



Physical and chemical properties of biodiesel from fish oil

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ABSTRACT

Our study consists to measure the density and fish biodiesel viscosity depending on the temperature. This study showed that the density and fish biodiesel viscosity decreases with temperature. This allowed us to conclude that the resulting biodiesel has very similar properties to biodiesel used by the engines.

Keywords: Density, Fish biodiesel oil, Temperature, Viscosity.

INTRODUCTION

The production and the use of the biodiesel in the world have experienced a strong growth due to the environmental concerns, the uncertainty about the security of the crude oil reserves, the global surplus of oilseeds and the various subsidies and the favorable government policies consecutive to the higher prices of mineral fuels. The production of the biodiesel is an alternative production of clean fuels, biodegradable, non-toxic and renewable. It can both be used as an alternative fuel to conventional the diesel or the additive. Pure or mixed, it reduces the emissions of air toxins, CO₂, particulate matter, carbon monoxide, hydrocarbons and black smoke generated by the vehicles. This could cause disastrous changes in the environment, such as violent storms, expanding deserts and melting ice caps, which would raise sea levels and drown coastal regions. Biodiesel is produced from animal fats or waste cooking fat, combined with alcohol (usually is methanol). The transformation of these products gives pure biodiesel and crude glycerin as a final product. Biodiesel is one of the prospects for reducing greenhouse gas (GHG), established in the Kyoto Protocol [1, 2] for the development of mechanisms, the reduction of dioxin emissions and furan derived, and the persistent organic pollutants or POPs from the combustion of diesel petrochemical. Biodiesel properties mainly depend on the raw material used and the alcohol. It has a high cetane index and contains no sulfur or aromatics. Oxygen residing there can be up to 11% [3].

MATERIALS AND METHODS

2.1. Density variation

The density or the specific gravity (d) provides information about the establishment, the state of oxidation or polymerization. [4] In our study we used the chicken oil and the biodiesel made from the same oil. The density measurement is shown in Figure 1.

2.2. Viscosity variation

The kinematic viscosity (η) is a property of the oil resulting from the resistance which opposes its molecules at a force tending to move by sliding. It varies with the temperature. [4]

The results of the viscosity measurements ($\text{mm}^2 / \text{s}^{-1}$) of oil chicken and their biodiesel function of temperature are shown in Figure (3).

2.2.1. Materials :

The viscosity is measured by an Ostwald viscometer

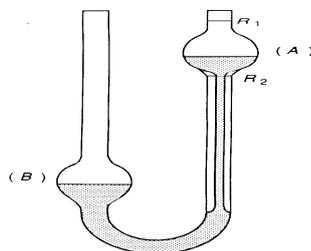


Figure 1 :The Ostwald viscometer

2.2.2 Methods

- **The measurement of the viscosity of vegetable oils:**

The flow time of a volume V of fluid is measured through a capillary tube.

The viscosity is proportional to the flow time of:

$$\nu = K \cdot \Delta t$$

The constant K of the apparatus is given by the manufacturer of the viscometer.

RESULTS

We have studied the variation of the density and the viscosity versus the fish biodiesel temperature: The results obtained are shown in figures (2) and (3) respectively.

3.1 Density variation

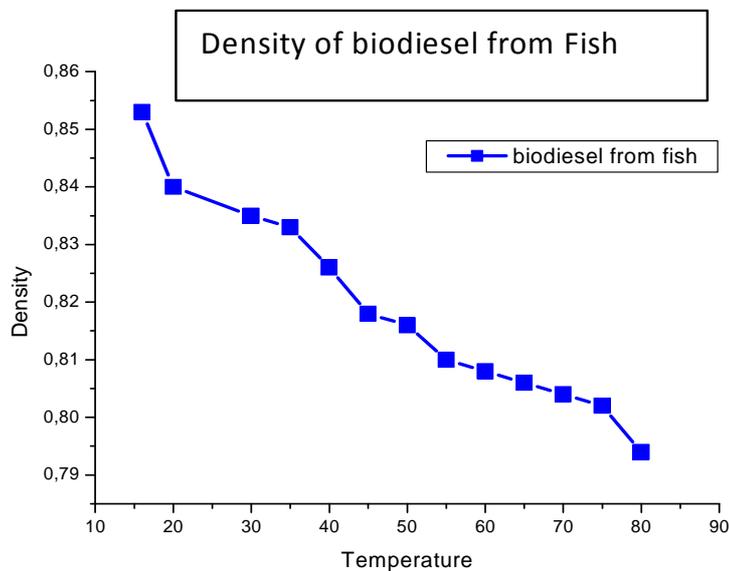


Figure 2: The variation of the density based on the biodiesel temperature of the fish oil

From the values shown schematically in Figure (2), it is observed that the density of the fish biodiesel oil is decreased with increasing temperature.

3.2 The viscosity variation

The results of the viscosity measurements (mm^2 / s) of the chicken biodiesel oil depending on the temperature are shown in Figure (3).

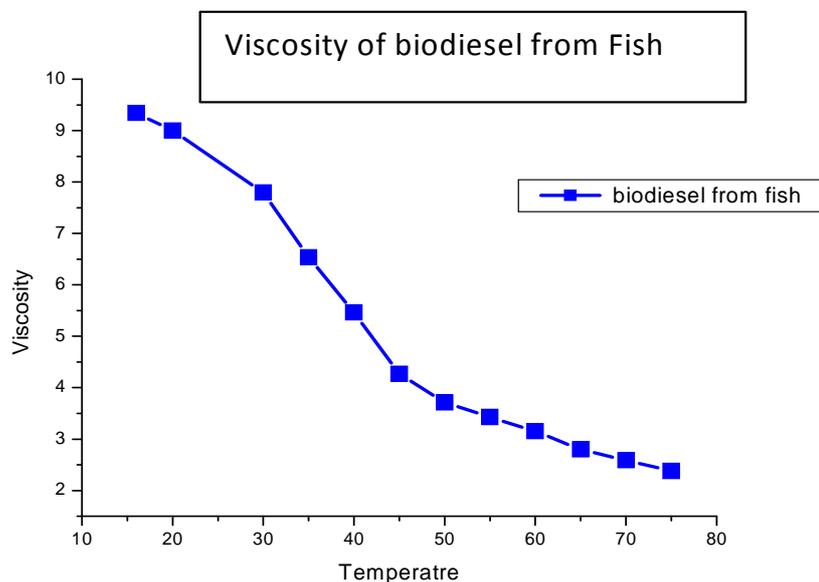


Figure3 :The measurement of the fish biodiesel oil viscosity

In Figure (3), it is noted that the viscosity decreases with increasing the temperature.

DISCUSSION

From the results obtained (variation in the density and viscosity of Biodiesel from fish oil) and what previously mentioned, we can deduce that we can perfectly use the biodiesel of the fish oil as a biofuel.

CONCLUSION

The biodiesel is an excellent diesel replacement fuel that is probably the best solution to the gas emission problems greenhouse and urban pollution

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