

Performance Characteristics of Neem Bio Fuel Blends with Kerosene Using Domestic Kerosene Stove

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ABSTRACT: Biodiesel is one of the most popular fields and it reached good height in automobile sector [1]. Biodiesel made huge changes in domestic applications. It has huge changes in fuel economy. One of the best options is replacement of kerosene to biodiesel. In India, in cooking stove kerosene is used as fuel. Kerosene causes environmental degradation. Because of it contains impurities like sulphur, aromatics and hydro carbons. This paper contain burning pressure stove using Neem bio diesel without changes in design of kerosene cooking stove. This paper contains comparison of blends of bio fuel with kerosene. B20, B40, B60, B80, B100 and kerosene. This experiment is done on stove without any modification in design.

KEYWORDS: cooking stove, kerosene, neem biodiesel.

I. INTRODUCTION

Biodiesel is one of the spreading revolutions in case of fuel replacement in automobile sector. Many researches are going on for using biodiesel [2]. The biodiesel is also playing most important role in rural thermal applications. In India most of the peoples are die as a result of emission from cooking fuels, like kerosene, LPG etc. [3]. Therefore this Paper is mainly concentrating on replacing kerosene to Neem biodiesel in rural for thermal application. By comparing Neem biodiesel and kerosene properties .The performance test on kerosene stove by using biodiesel was conducted using without any modification in the kerosene stove.

1.1 BIODIESEL

Biodiesel is a renewable fuel, bio degradable, non-toxic. This fuel is made from vegetable oil. It has high lubricity; it is clean burning fuel and can be fuel component for existing and unmodified diesel engine. Bio diesel is methyl ester or ethyl ester of fatty acid derived from range of organic source of oil.

Biodiesel is one of renewable resources. It can be used in the internal combustion engines without any modifications and this bio diesel not contains any petroleum products but its petroleum products can be blended with bio diesel in any form. Bio diesel is one of several alternative fuels designed to get usefulness of petroleum products and longevity and cleanliness of diesel engine.

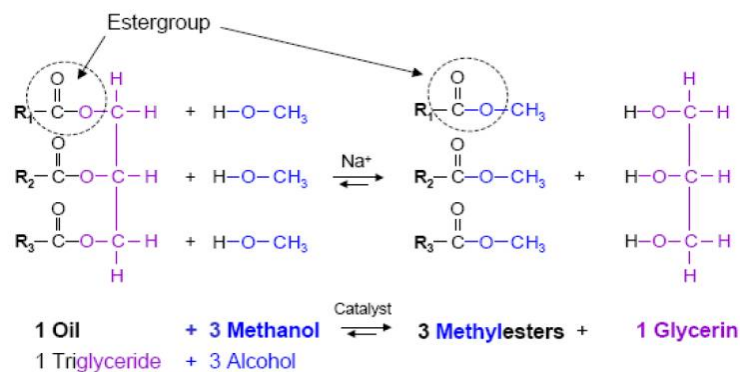
1.2 AZADIRACHTA INDICA



Figure 1.2 Neem seeds

Azadirachta indica, commonly known as neem, nintree or Indian lilac is a tree in the mahogany family Meliaceae. It is one of two species in the genus *Azadirachta*, and is native to the Indian subcontinent, i.e. India, Nepal, Pakistan, Bangladesh, and Sri Lanka. It is typically grown in tropical and semi tropical regions. Neem trees also grow in islands located in the southern part of Iran. Its fruits and seeds are the source of Neem oil.

1.3 Transesterification: Esterification is the change of a non-ester into an ester. Transesterification is the change of one ester into another i.e. a glycerin bio-diesel interested in an alkyl bio-diesel in the folder of bio- diesel where methanol replaces the glycerin. Biodiesel has lesser viscosity than raw oil because the transesterification process shortens the carbon length of the fatty acid molecule in the oil transesterification converts the triple chain triglyceride oil particle to three solo chain bio-diesel particle so the chain length of fatty acids remain the same. The fatty acids composition of the bio-diesel depends on the feed stock and is changed by esterification. Transesterification process changes tri-glyceride esters into alkyl esters by means of a catalyst and an alcohol reagent. Transesterification the tri-glyceride particle is broken down into three separates methyl esters molecules plus glycerin as a byproduct. Tri-glyceride is biodiesel; biodiesels are acids such as fatty acids united with an alcohol and glycerin is a heavy alcohol. The catalyst break the attachment in the fatty acid chain to the glycerin, fatty acid chain then bond with the methanol. Transesterification process happens in three stages. First stage fatty acid chain is broken down the triglyceride fragment and bond with methanol to form a biodiesel fragment, send-off a di-glyceride segment. After the fatty acid chain has busted down then di-glyceride fragment and bond with methanol to form another biodiesel fragment, leaving a monoglycerides molecule. Finally the mono-glyceride is changed to bio-diesel. The chemical reaction is given below.



