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Emission Characteristics of Variable Injection Pressure Engine with Pungai Oil and Methanol as additive

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Abstract - Biodiesel is a well recognized choice for diesel and has an benefit over the later because of it is renewable, biodegradable, sulphur free and non-less poisonous in nature, better lubricity and can considerably reduce exhaust emissions from the engine. This study investigates the use of ethanol as an additive with 20% pungai oil diesel blend (B20). The transesterification process is used to reduce the viscosity of the pungai oil. The main aim of this paper is to examine the emission parameters of variable injection pressure diesel engine runes with pungai oil 20% (B20) and ethanol as a additive by adding 5% and 10% at steady speed of 1500 rpm with variable loads and changeable injection pressure (180,210&240). The outcomes of these blends are to be compared with normal diesel. The fitness of pungai oil with ethanol is established as a bio fuel in this study. The impact of pressure injection on exhaust gas emissions has been investigated and offered. The exhaust emissions Hydrocarbons, Carbon monoxide and carbon dioxide are are almost reduced compared to diesel.

Key Words: Transesterification, Injection pressure, Pungai oil, Ethanol.

Introduction

Biodiesel refers to a vegetable oil- or animal fat-based diesel fuel consisting of long-chain alkyl (methyl, ethyl, or propyl) esters. Biodiesel is typically made by chemically reacting lipids (e.g., vegetable oil, soybean oil, animal oil fat with an alcohol. Biodiesel is meant to be used in standard diesel engines and is thus distinct from the vegetable and waste oils used to fuel converted diesel engines.

Biodiesel can be used alone, or blended with petro diesel in any proportions. Biodiesel blends can also be used be used as heating oil.

The use of biodiesel resulted in lower emissions of unburned hydrocarbons, carbon monoxide and particular matter. Biodiesel also increased catalytic converter efficiency in reducing particulate emissions. Chemical characterizations also revealed lower levels of some toxic and reactive hydrocarbon species when biodiesel fuels were used.

The fuel consumption in the world particularly in developing countries has been growing at alarming rate. Petroleum prices approaching record highs and they will deplete within few decades, it is clear that more can be done to utilize domestic non-edible oils while enhancing our energy security. The economic benefits include support to the agriculture sector, tremendous employment opportunities in plantation and processing.

I. MATERIAL AND METHODS

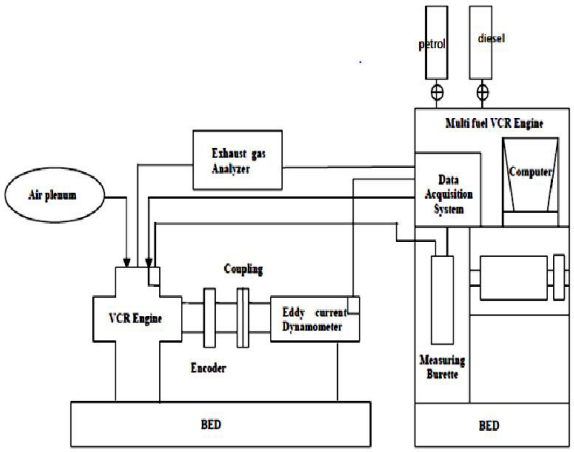
A. Experimental Test and Instrumentation

TABLE I. Technical Specification of VCR engine

Make	Kirloskar
General details	4- Stroke, water cooled, variable compression ratio Engine
Rated power	3.5Kw at 1500rpm
Speed	1500 rpm (constant)
No of cylinder	Single cylinder
Compression ratio	12:1 to 18:1
Bore	87.5 mm
Stroke	110 mm
Ignition	Compression ignition

II. THEORY

A. Experimental Setup



B. Preparation of Biodiesel Blends

Biodiesel blend is nothing but mixing of pungai oil or bio diesel with standard diesel at some amount of percentage. Now in this experiment we are using biodiesel blend called B20 (20% of biodiesel and 80% of standard diesel) is used to run the engine. Then methanol (additive) is added. Methanol is added with biodiesel blend (B20) in the percentage of 5%, 10%. The various blend proportions are Diesel, B20D80M0, B20D80M5, B20D80M10.

