
Studies on Viscosity of Soybean Oil

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ABSTRACT

A study was carried out to determine the effect of temperature on the viscosity of soybean oil, at different temperatures (10 to 90°C). The Redwood viscosities were determined using a Redwood Viscometer, a viscometer with aperture to allow the constant flow of oil through it. The time in seconds was noted for each sample at different temperatures and the experiment was repeated. Based on the observations, it was concluded that the maximum viscosity was at 10°C as 700 RWs and the minimum was at 80°C as 10 RWs.

The viscosities data were correlated with the temperature and it was concluded that the viscosity is a function of inverse of temperature. The rate of decrease of viscosity depends upon a number of factors like the age of oil, contamination, environmental factors, storage conditions etc.

Keywords: Soybean oil. Viscosity, temperature, Red Wood Viscosity.

INTRODUCTION

Vegetable oils are derived from plants and covers about 79% of the over 100 million tonnes of edible oils and fats produced worldwide. ^[1]These oils are essential part of our food and acts as a carrier of fat soluble vitamins in human body as well as a chief source of energy and growth nutrients. ^[2-4]The oils are categorized into edible and non edible oils on the basis of consumption. The non edible oils are applied in soaps, cosmetics, and pharmaceutical industries. ^[5,6]The edible oils applied in cooking are subjected to heating and on heating their physical and chemical properties get altered. These properties are termed as thermos physical properties and would play important role in health of consumer. ^[7]Oil viscosity is a type of this and expressed as absolute viscosity or kinematic viscosity. The absolute viscosity is resistance to flow and shear due to internal friction. The kinematic viscosity is resistance to flow and shear due to gravity.

Temperature has a strong influence on the viscosity of fluids with viscosity generally decreasing with increase in temperature. Pumping, flow measurement, heat exchange, sterilization, freezing, aresome operations where viscosity time interactions are required. The chemical composition of soybean seed affected by various geographic and environmental factors. Hurburgh have been reported that soybean oil is much more variable than protein from year to-year. It has been reported that States are the most distant from the center of the Corn Belt with the greatest weather extremes experience the most variability in composition. ⁸⁻¹¹ Average composition is shown in Table 1.

The viscosity of soybean oils were measured in RWs for market samples, solvent extracted samples, and stored samples and for used samples. The data obtained from above studies were recorded for comparative analysis. The current paper deals with the viscosity of fresh market sample.



REDWOOD VISCOMETER



OIL SAMPLE

TABLE 1 : COMPOSITION OF SOYBEAN OIL

Sr.no.	Property	Content (Approx.)
1	Protein	40.7
2	Lysine	2.56
3	Methionine	0.57
4	Cysteine	0.72
5	Tryptophane	0.52
6	Threonine	1.54
7	oil	21.4
8	ash	4.56
9	carbohydrates	29.5

MATERIAL AND METHODS

The oils for analysis were purchased from local market. The oil was filtered through filter cloth to remove the suspended impurities. The common procedure followed in Redwood Viscometer experiment is as follows. The oil cup was cleaned neatly and the orifice was closed with the ball valve. The oil cup was filled with oil to the required oil level. The water bath was filled with cold water first at 10⁰ C. The ball valve was lifted after getting the required temperature using a thermometer. The oil is allowed to flow through the orifice and collected 50ml of oil in the flask. The time taken was recorded in seconds. This time is called redwood seconds. The above procedure was repeated at different temperatures and note down the time.

TABLE2: VISCOSITIES OF SOYBEAN OIL

Temperature(°C)	10	15	20	25	30	35	40	45
Viscosities(RWS)	650	640	630	620	580	490	410	360
Temperature(°C)	50	55	60	65	70	75	80	90
Viscosities(RWS)	210	100	60	30	18	12	10	---

RESULTS AND DISCUSSION

The viscosity of oil is found as maximum at 10°C as 650 RWS and it decreases gradually with increase in temperature. At about 75° C it becomes almost negligible and becomes free flowing in 10 seconds.

The above studies indicates that the viscosity is a coefficient of temperature and various factors like age of oil, heating , storage conditions etc. affects it. These data could be applied to study the thickness and density of oil for applications in various fields^[12-14]

Further the comparative analysis of different oils would serve more details about this property.

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