USING TWO STEP METHOD PRODUCTION OF BIODIESEL FROM NEEM OIL

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Abstract : Biodiesel is a fatty acid methyl ester obtained from triglycerides by methanol transesterification and has attracted significant attention as a renewable, biodegradable and non-toxic fuel during the past century. The horrible rise in the amount of cars in the last year has resulted in higher demand for petroleum products as well as higher petroleum product prices so effort is moving to research now alternative fuel to diesel, currently most biodiesel is produced from oil seeds or refined type oil using alkaline catalyst and methanol. However, big quantities of oil and fats are not edible. However, in our nation, big quantities of non-edible oil and fats are feasible. Neem oil is used as an alternative fuel for the manufacturing of biodiesel in this research. In this technique, high-free fatty acid (FFA) oil is converted by combining optimum methanol and H2SO4 acid catalyst parameters to generate biodiesel with methanol and KOH catalyst..

IndexTerms **- Neem oil, transesterification, free fatty acid, biodiesel.**

I. INTRODUCTION

The tremendous increase in the number of cars in recent years has resulted in increased demand for petroleum products. It is estimated that crude oil reserves have been depleted for a few decades, so efforts are on the way to researching alternatives to diesel[1]**.** Biodiesel has become an area of high concern due to rising petroleum product and environmental concerns about car exhaust emissions[2]. Several non-edible oil seeds such as thevetia(thevetia peruviana), karanja (pongomia pinnate), jatropha (jatropha curca), neem (azadirachta india), etc. Among these, azadirachta indica seeds containing 25% -45% dry matter oil is non-edible oil that can be used in biodiesel production[3].

Biodiesel is a family of products produced of vegetable oil or animal fats and alcohol, such as methanol or ethanol, called fatty acid mono-alkyl esters. The study indicates that biodiesel has an power content of approximately 12% lower than diesel fuel based on oil. It decreases unburned hydrocarbons (HC), carbon monoxide (CO), and increases nitrogen oxides (NOx) compared to diesel engines. It is a natural oil-derived national, renewable diesel motor fuel such as Neem oil. Biodiesel is environmentally friendly liquid in engine testing, energy and fuel consumption comparable to standard diesel fuel[3, 4].

The purpose of this current inquiry is to consider elements linked to the feasibility of biodiesel production from neem oil. The variables that have an impact on biodiesel output and features have been researched. The findings acquired were evaluated and compared to standard diesel fuels.

2. MATERIALS AND METHODOLOGY

2.1 Materials

From the local market, crude neem oil was bought. Taleco Chemicals Pvt bought the magnetic stirrer with hot pte. Tirunelveli Ltd. Chemicals are used in processes such as Pottassium hydroxide pellet (88% purity), Methanol (99% purity), Concentrated sulphuric acid and Sodium sulphate. All chemicals are bought from Himedia and Nice Chemicals Pvt Ltd and their grade of analytical reagent

2.2 Equipment

A round bottom conical flask is used as reactor for these experimental purposes. A magnetic stirrer with hot plate arrangement is used for heating the mixture in the flask. During this experiment, the temperature range of 40–60 ° C is maintained and monitored by a thermometer. The separating funnel is used to separate the methanol-water mixture after acid pretreatment and the glycerol after transesterification.

2.3 Methodology

The objective of this research is to enhance the method of biodiesel production from crude neem oil. There are three processes such as oil filtration, acid esterification and alkaline transesterification.

2.3.1 Oil filtration

Neem oil has a greater moisture content and some other impurities. Therefore, it should be refined in order to remove moisture and impurities from the neem oil.

2.4. Fourier transforms infrared spectroscopy (FTIR) analysis

Analysis of FTIR was carried out using the instrument, Perkin Elmer, model spectrum one, to detect WCO's transesterification effectiveness by identifying the active groups generated from this method.

2.5.Alkaline transesterification

After pretreatment with acid, the esterified oil is taken in a flask and heated up to 60 ~ C.1 percent of KOH is dissolved in 30 percent (6:1 M) methanol. The dissolved solution is poured into a flask. The mixture is heated and stirred for 1hr. After acid pretreatment, the esterified oil is taken in a flask and heated up to 60 ~ C.1 percent of KOH is dissolved in 30% (6:1 M) methanol. The dissolved solution is poured into a flask. The mixture is heated and stirred for 1hr.

