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A Review Paper on use of Moha Bio-Diesel and its Blends in CI Engine

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Abstract: Nowadays pollution is increasing rapidly due to vehicular emissions of gases. To reduce this problem an alternative fuel was invented called Biodiesel, "Biodiesel is produced from plants (i.e. Moha, Jatropha, Karanja) and animals fat (i.e. chicken fat, meat). The Research works carried out in this area focus on improving efficiencies and limiting emission levels.

I. INTRODUCTION

The mineral diesel is the prime liquid fuel, being used in different sectors like transportation, power, agriculture etc. The transport sector plays an important role in the economic development of a country and alone consumes more than 70% of the total diesel consumption. , biodiesel is mainly produced from edible sources like soybean in USA, rapeseed, and sunflower in Europe, palm in Malaysia and coconut in the Philippines. But in a country like India where the demand for edible oil is higher as compared to other countries because of higher population, the biodiesel from edible oil sources is not viable. As per biodiesel policy of India, there is a target to blend 10% biodiesel with mineral diesel by 2017 and Bureau of Indian Standards (BIS) has established the standard IS-15607 for B100. India is rich in forest reserves and a source of non-edible oil trees like Karanja, Mahua, Neem, Moringa, Croton, Karabi, Sea Mango, Kusum, Sal is available in abundance. Most of the seeds go waste in the forest. These forest origin plants do not require any care but simultaneously provide a good source of income to tribal people by collecting seeds for oil production. The availability of some forest-origin non-edible oilseeds in India per annum are given by Karanja-55 Kiloton, Mahua-180 Kiloton, Neem-100 Kiloton, Kusum-25 Kiloton and Sal-180 Kiloton Among these, mahua seed is one of the promising feedstock of biodiesel.Biodiesel is a mixture of a mono-alkyl ester of long chain fatty acids obtained from vegetable oil or animal fat through transesterification process.

II. HISTORY OF BIODIESEL

Developed in the 1890s by inventor Rudolph Diesel, the diesel engine has become the engine
of choice for power, reliability, and high fuel economy, worldwide. Early experimenters on vegetable oil fuels included the French government and Dr. Diesel himself, who envisioned that pure vegetable oils could power early diesel engines for agriculture in remote areas of the world, where petroleum was not available at the time. Modern biodiesel fuel, which is made by converting vegetable oils into compounds called fatty acid methyl esters, has its roots in research conducted in the 1930s in Belgium, but today's biodiesel industry was not established in Europe until the late 1980s.

A. Preparation of moha biodiesel:

1) In this present study, crude moha oil has been procured from sakoli (India) field and processed to produce moha biodiesel.
2) For esterification of crude Moha oil, 1 liter of Moha oil is taken in a beaker and is a filter.
3) Then filtrated oil is neutralized with HCl. It is further filtrated to remove unwanted impurities.
4) The oil contains some amount of moisture content to remove it oil is heated up to 1100C for 2hrs.
5) For the esterification of oil, we have added 0.5% H2SO4 solution and 10% CH3OH solution and heated up to 400C.
6) The solution is continuously stirring(600rpm) below 60C for 80min and readings are taken in the interval of 2minutes.
7) After esterification solution is kept stable for 24hrs.
8) Biodiesel was prepared by transesterification method. The oil was heated to a temperature of 60 °C and methanol (0.35 v/v) and catalyst sodium hydroxide (NaOH) (0.7% v/v) were added to it Then the mixture was stirred vigorously and kept for 48 h. After transesterification, the total mixture was separated into two layers. The upper layer was methyl ester and the lower layer was glycerol.
9) The upper layer (methyl ester) was separated then warm water about 10% of the methyl ester was added to remove the catalyst present in the ester. The mixture was allowed to settle down for another 48 h.

10) The physio-chemical properties of mahua oil and its biodiesel like density, kinematic viscosity, flash point, cloud point, pour point, cold filter plugging point was measured as per ASTM-6741 standard.
11) We can not use 100% biodiesel directly as a fuel, therefore, we have blended it with diesel with various composition ratios.

B. Effects of biodiesel on c.i. Engine :
1) Performance Analysis
a) Performance properties are slightly lesser for biodiesel compared to diesel. Accordingly, they improve injection process and ensure better atomization of the fuel in the combustion chamber.
b) Biodiesel can be blended in any ratio for better performance and the increased lubricity makes for a better running of vehicles.
c) Results of the experiments in the form of brake power, brake thermal efficiency, specific fuel consumption for different load conditions for various blends of Moha methyl esters are compared with the petroleum diesel in the form of graphs.
2) Emission analysis
a) Emission characteristics are improved for biodiesel compared to conventional diesel except for oxides of nitrogen, which is slightly higher than diesel.
b) Basically, the engine just runs like normal except for the odor. Trasesterified vegetable oils have lower viscosities than the parent oils (Mehar et al., 2004).
c) Biodiesel can be blended in any ratio for reduced emissions and the increased lubricity makes for a better running of the vehicle (Sharma and Singh, 2008).
d) Results of the experiments in the form of carbon monoxide (CO), Nitrogen oxides (NOx) and Smoke density for different load conditions for various blends of jatropha methyl esters is compared with the petroleum diesel in the form of graphs.