Table 2: Fuel Nomenclature

B20D80	20% Biodiesel + 80% Diesel
B20D80M5	20% Biodiesel + 80% Diesel + 5%Methanol
B20D80M10	20% Biodiesel + 80% Diesel + 10%Methanol

III. RESULTS AND DISCUSSIONS

A. Experimental Results

The Carbon monoxide emission values for Diesel, B20D80, B20D80M5, B20D80M10 are evaluated with help of various loads like 0%, 25%, 50%, 75% and 100%. The result concluded from this Fig.2 is carbon monoxide decreases 5% with help of increase in loads when B20D80M5 is used as a bio fuel.

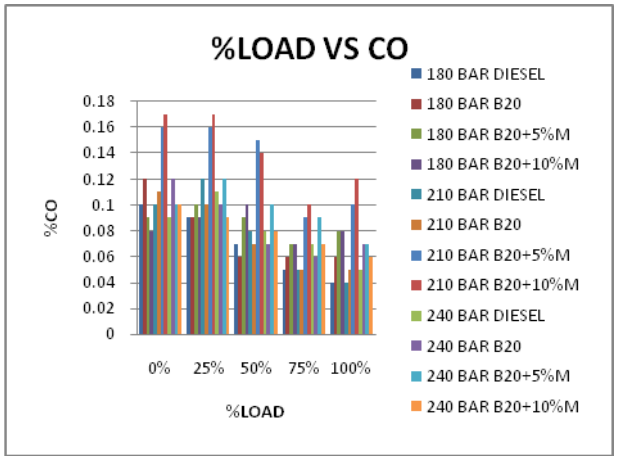


Fig.2: Variation of CO with load

The Hydro carbon emission values for Diesel, B20D80, B20D80M5, B20D80M10 are evaluated with help of various loads like 0%, 25%, 50%, 75% and 100%. The result concluded from this Fig.3 is hydro-carbon decreases3% with help of increase in loads when B20D80M5 is used as a biofuel in the engine.

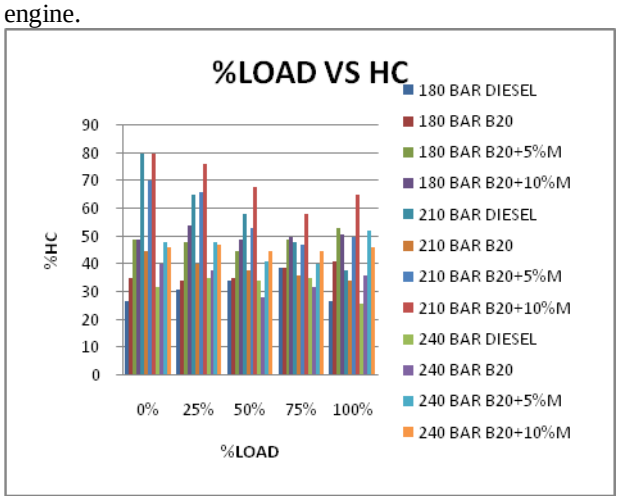


Fig.3: Variation of HC with load

The NOX emission values for Diesel, B20D80, B20D80M5, B20D80M10 are evaluated with help of various loads like 0%, 25%, 50%, 75%and 100%. The result concluded from this fig.5 is nitrous oxide decreases with 3% with help of increase in loads when the blend B20D80M5 in pressure engine.