Comparison of fuel properties

Properties	Neem Biodiesel	Kerosene
Density(Kg/m ³)	910	780
Flash point (°C)	175	45
Fire point(°C)	185	55
Calorific value(MJ/kg)	41.7	43
Viscosity (cSt)	4.5	1.12
Specific gravity	0.87	0.78
HC	20	32
CO	0.07	0.86
CO ₂	5.6	6.3
NO _x	832	651

Table 1.1 fuel properties

II. EXPERIMENTAL SETUP

The experimental work is shown in figure below. The domestic stove consists of burner, hand pump, fuel tank, oil knob and air screw. The burner is the part of stove that burns kerosene and produces flame. Pump is a device used to increase the pressure on the fuel. Air release screw is used to increase the pressure by tighten it during the pumping, as it the fuel enters the burner and the fuel sprinkles on the burner then the air release screw is released and the fire is ignited. The stove starts to burn and the air release screw is tightened for continuous burning.



Figure 2.1 experimental setup



Figure 2.2 burning of Biodiesel in stove

Technical specification of stove

Manufacture	MVS enterprises
Stove type	Capillary feed
Weight of stove	2 kg
Fuel tank capacity	One litre
Thermal efficiency	60%
Design of fuel	Kerosene

III. EXPERIMENTS AND METHDOLOGY

Firstly, from the Kerosene it is made to boil the water from 0°C to 100°C and the time taken for the boiling of water from 0°C to 100°C is noted down. The same procedure is continued for all other biodiesel blends like B20, B40, B60, B80 and B100. The time taken for boiling of water for all the fuel samples is recorded.

Fuel Sample used	Time taken (0 °C to 100°C)
Kerosene	5min
B20	5.5min
B40	6min
B60	6.5min
B80	7min
B100	7.5min

Table 3.1 Comparison of performance analysis of kerosene and neem biodiesel blends.

3.1 RESULTS AND DISCUSSION

The performance analysis on the kerosene pressure stove of kerosene, B20, B40, B60, B80 and B100. The B20 time values are nearer to the kerosene value. Hence the biodiesel can be used for the burning of kerosene pressure stove with the blends of kerosene.

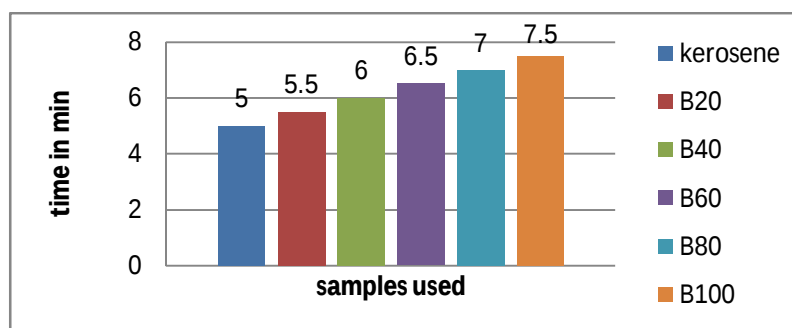


Figure 3.1 Representation of variation of Time for samples used

IV. CONCLUSION

The main aim of this experimental work was to study the effect of using various blends of Bio-fuel and kerosene on performance of normal Kerosene stove. The blends tested where 20%, 40%, 60%, 80%and 100%.Bio-Diesel In kerosene and it can successfully use as Alternative fuel in normal kerosene stove.

The values of thermal efficiency and fuel consumption rate for Bio-Diesel blended fuel where found to be comparable with reference fuel

1. Neem oil can be successfully converted into methyl ester by using transesterification process.
2. Transesterification process reduces the viscosity of the Neem oil and it improves the properties like viscosity, flash point, fire point of the Neem methyl ester.
3. The properties of B20 sample are closer to the diesel properties and hence it gives better performance.
4. Smooth burning of stove is observed with esterifies Neem oil compared with that of diesel.
5. The B20 Bio fuel blends with kerosene is nearer to the diesel value.
6. The Neem bio fuel blends used in the automobiles, but it also can be used domestic purpose.

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