EVALUATION OF ENGINE PERFORMANCE BY USING SESAME OIL, DEE AND ITS BLEND WITH DIESEL ON FOUR STROK FOUR CYLINDER DI DIESEL ENGINE.

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ABSTRACT: Producing and using renewable fuels for transportation is one approach for sustainable energy future for the India, as well as the rest of the world. Renewable fuels may also substantially reduce contribution to global climate change. There are various techniques and methods are used to solve the problems resulting from high viscosity. One of the techniques is fuel blending. Also day by day the fuel consumption increased as well as the luxuries life style and population also increased. In this study blend of Diesel, Sesame oil and Diethyl ether at various proportion is used as a fuel in a direct injection diesel engine. Hence, it is seen that blend of sesame oil, diethyl ether and diesel fuel can be used as an alternative fuel successfully in diesel engine without any modification. Also by using this blend the fuel consumption is reduced at a full load condition also thermal efficiency increased as a compared to the diesel fuel. The fuel consumption of blend D69S25DEE6 is less as compared to the diesel fuel. It is concluded that it is possible to use Sesame oil in diesel engines as an alternate fuel in the future.

Keywords—Sesame oil, DEE, diesel, blended fuel, diesel engine

Introduction

Recently, the use of diesel engine has increased by virtue of their low fuel consumption and high efficiencies. Now-a-days, Diesel engines are used transportation, electric power generation, farming, construction and in many industrial activities.[1] Vegetable oils are alternatives fuels and many researches are carried out on development of these fuel. Now-a-days, vegetable oils are alternative fuels to those derived from petroleum oils and can be used instead of ordinary diesel fuel as fuel in diesel engine.[3] Here to determine diethyl ether (DEE) for use as a transportation fuel, it is necessary to understand its engine performance characteristics, as well as what it might cost.[4] Although DEE has long been known as a cold-start for engine, knowledge about using DEE for other applications, such as significant component of blend, or as a complete replacement for diesel fuel, is limited. To evaluate the potential of DEE as a transportation fuel, we conducted a literature survey. The main problem of using neat vegetable oils as fuel in diesel engine is related to their high viscosity.[2] The high viscosity leads to the following problems in diesel engine: the blockage of fuel lines and filters, poor atomization of fuel, incomplete combustion, severe engine deposits, injector coking with trumpet formation and piston ring sticking, gum formation and thickening of the lubricating oil. To solve these problems caused by the very high viscosity of neat vegetable oils, the following usual method are adopted blending in small blend ratio with normal diesel fuel. [5]

2. PROPERTY TABLE:

<table>
<thead>
<tr>
<th>Property</th>
<th>Diesel</th>
<th>Sesame oil</th>
<th>DEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating value(KJ/Kg)</td>
<td>42900</td>
<td>39349</td>
<td>33900</td>
</tr>
<tr>
<td>Viscosity(mm²/s) at 4°C</td>
<td>4.3(at 27)</td>
<td>35.5 (at 38°C)</td>
<td>0.23</td>
</tr>
<tr>
<td>Density (kg/l)</td>
<td>0.815</td>
<td>0.913</td>
<td>0.71</td>
</tr>
<tr>
<td>Cetane number</td>
<td>47</td>
<td>40.2</td>
<td>&gt;125</td>
</tr>
<tr>
<td>Flash point</td>
<td>58</td>
<td>260</td>
<td>-45C</td>
</tr>
<tr>
<td>Sulfar</td>
<td>&lt;0.01</td>
<td>0.01</td>
<td>---</td>
</tr>
<tr>
<td>Carbon residue(%) by weight</td>
<td>&lt;0.35</td>
<td>0.25</td>
<td>----</td>
</tr>
</tbody>
</table>

3. EXPERIMENTAL SETUP

3.1 Engine setup

The schematic layout of the experimental setup is shown in Fig. 1, and the specifications of the engine are shown in Table 2. The test engine used was a four cylinder, water cooled, direct injection stationary diesel engine. A Rope brake dynamometer was used to provide the engine load. A chromel alumel thermocouple, in conjunction with a digital
temperature indicator, was used to measure the exhaust gas temperature. An air box and inlet manifold were fitted to the engine, and an air flow meter was used for airflow measurement. The fuel was passed from the fuel tank to the engine via the fuel injection pump and the fuel injector, and the fuel flow was measured on volumetric basis using a burette and a stopwatch. Initially, experiments were carried out using base diesel fuel. All the experiments were conducted at the rated engine speed of 2500 rpm.

4. RESULTS:

4.1 Fuel consumption:

Fig.2 Shows the variation of fuel consumption with break power at various blend proportion in the diesel. From the above graph it show that at full load condition the fuel consumption is increased. since from the graph it is concluded that the the fuel consumption of diesel fuel is more as compared to the blend D69S25DEE6.

4.2 Specific Fuel Consumption:

Shows the variation of specific fuel consumption with break power at various blend proportion in the diesel. The graph shows that the SFC of diesel fuel is more as compared to the all other blend. The blend D69S25DEE6 SFC is minimum for the entire blend.

4.3 Brake thermal efficiency:

In this experiments we use the diesel engine and it is connected with the rope break dynamometer with the help of dynamometer, varies the load on the engine or load remain constant. The reading takes by constant load or by varying the load on the engine using the dynamometer. Engine performance such as break power, indicated power, break specific fuel consumption etc find from the experiments. First only diesel fuel is used and engine performance is find. Then the blending of diesel and sesame oil and DEE at different proportion concentration in the diesel fuel takes and find the engine performance, since this practical was performed on four cylinder four stroke diesel engine without modification in the diesel engine.
This blend can directly used in the four cylinder 4-stroke diesel engine without modification of the engine.

It is also concluded that the diesel fuel indicated thermal efficiency as well as the brake thermal efficiency is lower as compared to the other blend.

**Reference:**

1. Prof.Nilamkumar S. Patel et al., Performance characterization of single cylinder diesel engine fuelled with Sesame oil - diesel and its blend with Ethanol.
2. Ismet Sezer, Performance and emission investigation of a diesel engine running on die methyl ether and diethyl ether.
5. Z.H.Huang, Y.Ren, D.M. Jiang, L.X.liu, Combustion and emission characteristics of compressions ignition engine fullled with diesel – dimethoxy methane blends.

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