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Full Length Research Paper

Determination of Different Parameters of Edible Oils

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ABSTRACT

Edible oils are derived from a wide variety of plants and plant seeds and plant seeds are used in many aspects of domestic and worldwide food production. Acid value and saponification value were determined by the metric method. The different parameters were calculated: acid value, ester value, saponification value, and volatile matter. These parameters are shown in different values in the different oil samples: - Acid value is a common parameter in the specification of fats and oils. It is defined as the weight of KOH in mg needed to neutralize the organic acids present in 1g of fat and it is a measure of the free fatty acids present in the fat or oil. Ester value is number of milligrams of potassium hydroxide required to hydrolyze the ester in one gram of oil sample. The saponification value of fats and oils is one of the most common quality indices, reflecting the mean molecular weight of the constituting triglycerols. The flavor of edible oils is caused by a large number of volatile substances at low concentration, including saturated and unsaturated aromatic hydrocarbons.

Introduction

Inedible vegetable fats and oils include processed tongs and castor oil used in lubricants, paints, cosmetics, pharmaceuticals, and other industrial applications [(1).] The oil contains unsaturated fatty acids and relatively high levels of phospholipids which can react with oxygen to produce unpleasant flavours and odours in the oil. [(2)] According to projections from the National Council of Applied Economic Research (NCAER)per capita consumption of edible oil is likely to reach 13.95,14.83 and 16.17 kg by 2009-2011[(3)] Biodiesel has a viscosity much closer to diesel fuel than vegetable oil. This helps produce a much smaller drop, which burns clear [(4)] Oils extracted from plants have been used since ancient times and in many cultures. Researchers at Central Soya discovered that a trypsin inhibitor in soybeans could be deactivated by toasting the meal, and both licensed their invention and sold soy meal augmented with vitamins and minerals as Master Mix, a product for farmers to mix with their grain to produce a high-quality feed. [(5)]

Vegetable oils have naturally occurring high phosphorus, calcium and magnesium content and contain traces of other elements like iron and copper. Significant concentrations of these substances are removed during the refining process. Hydrogenation is a chemical process that changes the property of edible oil to improve its stability and physical characteristics. [(6)] Can you imagine that most parts of the docile0 looking tree or plant that grows right next to your house could be providing mankind with beneficial oils? [(7)]This is in contrast to essential oils which are volatile in nature some of the prominent fixed oils are almond oil, castor oil, coconut oil etc. The term vegetable oils are normally used interchangeably with the term fixed oils.

The spicy heat of the crushed mustard seeds and the French proactive of mixing the ground with must, the young, unfermented juice of wine grapes. [(8)] Mustard oil is an amber-coloured, volatile liquid derived from the seeds of the mustard plant [(9)] It is used as a flavouring agent in foods soaps as a rubefacient or counterirritant in folk medicine, as a fungicide, repellent for cats and dogs in ointments and as a fumigant. Mustard oil is an amber-coloured, volatile liquid derived from the seeds of the mustard plant. It is used as a flavouring agent in foods, soaps as a rubefacient or in folk medicine, fungicide, repellent for cats and dogs in ointments and as a fumigant. [(10)]

There was no history of sexual contact, sexually transmitted disease or any relevant drug intake.[11] Canola oil, which was previously called rapeseed oil, differs from other vegetable oils because it contains significant quantities of eicosanoids and erucic fatty acids. It is used as both edible oil and as a lubricant for metal surfaces because of the high viscosity of rapeseed oil. [12] . It is never applied to fruit oils like olive oil and palm oil since these oils have already been in contact with water during their production.[13] Water degumming is the oldest degumming treatment and also forms the basis of the production of commercial lecithin.

Since the water degumming process involves more water than when crude oil is allowed to absorb moisture from the atmosphere, the gums resulting from the water degumming process also remove hydrophilic substances such as sugars from the oil[14 The water degumming process involves more water than when crude oil is allowed to absorb moisture from the atmosphere, the gums resulting from the water degumming process also remove hydrophilic substances such as sugars from the oil[15] Generally the cake in the oil is separated by centrifuge, decolouring by active clay and steam deodorization at high temperature in vacuum up to 5 mm. H g.[16] Thus a new vegetable oil refinery has got good potential. [17] Mustard oil is the third largest edible oil produced in the world after soy oil and palm oil. [18]

It was the introduction of polyunsaturated fat oils which started the problem. To protect their huge investments a propaganda was let loose that the poly saturated oils like sunflower, rice bran etc are heart friendly and keep your heart healthy and cholesterol in check and protect you from heart ailments.[19] The coconut development board and central food technology research institute (CFTRI), Mysoree have developed technology for the production of virgin coconut oil and dietary Fibre[20] Many feedmanufacturerss have been using fat in swine diets as an energy source and palatability promoter [21] Groundnut can withstand drought and is suitable for dry land farming .[22] If the husk is solidly black, the seeds are called black oil sunflower seeds [23] the crops may be referred to as oilseed sunflower crops.