2.6. Acid esterification

In the flask, 100 ml of refined neem oil is poured and heated up to 60 ° C. With the preheated neem water, the 45% v / v methanol is added and stirred for a few minutes. The combination adds 0.5 percent of the sulphuric acid. At atmospheric pressure, heating and stirring should proceed for about 45min. After this response, the blend is poured into a separate funnel to separate surplus alcohol, impurities and sulphuric acid. The surplus alcohol, sulfuric acid and impurities move to and from the top layer. To further process transesterified into methyl ester, the reduced layer is separated. This method decreases the refined neem oil's acid value to less than 1% of FFA.

3.EFFECT OF DIFFERENT PARAMETERS

Effect of different parameters are shown by graph according to **T. Sathya** et.ol.(2013)

3. 1 Effect of methanol-to-oil ratio

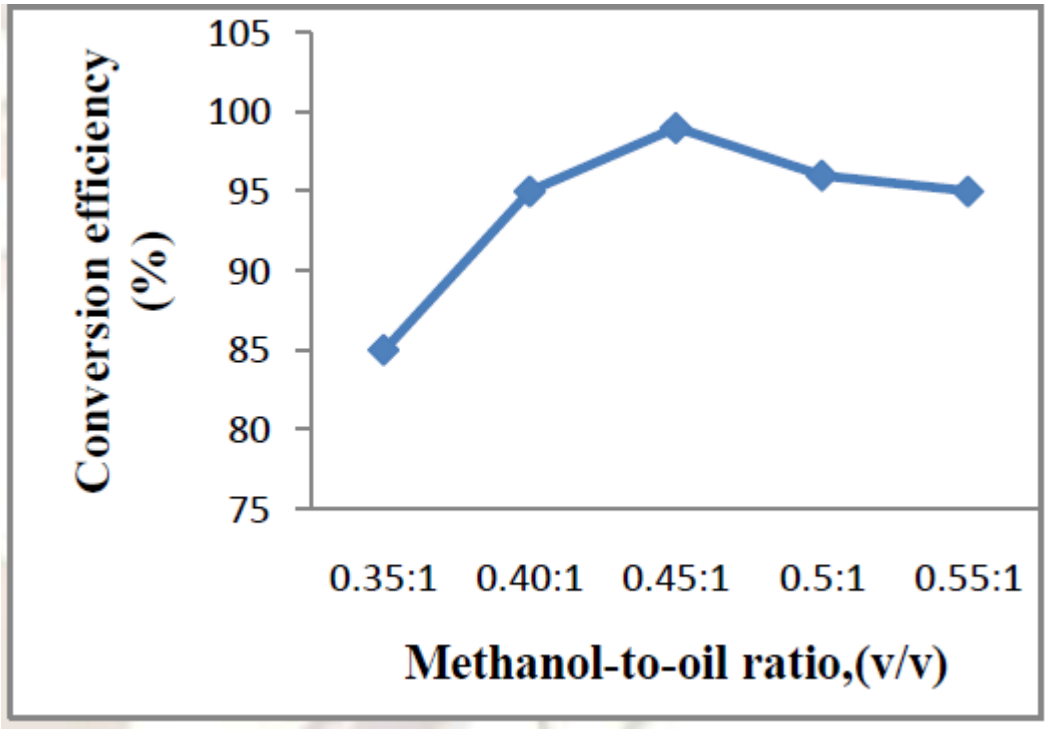
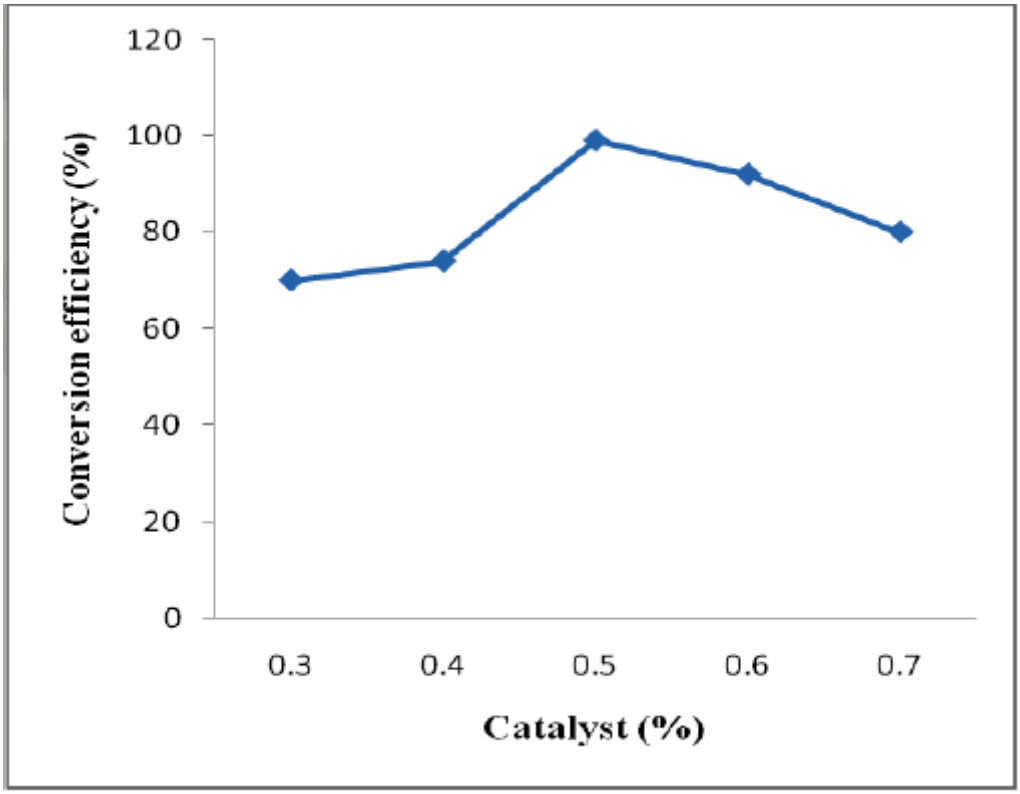


