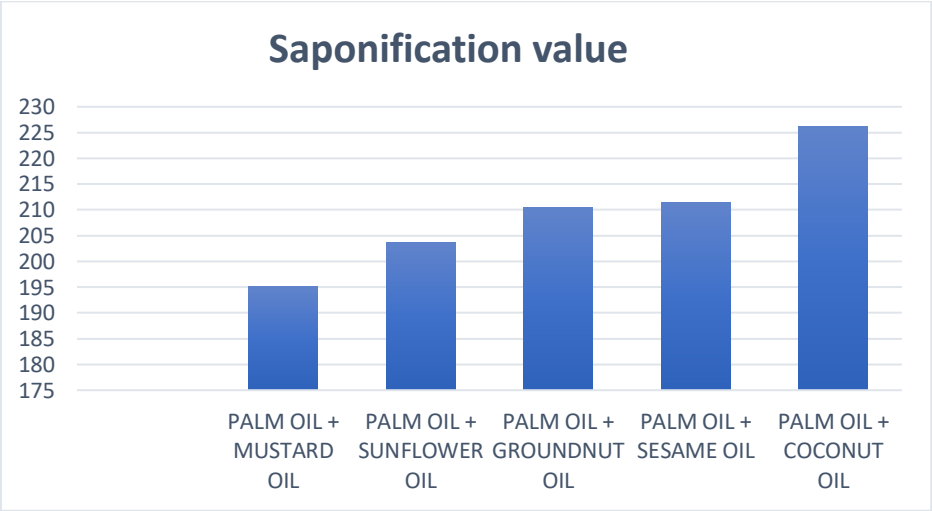
Sr No.	Vegetable oil	Saponification oil
1	Mustard Oil	165-185
2	Groundnut Oil	180-200
3	Sesame Oil	186-199
4	Sunflower Oil	185-198
5	Palm Oil	190-205
6	Coconut Oil	250-264

RESULTS AND DISCUSSION

Saponification values of blended oils sample are as follows:

1) Blending of coconut oil with vegetable oils

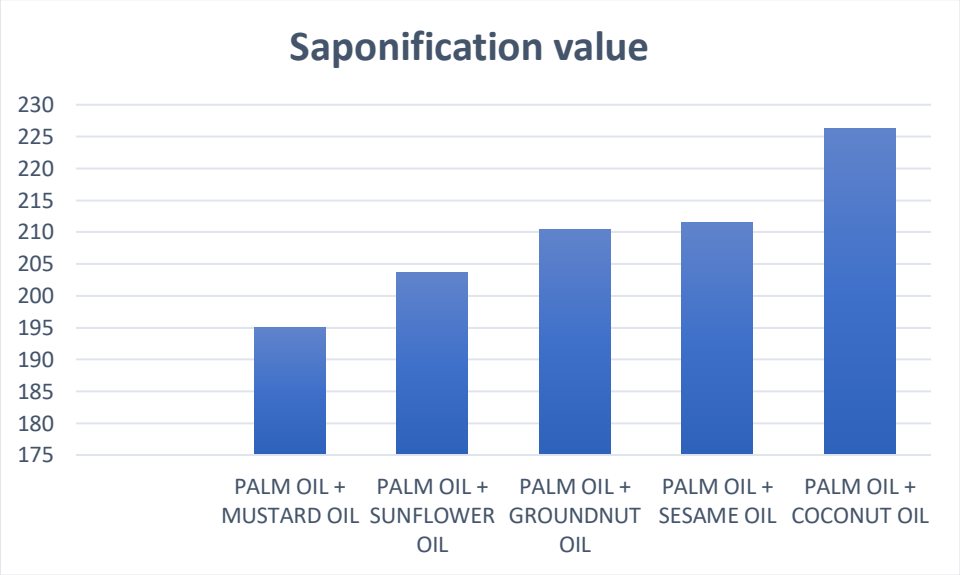
Sr. No	Blend oil	Saponification value
1	COCONUT OIL + MUSTARD OIL	206.71
2	COCONUT OIL + SUNFLOWER OIL	213.14
3	COCONUT OIL SESAME OIL	215.60
4	COCONUT OIL + GROUND OIL	224.22
5	COCONUT OIL + PALM OIL	226.26



From the above observation we conclude that when coconut oil is blended with the vegetable oils its saponification value is decreases. Coconut Oil is blended with Mustard oil it shows lower sap value. Coconut oil blended with Groundnut oil, Palm Oil, Sesame oil its saponification values are high so it contains Of unsaturated fatty acid) which are beneficial in health pint of view, for heart diseases.