But it was the America Indian who first domesticated the plant into a single headed plant with a variety of seed colors including black, white, red and black white striped. [24]Although modern sunflower cultivars were not grown widely in the U.S until the 1970 there were tests of sunflower oilseed processing by the southeast Missouri sunflower grower association in Missouri in 1926. [25]Sustained high crude oil prices in the near term, ICRA believes that edible oil prices would continue to remain firm.[26]

Review of literature

E.H. Agba and E.J.Ibanga[27] studied the effects of X-Rays on the physicochemical properties of Edible oil. Edible oil was studied to investigate the effect of X-radiation on its phyrico chemical properties. Marta Gomes dsilva's Paul Singh[28] carried out the measurement that viscosity and surface tension of edible oil at frying temperature surface active properties and viscosity changes of corn oil were determined under conditions. J.C.O. Santos I.M.G. Santos and A.G Souza[29]. Carried out the measurement in this work. The temperature dependent rheological behavior or un-used and used vegetable cooking oils was evaluated. L.S.Bark and N.Hadipranota[30]. Studied the enthalpimetric determinatin of the iodine value to some edible oils and fats. A simple, rapid and accurate direct injection enthalpimetric (DIE) method has been developed for the determination of the iodine. F.J. Sanchez-muniz[31]. Carried out the measurement of thermal Oxidation of Olive oil,Sunflower Oil and a. Departamento de Nutricion y Bromatologia I (Nutricion),Seccion Lipidos, FacultaMix of Both Oils during Forty Discontinuous Domestic Fryings of Different Foodsd de Farmacia,Universidad Complutense de Madrid, 28040 Madrid, Spain Changes in Sunflower oil(so), olive oil(OO) of 0.4.c acidity value and a mixture(1.1) of both oils (MO) were studied during forty domestic discontinuous deep fat frying of various food stuffs ,mostly frozen foods. The replenishment of the oil in the fryer with fresh oil was performed after every ten uses to maintain the oil volume in the fryer. Lubomir Karasek, Thomas Wenzl, Franz Ulberth [32], studied the proficiency test on the determination of mineral oil in sunflower oil. O.O. Fasina, H. Hallman, M. Craig- Schmidt and C. Clements [33], carried out the predicting temperature-dependence viscosity of vegetable\e oils from fatty acid composition. C.M. Rodenbush, F.H.Hsieh and D.S. Viswanath[34] ,studied the density and viscosity of vegetable oils. Juliana Rabelo, Eduardo batista, FL vio W. Cavaleri and Antonio J.A.Meirelles[35], viscosity prediction for fatty systems Viscosity data have been measured as a function of temperature for two pure polyunsaturated fatty compounds (linoleic acid and trilinolein) ,for two multicomponent fatty systems, for a commercial –grade oleic acid (approximately 80% pure) ,and for canola oil. Karl D. Meilke, Professor and G.R.Griffith[36], studied the application of the Market Share Approach to the demand for soyabean and rapeseed oil*. S Armenta ; S Garrigues' M de la Guardia[37], Carried out the determination of edible oil parameters by near infrared spectrometry. Guillen M D. Cabo N [38], carried out the relationship between the composition of edible oils and lard and the ratio of the absorbance of specific bands of their Fourier transform

Methodology

Acid value [39]

Acid value was determined by titric method by pearson (1970).20 g of oil sample was weighted and 50 ml of was added with a ffew drops of phenolphthalein. The mixture was shaken vigorously and titrated with 0.1N NAOH solution with constant shaking until pink colouration permanent Acid value was calculated using the formula:

Acid Value = V 5.6/ Weight of sample

Where v = Titration end point value

*Theory :-*Acid value of oil in the number of milligrams NAOH required to neutralize the free acid present in one gm of oil. Acid present in the given oil is directly titrated against standard alcoholic NAOH solution.

Reagent:-
20 gm of oil sample+ 50 ml of hot neutral alcohol phenolphthalein indicator, 0.1N NAOH solution.

Procedure:-
Weight 20 gm of oil into a flask and add 50 ml of 95% alcohol which has been Neutralized to phenolphthalein end point with 0.1N alkali. Heat to boiling and swirl the flask. Titrate the hot sample with 0.1N NAOH solution until colour persists for 30 Seconds (after vigorous swirling)

Saponification value:-
The saponification value was determined according to the titrimetric method of Pearson (1981).2gm of oil sample was weighted into a conical flask and 25 ml of alcoholic potassium hydroxide was added. solution was heated in boiling water for 30 minutes.1 ml of 1% phenolphthalein was added and titrated with 0.5N HCL. A blank was prepared alongside the oil samples.

The value was calculated by the formula:
Saponification value= 56.1N (B-A)/W

Where N= Normality of HCL used,
A= Volume of H2SO4, for blank, ml; B= Volume of H2SO4, for sample, ml; 56.1= Equivalent weight of KOH.; W= Weight of oil used (2g)

Theory:
Saponification is the process by which the fatty acids in the glycerides of oil are hydrocryser an alkali. Each mole of triglyceride used three moles of koh for saponification on per the following equation-

Saponification value:- Saponification value is a amount (mg) of the alkali required 1 g of an oil or fat. This value is useful for cooperative study of the fatty acid and chain length in oils.