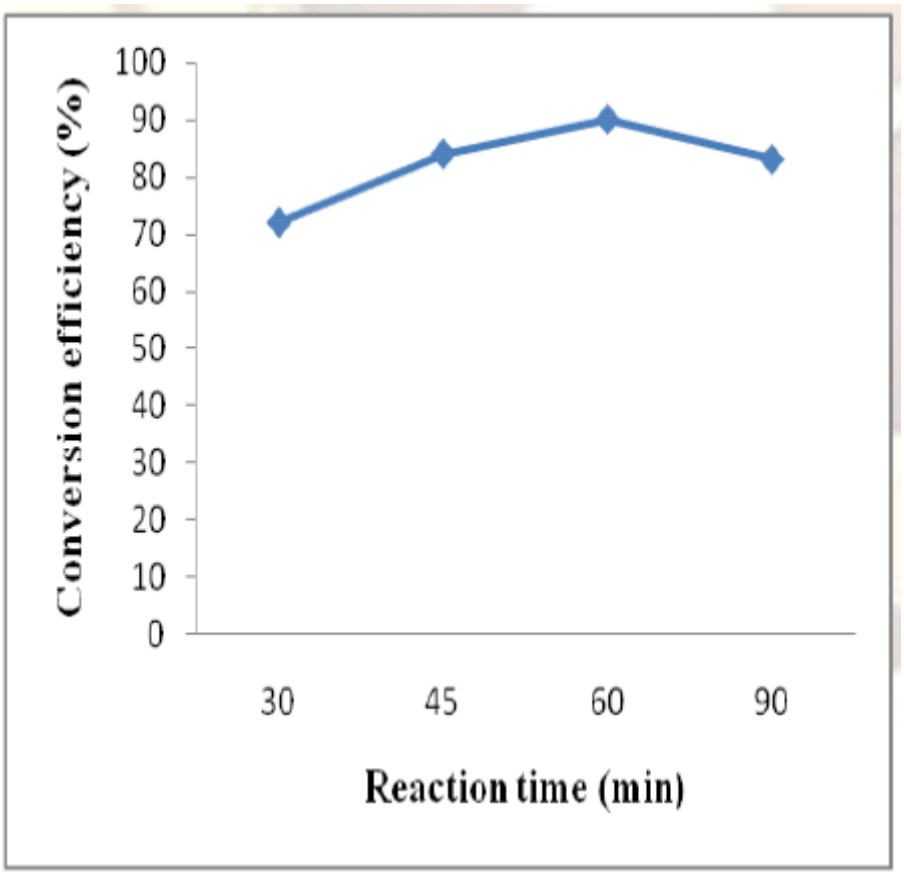
Fig (1) Effect of methanol to oil ratio

3.2 Effect of acid catalyst amount



Fig(2) Effect of acid catalyst amount

3.3 Effect of reaction time



Fig(3) Effect of reaction time

4. CONCLUSION

The surplus alcohol, sulphuric acid and impurities move to and from the top layer. The reduced layer is separated for further processing of transesterified into methyl ester, which decreases the acid value of refined neem oil to less than 1% of FFA. So by this study we conclude that two step method production of biodiesel is best idea for improve the kinematic viscosity ,conversion efficiency ,cetane number and oxidation stability.Hence by this stydy we can say that two step method production of biodiesel is better than one step method of biodiesel production.

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