2) Blending of Palm oil with vegetable oils:

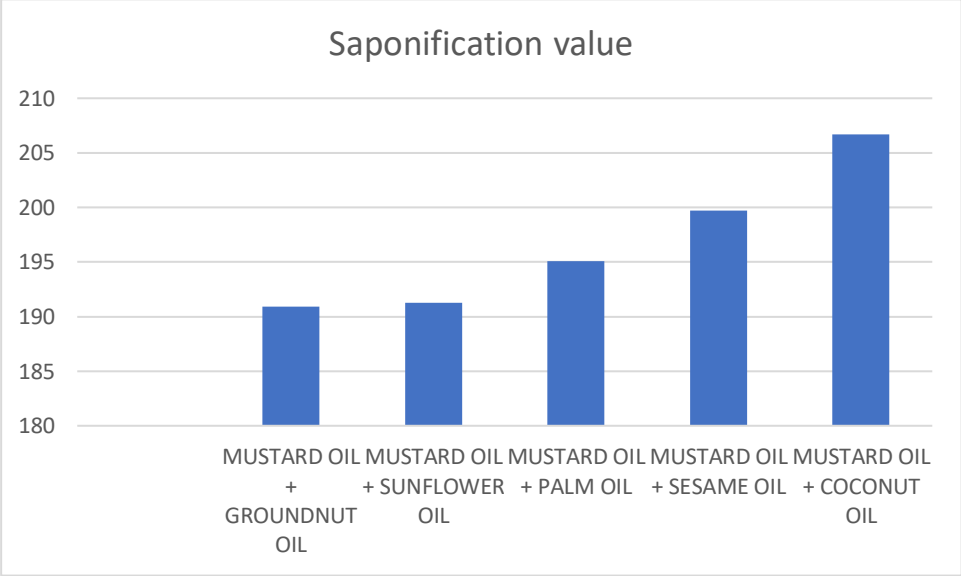
Sr. No	Blend oil	Saponification value
1	PALM OIL + MUSTARD OIL	195.10
2	PALM OIL + SUNFLOWER OIL	203.59
3	PALM OIL + GROUNDNUT OIL	210.39
4	PALM OIL + SESAME OIL	211.48
5	PALM OIL + COCONUT OIL	226.26



From the above observation we conclude that when Palm oil is blended with the vegetable oils its saponification value changes. Blending of Palm oil and Coconut oil shows higher sap value. When Palm oil with Coconut oil, sesame oil, Groundnut oil its saponification values are high so these blended oil sample are for health point of view. These oils generally we can use in our diet.

3) Blending of Mustard oil with vegetable oils:

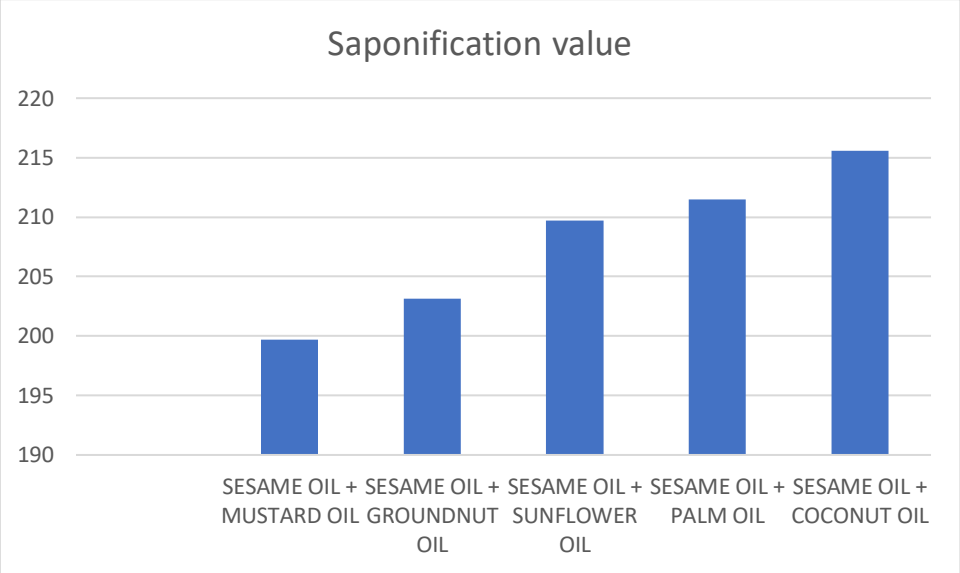
Sr. No	Blend oil	Saponification value
1	MUSTARD OIL + GROUNDNUT OIL	190.90
2	MUSTARD OIL + SUNFLOWER OIL	191.28
3	MUSTARD OIL + PALM OIL	195.10
4	MUSTARD OIL + SESAME OIL	199.71
5	MUSTARD OIL + COCONUT OIL	206.71



From the above observation, we conclude that when Mustard oil is blended with the vegetable oils its saponification value changes. Blending of Mustard oil and Coconut oil shows higher sap value. When mustard oil blended with Coconut oil, Sesame oil, Palm oil its saponification values are high, it contains a greater number of unsaturated fatty acid. These blended oils are having polyunsaturated fatty acid which are useful for health point of view.

4) Blending of Sesame oil with vegetable oils:

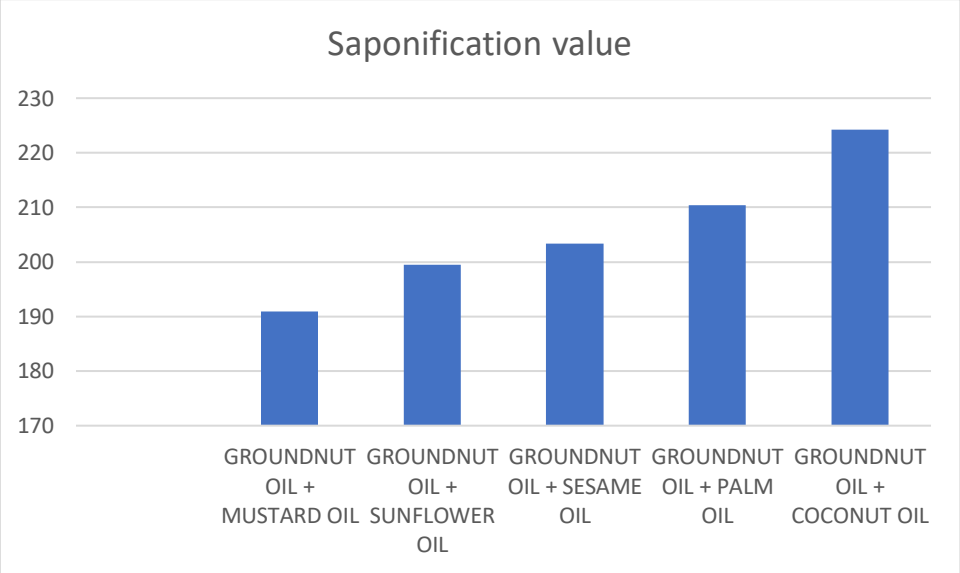
Sr. No	Blend oil	Saponification value
1	SESAME OIL + MUSTARD OIL	199.71
2	SESAME OIL + GROUNDNUT OIL	203.16
3	SESAME OIL + SUNFLOWER OIL	209.69
4	SESAME OIL + PALM OIL	211.48
5	SESAME OIL + COCONUT OIL	215.60



From the above observation, we conclude that when Sesame oil is blended with the vegetable oils its saponification value changes, Blending of Sesame oil and Coconut oil shows higher sap value. When Sesame oil is blended with Coconut oil, Palm oil, Sunflower oil its saponification values are high, it contains a greater number of unsaturated fatty acid. These blended oils are having polyunsaturated fatty acid which are useful for health point of view.