A known quantity of the oil reflexed with a known excess of alcoholic KOH. After saponification . The remaining KOH is estimated by titrating it against a standard acid.

Reagent:-
0.5N alcoholic KOH solution, 0.5N HCL, phenolphthalein indicator, oil sample

Procedure:-
Weight completely dry liquid sample (2g) into a flask. Add alcoholic KOH 25 ml Soluble from the burrete into the flask. Simultaneously process another flask in the same way without adding the sample, Connect air condenser to the flask and boil the contents gently or water bath For about 30 minutes. Allow the contents to cool at room temperature and rinse the inside of the condenser. Titrate the solutions against 0.5N HCL using phenolphthalein as indicator. The end point is the just appearance of pink colour. From the difference between the titration value of the blank flask the flask containing the oil. The amount of KOH in mg that has been used for oil can be calculated.

Ester value:-
The ester value of an oil sample is the measure of the amount of esters present. This can be obtained by subtracting acid value from the saponification value.
We can calculate the ester value using this formula:-
Saponification value-Acid value

Volatile matter:-
A known weight of the sample, taken in a crucible, is heated in an oven around 100 C until constant weight is obtained. The loss in weight gives the amount of volatile matter.
The value was calculated using the formula:- % volatile mater = (w2-w3)/(w2-w1) 100

Procedure:-
Take a known weight (2g) of the sample in a crucible and heated in an oven around 100 C. Heat until constant weight is obtained.
The loss in the weight is the amount of volatile matter.
From the difference between the constant weight and crucible weight, we can calculate the volatile matter

Results and Discussion

The different oil samples are shown different-2 parameters value. The different parameters were calculated that is acid value, ester value, saponification value, and volatile matter.

These parameters are shown different value in the different oil sample.

Acid value of different oils:-

Acid value of the mustard oil is 0.6%, coconut oil is 0.2%, soybean oil is 2.0%, sesame oil is 3.3%, olive oil is 6.6%, castor oil is 4.7, baby oil is 1.6%, jasmine oil is 3.9%, allover oil is 3.2%, and almond oil is 1.0%. The olive oil shown highest value of acid.

Saponification value of different oils :-

Saponification value of mustard oil is 112.22%, coconut oil is 252%, soybeans oil is 190%, sesame oil is 190%, olive oil is 195%, castor oil is 180%, baby oil is 90%, jasmine oil is 85%, alovera oil is 195%, and almond oil is 205%. The coconut oil shown highest sap value of samples.

Ester value of different oils:-

Ester value of mustard oil is 12.16%, coconut oil is 250%, Soya oil is 188%, sesame oil is 186.66%, olive oil is 188.83%, castor oil is 175.24%, baby oil is 88.32%, jasmine oil is 8081.08%, alovera oil is 191.78%, and almond oil is 204%.Coconut oil shown highest ester value of oil.

Volatile matter of different oils:-

Volatile matter value of mustard oil is 32.25%, coconut oil is 13.45%, Soya oil is 2.27%, sesame oil is 24.23%, olive oil is 18.26%, castor oil is 16.66%, baby oil is 6.19%, jasmine oil is 15.21%, alovera oil is 40.90%, almond oil is 4.5%.Alovera oil shown highest volatile matter value of oil.

Summary and conclusions

Oils and fat form an important constituent of human food. In India the fats used as cooking media are generally vegetable oil, vanaspati and ghee. Vegetable oil is derived from seeds of plants. Among the oil seeds cultivated in India, from which edible oil is obtained, are groundnut, rapeseed, mustard, sesame, sunflower, Niger, soyabean, linseed, and castor. The other sources of vegetable oil are palm, cottonseed, coconut and rice bran. Generally the two methods employed for obtaining edible oil are pressing and solvent extraction.

Studied on the parameters of the edible oil, the results obtained from the different parameters of the oil sample. These different parameters are acid value, ester value, saponification value and volatile matter.

These parameters are calculated by the different method:-

Acid value and saponification value was determined by the metric method. The apparatus used for the determination of physical parameters are following: Burrete, pipette, RBF, conical flask, oven, crucible etc

These tables are shown for different parameters value of the oil samples. The different parameters were calculated : acid value, ester value, saponification value, and volatile matter. These parameters are shown different value in the different oil samples:-

- The olive oil shown highest acid value.
- The coconut oil shown highest ester value.
- Coconut oil shown highest saponification value.
- The alovera oil shown highest volatile matter.

These parameters are summarized in the following table 1:-

Oil Samples	Acid Value	Saponification value	Eater value	Volatile value
Mustard oil	0.6	12.22	112.16	32.25
Coconut oil	0.2	252	250	13.45
Soya oil	2	190	188	2.27
Sesame oil	3.36	190	186.64	24.23
olive oil	6.17	195	188.83	18.26
castor oil	4.76	180	175.24	16.66
Baby oil	1.68	90	88.32	6.19
jasmine oil	3.92	85	81.08	15.21
Allovera oil	3.22	195	191.78	40.9
Almond oil	1	205	204	4.5

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