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Comparison of iodine values between cold pressed oil and refined edible oils.

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ABSTRACT

Vegetable oils are triglycerides of extract from plants and made up of fatty acid chains. The fatty acids can be saturated or unsaturated depending on the number of carbon-carbon double bonds. The degree of saturation or unsaturation is indicated by the iodine value of the oil. Hence this research work was aimed at comparing the iodine values of different edible oil such as Sunflower, Safflower and Ground nut. The main aim of the present research work is to focus on the iodine values of cold pressed oil and refined oil. Here the work is focused on comparing iodine values in cold pressed oil and refined oil of Sunflower, Groundnut and Safflower. The iodine values found significant for cold pressed oil than refined oil.

Keywords: Sunflower oil, Safflower oil, Ground nut oil, iodine number.

Introduction

Edible oils make up a small segment of your diet they play a key role. Oils provide essential nutrients to help maintain body functions. Choice of oil in diet can make a big difference to health. Oils are the most efficient energy nutrient which could be consume. Oils help build healthy cell membranes and assist the nervous system in sending messages to the brain. Oils help intestines to absorb vitamins A, D, E and K, and store them in human's body fat. Oils assist in regulating hormones, lubricating skin and cushioning organs. Always important, oils add taste and texture to the food.

Types

- Monounsaturated and polyunsaturated oils remain liquid at room temperature.
- Saturated and Trans fat oils often clump up at room temperature.
- Unsaturated oils contain essential fatty acids, which are nutrients required for good health .
- Human beings body has all the saturated oils and Trans fat oils it needs.

Unsaturated oils include olive, peanut, canola, soybean, sunflower, corn and fish oils. Saturated oils include butter, lard, shortening, margarine, partially hydrogenated vegetable oil and animal fats. Too much saturated oils in diet raise LDL, or bad cholesterol, causing high blood pressure. Consuming unsaturated oils raises HDL or good cholesterol, lowering blood pressure. (Adeyeyeet al., 1992, Bansal et al.,1993).

Cold -pressed oil

The oils that we use for cooking are extracted from seeds, fruits or vegetables, and even nuts. Cold-pressed oils are extracted from oilseeds like sunflower, canola, coconut, sesame seed or olive without applying heat. If heat is applied, the flavour and the nutritional quality gets degraded. The cold press method involves crushing the seeds or nuts and forcing out the oil through pressure. During olden times, a long cylindrical contraption known as *'Ghani'* was used to extract oil from oilseeds. *Ghani* was a mortar and pestle device made of stone or wood.It used a perambulating animal to extract oil under pressure from oil-bearing seeds. This was considered as the simplest method for cold pressing oils out of a seed because it didn't involve the generation of too much heat. Recently, extraction machines have replaced *Ghanis* that use excessive heat thereby generating high quantities of oil. In such cases, the quality may suffer. Cold pressed oil are of good qualities because the temperature during the processing does not rise to a level that produces adverse effects on the ingredients. During the pressing process, heat is necessarily released. But the temperature may not exceed 49 °C (120 °F) for the oil to be designated as cold pressed. When oils are extracted in this way, it retains its genuine flavour, aroma, and nutrients (AOAC., 2000).

Difference between cold-pressed oil and refined oil

Refined oil extraction uses high heat and chemical solvents, both of which damage the bio-active compounds responsible for the benefits of the oil. The yield in refined oil is higher. To make refined oil appear attractive, it is processed to remove gums (a thick layer that forms in the oil) and then refine it further with acetic acid, hexane or bleaching soda. Sometimes they also do double-refining process. When external heat of around 200 celsius is applied it destroys all the nutrients.

Cold-pressed oil is the oil extracted in its natural form. Oilseeds are just pressed (crushed) to yield out the oil. The method is just pressing, nothing else. Cold pressed oil in its natural form is very healthy with all-natural nutrients and flavour. Cold pressing is more expensive as it takes longer time and produces lower yields – but it is the safest, most natural extraction method. Cold pressed oil is processed at lower temperatures and hence it does not alter the properties of the oil, which contains a higher phenolic and nutrient content than expeller-pressed oil. Cold pressed oils to retain all its flavour, aroma, and nutritional value, making these oils great for cooking and skincare requirements. (Asibuo et al.,2008).

Iodine value

The iodine value, also known as the iodine number, is a measure of the degree of unsaturation of fat, wax, or oil; it is expressed in grams, the amount of iodine, which is taken up by 100 grams of the fat, wax, or oil. Iodine is not taken up by saturated oils, waxes, or fats, because their iodine value