5) Blending of Groundnut oil with vegetable oils:

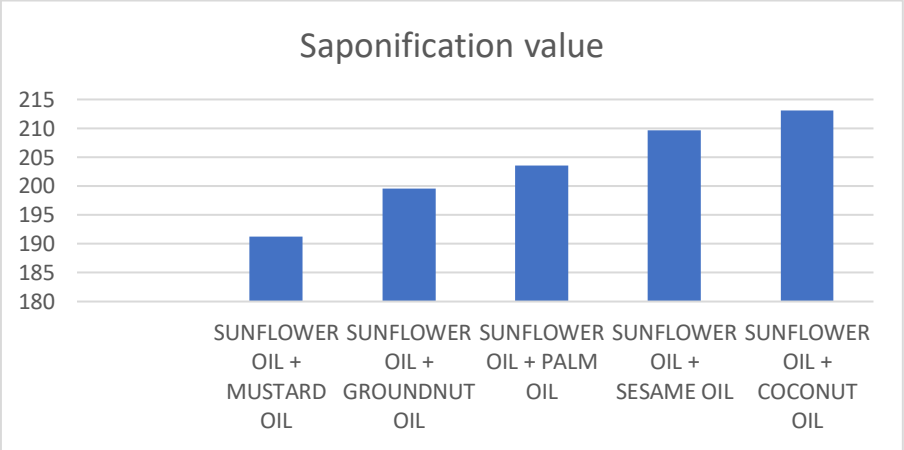
Sr. No	Blend oil	Saponification value
1	GROUNDNUT OIL + MUSTARD OIL	190.90
2	GROUNDNUT OIL + SUNFLOWER OIL	199.53
3	GROUNDNUT OIL + SESAME OIL	203.39
4	GROUNDNUT OIL + PALM OIL	210.39
5	GROUNDNUT OIL + COCONUT OIL	224.22



From the above observation we conclude that when Groundnut oil is blended with the vegetable oils its saponification value changes Blending of Groundnut oil and Coconut oil shows higher sap value. Groundnut oil and Mustard oil shows lower sap value. When Groundnut oil is blended with Coconut oil, Palm oil, Sesame oil its saponification values are high. it contains a greater number of unsaturated fatty acid. These blended oils are having polyunsaturated fatty acid which are useful for point of view.

6) Blending of Sunflower oil with vegetable oils:

Sr. No	Blend oil	Saponification value
1	SUNFLOWER OIL + MUSTARD OIL	191.28
2	SUNFLOWER OIL + GROUNDNUT OIL	199.53
3	SUNFLOWER OIL + PALM OIL	203.59
4	SUNFLOWER OIL + SESAME OIL	209.69
5	SUNFLOWER OIL + COCONUT OIL	213.14



From the above observation we conclude that when Sunflower oil is blended with the vegetable oils its saponification value changes. Blending of Sunflower oil and Coconut oil shows higher sap value. Sunflower oil and Mustard oil shows lower sap value. When Sunflower oil is blended with Coconut oil, Sesame oil, Palm oil its saponification values are high, it contains a greater number of unsaturated fatty acid. These blended oils are having polyunsaturated fatty acid which are useful for health pint of view.

Improvement in the frying quality of vegetable oils by blending with Palm oil

Palm oil with its excellent frying properties improves the frying quality of other vegetable oils when blended with them. Thus, the induction period of variety of oils is raised by blending indicating improved resistance to oxidation. The improvement is also seen in measurements reflecting primary and secondary oxidation and formation of the fatty acid's other volatiles and polymers.