C. By using biodiesel the following parameter can be improved:
1) BTE slightly decreases
2) SFC slightly increases
3) HC reduces
4) CO reduces
5) NOx increases
6) CO2 increases

III. CONCLUSION

This review works shows that in recent years, biodiesel has been in focus as a part replacement component of petroleum diesel and the following parameters can be improved BTE slightly decreases, SFC slightly increases, HC reduces, CO reduces, NOx increases, CO2 increases.

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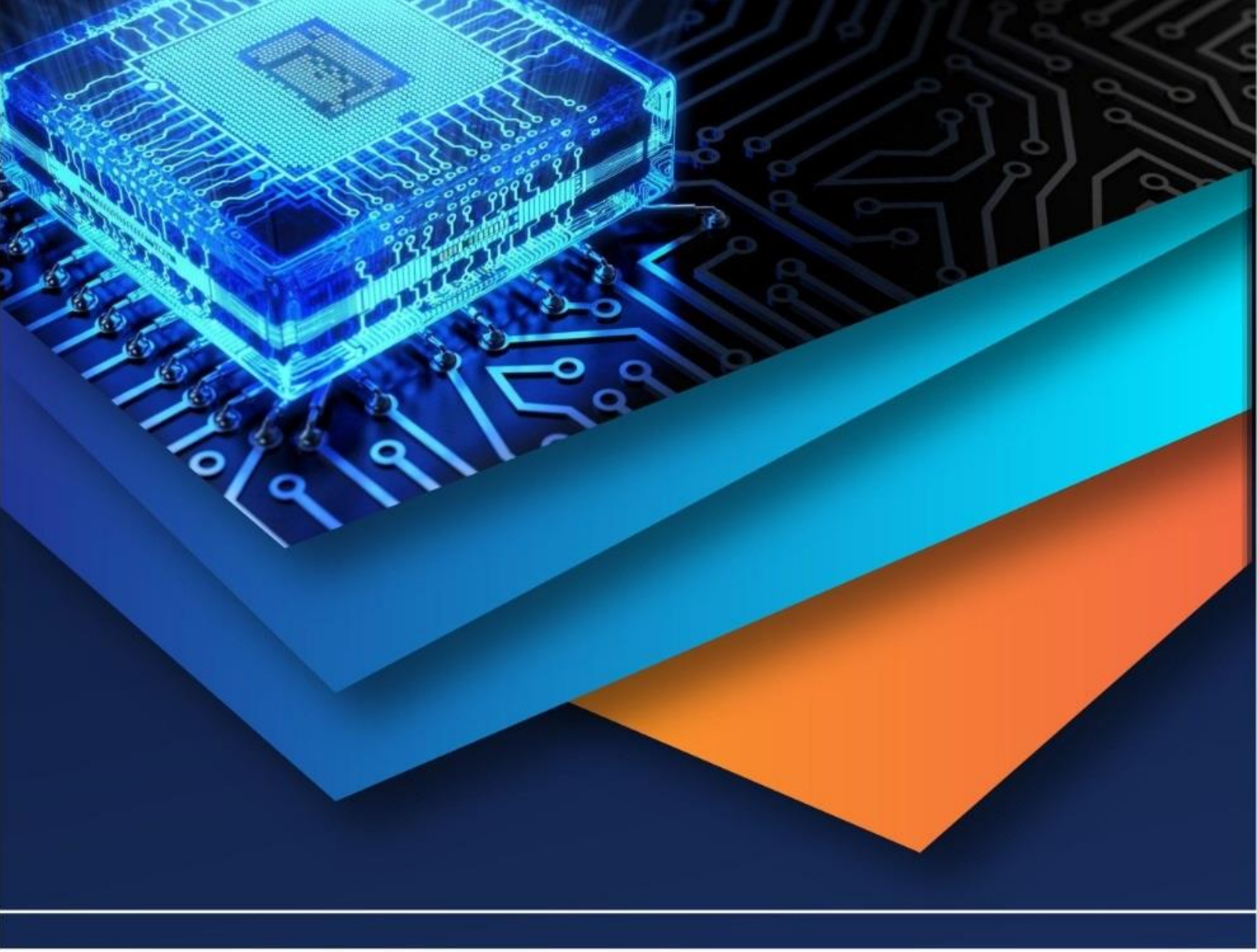

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