Saturated and Unsaturated Fats

Fat is an ester of fatty acids found in a variety of food materials and animals. This is a hydrocarbon chain that has glycerol in one of its ends. There are usually two types of fat we find saturated and unsaturated. Saturated fats are the chain that contains all single-bonded carbon-carbon bonds. This is denoted by the C-C bond and as the carbon atoms are fully bonded with two hydrogens there is no possibility of any more hydrogen atoms being bonded with the carbon. Each carbon atom is bonded with two other carbon and two hydrogen atoms in the chain. These are very stable molecules and it is very hard for them to get emulsified. Unsaturated fats have a double or triple-bonded carbon chain in them. This leaves room for future reactions of the chain where it can get bonded with the hydrogen atoms and even get emulsified with relative ease. Each triple or double bond can be broken into a single bond and hydrogen atoms get added to the carbon atom. When it comes to fat they have a very bad reputation as many of them are associated with life-threatening diseases like cardiovascular disease, diabetes, and obesity. But not all fats are the same and our body requires certain types. of fats to carry out its day-to-day activities. They are generally saturated fats. Researchers have found that unsaturated fats have a good impact on our body metabolism and are useful in maintaining it. So the unsaturated fats are usually called good fats.(Campos et al.,2009).,

Importance of Iodine Value

The purity of fats is an important thing to measure and is mandatory by many government regulations to mention it on the packaging of food materials. The best way to find the purity of saturated/unsaturated fats is iodine value. Iodine value or Iodine number as it is commonly known as is the amount of Iodine that can react with the fat of a common mass (100 grams). This denotes the degree of unsaturation of fats. The saturated fat takes up no Iodine so their Iodine value is said to be of value zero. But the unsaturated fats have double or triple bonds which are generally very reactive towards the iodine. With the increase in double or triple bonds in carbon, the reactivity with iodine increases and it consumes more Iodine in reaction and so has a higher iodine value. For the method of the test, a known amount of Iodine in the form of iodine monochloride is left in a beaker of 100 grams of fats, oils, or wax. This starts the reaction between them and after the reaction is over the remaining amount of Iodine is found out by titration and so we can get the amount of Iodine that reacted with the fat and that becomes the iodine value of the fat. In summary, the Iodine Value is the degree of unsaturation of fats, oils, and waxes zero; however, iodine is taken up by unsaturated fats, oils, and waxes. (Lucyna Dymińska et al.,2017).

Aims and Objectives

This research work is aimed at comparing the iodine values of some common edible oil. The specific objectives are:

1. To determine the iodine values of Sunflower, Safflower and groundnut edible oil.
2. To compare the iodine values of cold pressed and refined oil of Sunflower, Safflower and Groundnut oil.

Materials and methods

Sample collection

The edible oils to be analyzed were bought in neat bottles from market of Aurangabad. The samples were labelled and store at room temperature in fume cupboard to prevent exposure from light which could altered the properties of oil.

Apparatus/Instruments used

Burette (25 ml), 100 ml measuring cylinders, 100 ml beaker, Stoppered bottles (250 ml), Analytical balance, 1.0 ml micropipette, 500 ml conical flasks.

Materials

0.2 ml Sunflower oil, 0.2 ml Safflower oil, 0.2 ml of Ground nut oil, Hanus iodine reagent, Sodium thiosulphate ($Na_2S_2O_3$) 0.1N, potassium Iodide (15%), 1% starch indicator, chloroform 20 ml.

Methods

Iodine value were determined according to the Hanus iodine method. 0.2 ml of oil sample were weighed in 500 ml of conical flask and 20 ml of chloroform were added to dissolve the oil sample completely, 25 ml Hanus iodine solution was added. The flasks were sealed, shaken thoroughly and [laced in dark for 30 min, 20 ml of KI solution were added to the sample solution. The sample solution was immediately titrated with 0.1N sodium thiosulphate ($Na_2S_2O_3$). 1 ml of 1% starch solution were added to the solution and titration continues until the dark blue color disappears leaving behind a clear solution with thorough shaking of conical flask throuhght the titration process in order to ensure that all the iodine were removed from the chloroform layer. At the same time, blank solutions were set up in the absence of oil. The titration processes were repeated with another oil sample.The volume of the sodium thiosulphate in the burette were recorded in data table. One blank of each trial and one test sample of each trial were utilized. The difference between each blank(B) and test sample (S) reading (B-S) gives the number of ml of 0.1 N sodium thiosulphate needed to react with the equivalent volume of iodine. (Hashemy et al.,1977).

The iodine value from the above experiment were calculated by using formula

Iodine number = A*N*0.1269*100/W

Where, A= ml of sodium thiosulphate (Blank- Sample)

N= normality of sodium thiosulphate

W= weight of oil in grams

Where 0.1269 is the molecular weight of iodine per 100g of oil sample

Before titration

After titration

The results of the research work were summarized using table as shown below

Table 1: Iodine values of sample oil.

Sr.no	Oil sample	Iodine value of cold pressed oil(g of I_2/100g of oil)	Iodine value of refined oil(g of I_2/100g of oil)
1.	Sunflower oil	**133**	128
2.	Safflower oil	**142**	135
3.	Ground nut oil	**90**	85

Conclusion

Based on findings and result so far it is concluded that cold pressed oil of Sunflower, Safflower and Groundnut oil have higher iodine values than refined oil. The result of these findings shows that cold pressed oil have significant nutritional value than refined oil hence it could be recommended for consumption of cold pressed oil in daily diet for maintaining good health of the human beings.

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