Fats and oils are widely used for deep frying and are among the most materials used in the catering and manufacturing industries. In normal deep fat frying the content of Linoleic acid is kept low to improve the oxidative stability of the oils. Thus, it is customary to partially hydrogenase vegetable oils to reduce their Linoleic acid content to an acceptable level. An alternative means is to blend vegetable oils with Palm oil, which has a similar effect to partial hydrogenation to reducing the Linoleic acid and Linoleic acid content, but without interlacing stability owing to their inherent composition and to the presence of tocopherols, which are natural antioxidants. By blending vegetable oils with Palm oil, the positive effects of Palmolein are conferred on the blend during frying. Peanut is most favoured oil for frying. Followed by cottonseed oil. Addition of 300/0 Palm oil to these oils has found to improve their frying quality in terms of primary and secondary oxidation and formation of polymers, polar components and oxidized fatty acids.

CONCLUSIONS

The saponification and blending of vegetable oils, such as sunflower oil, sesame oil, mustard oil, palm oil, coconut oil, and groundnut oil, offer a wide range of possibilities in soap production.

By subjecting these oils to saponification, they can be transformed into soap, which is an effective cleansing agent. The process breaks down the oils into fatty acids and glycerol, which then react with an alkali to form soap molecules. Each of these oils has its own unique composition of fatty acids, resulting in different properties in the final soap product.

Blending these vegetable oils allows manufacturers to create customized soap formulations that cater to specific preferences and skin types. For example, the addition of coconut oil can enhance lathering and hardness, while oils like sesame oil and groundnut oil provide moisturizing and conditioning benefits. By combining different oils in varying proportions, soap producers can achieve desired characteristics and meet market demands.

The use of these vegetable oils in saponification and blending processes also promotes sustainability. These oils are derived from renewable plant sources, reducing reliance on non-renewable alternatives. Additionally, vegetable oils often possess nourishing properties for the skin, providing moisturization and essential nutrients.

ACKNOWLEDGEMRNT

It gives me great pleasure to express my gratitude whole heartedly to all those people who helped me, guided me and supported me during my project work.

I am thankful to my project guide Asst. Prof. Miss Benazir Shaikh for encouraging me to complete this project, guiding me and helping me out through all the obstacles in the project.

I would like to thanks our H.O.D. Dr. N. T. Nirgude, N. B. Mehta (v) Science college,Bordi for providing support and suggestions wherever required in study

My hearty thanks to my family and friends who always support me.

I also extend out thanks to all those who have help me directly or indirectly in the completion of this project.

REFERENCES

1. http://www.soap-making-resource.com/savx»nification-table.html
2. http://en.wikipedia.orWwiki/Saponification_vaIue
3. http://www.pvsoap.com/saponification_chart.htm
4. http://en.wikipedia.org/wiki/()live_oil_regulation_and_adulteration
5. http://coconuttx»ard.nic.WEnglish-Article-Gopalakrishna-CFTRI.pdf
6. http://www.organicfacts.net/health-benefits/essential-oils/health-benefits-of-mustard-essential-oil.html
7. http://www.ehow.com/facts_5486518 _palm-oil-health-benefits.html

8. C. Paquot and A. Hautfenne, Standard methods of the analysis of oil. fats and
9. derivatives. 7th Ed. , Blackwell scientific publications, (2007).
10. Longman, Vogel's Textbook of Practical Organic Chemistry. 6th Ed. ELBS, (2008)
11. Niir Board, Modern Technology of oils, fats and its derivatives, Asia Pacific Business Press Inc.4.
12. M. Chakrabarty, Chemistry and technology of oils and fats. Allide Publishers
13. Pvt. Limited, (2008).
14. E. G. Latondress, Journal of American oil chemists' society 58 (185-187)
15. S. M. Herschdoerfer, Quality control in the food industry, Academic Press London and New York, Volume 2, (2000).
16. D. Pearson, Laboratory techniques in food analysis, Butterworth and Co. Publishers, (1973).
17. Ronald S. Kirk and Ronald Sawyer, Composition and analysis of food, 9th