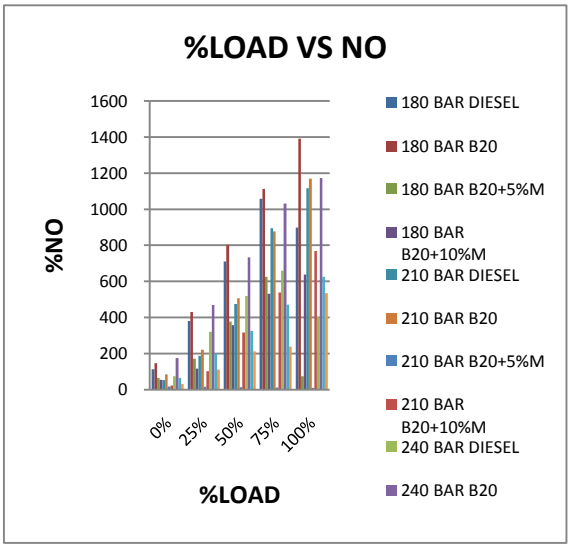


Fig.4. Variation of NO_x with load

The CO_2 emission values for diesel, B20D80, B20D80M5, B20D80M10 are evaluated with help of various loads like 0%, 25%, 50%, 75%, 100%. The result concluded from this fig.5 is carbon dioxide decreases with 3% with help of increase in loads when the blend B20D80M5 in pressure engine.

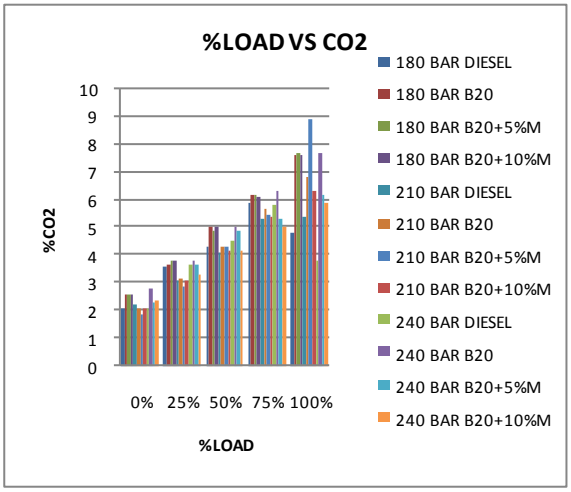


Fig.5: variation of co_2 with load

The O_2 emission values for Diesel, B20D80, B20D80M5, B20D80M10 are evaluated with help of various loads like 0%,25% ,50%, 75%and 100%. The result concluded from this fig.5 is oxygen increases with 3% with help of increase in loads when the blend B20D80M5 in pressure engine.

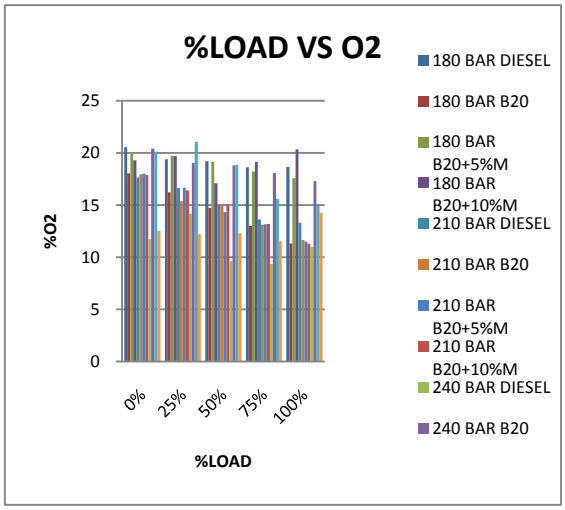


Fig.6. variation of o_2 with loads.

The O_2 emission values for Diesel, B20D80, B20D80M5, B20D80M10 are evaluated with help of various loads like 0%,25% ,50%, 75%and 100%. The result concluded from this fig.5 is oxygen increases with 3% with help of increase in loads when the blend B20D80M5 in pressure engine.

IV. CONCLUSIONS

The performance and emission characteristics of a variable compression ratio engine fueled with Biodiesel blends have been investigated and compared with the standard diesel. The following conclusions are drawn from this investigation Carbon - monoxide emissions decreases 5% when the blend B20D80M5 is used as a fuel invariable Injection pressure engine with varying loads.

Hydrocarbon emissions decrease 3% when the blend B20D80M5 is used as a fuel in variable Injection engine with varying loads. Nitrous oxide decreases with 3% with help of increase in loads when the blend B20D80M5 in pressure engine. Carbon dioxide decreases with 3% with help of increase in loads when the blend B20D80M5 in pressure engine.

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