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To determine physical parameters of different edible oils.

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ABSTRACT
Different oil samples of various brands were collected from local market and analyzed for Physico-Chemical parameters like surface tension(γ), density(ρ), viscosity(η) and refractive index(n). By observing the obtained results, it can be concluded that coconut oil is of good quality.

Keywords: Physico-Chemical, viscosity, free fatty acids.

INTRODUCTION

Various cooking oils are being used since ancient times of history. The earliest of Man, who lived in Paleolithic era, consumed animals along with their fats with scarce availability of dairy, fruits, vegetables and nuts even though cooking was discovered [1]. Agriculture started just 10,000 years ago where the staple food changed from animal food to plant based cereals and pulses [2]. Even then for many years, animal fats like lard and tallow were used for cooking. The various arrays of vegetable cooking oil started early in last century with introduction of electricity, where the previously used source for lamps such as cotton seed oil lost its galore and entered to the kitchens of humans [3]. Various other vegetable oils like palm, coconut, sunflower, saffflower, rice bran, and canola oils hit the markets with claims of various nutritional benefits, but offered none [4].

In a study, researchers studied the cases of 458 patients who had experienced a coronary event. Of these men, 16 percent who had replaced animal fats with omega-6 polyunsaturated fats found in corn, sunflower and safflower oil died from heart disease

In contrast, only 10 percent of those who did not substitute their fats died as a result of a coronary event [4].In the modern medical literature, usage of oils and its relation to disease is the one of the most debated issue and it is still going on [5]. A slow but steady shift from vegetable oils to animal fats is taking place widely in the world due to knowledge of inherent health benefits in animal fats over vegetable oils. Such awareness has yet not reached the rural parts of India as a result they are still consuming refined vegetable oils for cooking [6]. The question of high prevalence of Diabetes, Hypertension and Heart disease attributed to vegetable oils is still a mystery to be solved.

The commonly used cooking oils in rural India are refined sunflower oil, Palm oil, Ground nut oil, Sesame oil, Coconut oil and others [7]. Many literature quotes refined Sunflower oil is one of the healthiest and cheapest oils compared with that of other oils [8]. Even though other refined vegetable oils are as harmful as sunflower oil due to its omega 6 fatty acid consumption and oxidation [9].

Edible oils play an important role in the body as carriers of essential fatty acids (EFA). They are needed for the synthesis of prostaglandins which have many vital functions to perform in the body. By maintaining good diet, we can control health issues like diabetes, cholesterol, blood pressure, etc.

Several factors affect the edible oil quality such as agronomic techniques, seasonal conditions, sanitary state of drupes, ripening stage, harvesting and carriage systems, method and duration of storage, and processing technology and it is determined by different analytical methods in order to assess the stability of oil and to avoid possible adulterations.
Oils and fats are important parts of human diet and more than 90 per cent of the world production from vegetable, animal and marine sources is used as food or as an ingredient in food products. Oils and fats are a rich source of dietary energy and contain more than twice the caloric value of equivalent amount of sugar. [10] Different oil samples of various brands where collected and analyzed for physico-chemical parameter studies.

METHODOLOGY

Chemistry laboratory inside the college department was identified for this work. Sterilized & disinfected sample bottles were used for sampling purpose. Analysis of various parameters were carried out in the laboratory as per referred literature. Analysis of oil samples were done to investigate its utility in eating or other purposes.
Following different physico-chemical parameters were tested for monitoring quality of Oil.

1. **Density**
2. **Surface tension**
3. **Viscosity**
4. **Refractive index.**

Oil samples were collected in sterile bottles from different shops.

RESULTS AND DISCUSSION

Since, oil is an important ingredient in our diet, it is important to consume healthy oil. Hence, I was curious to study oils. Some oils were collected from home and some from shops of different brands. The different types of edible oil were Coconut oil, Mustard oil, Soyabean oil, Sunflower oil and Palmolean oil.

I have studied the different physico-chemical parameters which I could perform in our college laboratory were density, surface tension, viscosity and refractive index.

It was found that the parameters showed slightly different values for each parameter which are as follows-

Density
Oils with the density of lower values are highly appreciable to consumers. The results tabulated in Table 1 show that at room temperature of 25°C highest and lowest values of the densities are 0.9683 g/ml and 0.901 g/ml for Deshi/Ghani mustard oil and Mustafa soybean oil, respectively. This is because, the π bonds that make the bonding more rigid androtation between C-C bonds becomes more strenuous [7].

INSTRUMENTS USED FOR PARAMETERS ANALYZED

Sr.no.	Studied Parameter	Method Used
01.	Density	Density Bottle
02.	Surface Tension	Stalagmometer
03.	Viscosity	Ostwald Viscometer
04.	Refractive Index	Abbe's Refractometer (Mod.AR-10, mvtex Ind.)

Sr. no.	Parameters	Coconut oil	Mustard oil	Soyabean oil	Sunflower oil	Palmolean oil	Distilled water
1	**Density (g/ml)**	0.9096	0.9131	0.9130	0.9130	0.9125	0.9977
2	**Surface tension (dyne/cm)**	27.413	70.195	67.732	66.681	78.273	72.8
3	**Viscosity (N/m^2)**	4.355	6.2379	5.5443	4.90515	4.5467	10.08
4	**Refractive index**	1.452	1.472	1.476	1.471	1.468	1.335

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Oils with the density of lower values are highly appreciable to consumers. The results tabulated in table show that at room temperature of 25° C. Highest and lowest values of the densities are (0.9131 g/ml) and (0.9096 g/ml) for Mustard oil and Coconut oil respectively.

This is because, the pi (π) bonds that make the bonding more rigid and rotation between C-C bond becomes more strenuous[11]. It means that the Mustard oil is denser than Coconut oil, this is because it contains higher amount of fats compared to Coconut oil.

Surface Tension

High Surface Tension of oil means less spreading of oil over the surfaces and consequently more energy loss. Surface tension of Palmolean oil (78.273dyne/cm) is highest and least for Coconut oil (27.413 dyne/cm). It is shows that Palmolean oil contains more fat as compared to Coconut oil.

Viscosity

The viscosity of edible oils is a function due to the fatty acid's composition in different oils[12]. The viscosity of Mustard oil (6.2379 N/m^2) is highest and is least for Coconut oil (4.355 N/m^2). It shows that oil sample i.e. Mustard oil contains more fat than Coconut oil.

Refractive Index

The refractive index value of Soyabean oil (1.476) is highest and the least is for Coconut oil (1.452), it is shows that oil sample of Soyabean contain more fat than Coconut oil.

CONCLUSION

The observations conclude that we should consider the physicochemical properties for selecting a good type of edible oil. The study shows that the oil with low density values and lower viscosities are ones with low free fatty acid content which are good quality of attributes of ideal edible oils.

Conflicts of interest: The authors stated that no conflicts of interest.

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