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Experimental Investigations & Performance of Emission Characteristics Ondi Av1 553 Diesel Engine Fuelled with Biodiesel

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ABSTRACT: In present work, the mixes of biodiesel and ethanol are attempted. Overall, there are exceptionally restricted away at this, and no solid proposal is discovered with respect to mix creation.Henceforth it is chosen to attempt diverse extents and discover ideal mix. From this examination, it is distinguished that 75% Bio-diesel and 25% Ethanol is ideal. Encourage the added substances, which areattempted with Diesel and Ethanol mixes are additionally attempted with Biodiesel and Ethanol mixes. Inthis case, additionally 2% THF added substance is observed to be the best-added substance in termsenhancing engines productivity and diminish emanations. Finally, minor alterations on the enginelike fluctuating the Pressure proportion, Injection weight and Injection timing are tried. The exploratoryoutcomes could yield streamlined an incentive for these motor outline parameters which are observed tobe CR-18.5,IP 240bar and IT 29^0TDC for this test engine. The preheating of fuel moreover attemptedand 500 is giving better execution. The last outcome yielded percentage of change in the execution of the engineregarding Thermal efficiency/BSFC the present examination is relied upon to be valuable for what's tocome advancement of a feasible IC Engine fuelled with mixes of Ethanol and biodiesel.

I. INTRODUCTION

Energy is one of the most significant inputs for growth of all sectors including agricultural, industrial services and transport sectors. Energy has been at the centre stage of national & global economic development since several decades. The demand for energy, around the world is increasing exponentially, specifically the demand for petroleum-based energy. Petroleum derived fuels, actually, exceeds the demand of any other fuels or energy resources. The world consumption for petroleum and other liquid fuel will grow from 85million barrels/day in 2006 to 107 million barrels/day in 2030. Under these growth assumptions, approximately half of the world's total resources would be exhausted by 2030. In addition, as per many studies, the world oil production would peak sometime between 2007 and 2030. Global warming is related with the greenhouse gases, which are mostly emitted from the combustion of petroleum fuels. In order to control the emissions of greenhouse gases, Kyoto Protocol targets to reduce the green house gas emission by a collective average of 5% below 1990 level of respective countries. The Intergovernmental Panel on Climate Change (IPCC) concludes in the Climate Change 2007 that, because of global warming effect the global surface temperatures are likely to increase by 1.1°C to 6.4°C between 1990 and 2100 NOx emissions are over the diesel. Siva Kumar A et al. (2009) investigated the performance check on a diesel engine with neat diesel fuel and Cottonseed biodiesel mixtures. The engine experimental results showed that exhaust emissions like carbon monoxide (CO), particular matter (PM) and smoke emissions were reduced for all biodiesel mixtures. However, a small increase in Nitrogen oxides (NOx) emission was found for biodiesel mixtures.sudhakar Al(2001) has conducted investigations to search out the suitability of Rape seed oil in compression ignition engine. Investigations are conducted with 25%, 50% and 75% of Rapeseed oil in an exceedingly mix of Rape seed oil and diesel. From the experimental results,it is found that the mix with 25% of Rape seed oil is showing higher performance. Qiu et al. (2001) conducted the behavior of the pure diesel and nano diesel (combination of diesel and nano particles) determine that a concentration of nickel nano particles between 0.2 and 0.5 give the best anti-wear behaviour and friction reduction.V. Arul MozhiSelvan et al. (2009) has conducted the performance and emission characteristics of compression ignition engine.

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II. EXPERIMENTAL SETUP

The experimental is conducted to find the phase separation phenomena of the bio-diesel ethanol blends. In these experimental use cerium oxide nano particles in diesel ethanol blend and pure diesel has the tendency to set down at the fuel tank. Used in the tests cerium oxide nano particle with the size of 32nm and ethanol (99.9%). After series of experiments, it is find that the blends subjected to high speed mixing followed by ultrasonic bath stabilization improves the state of being stable. The separation between ethanol and diesel. The biodiesel is produced using the Transesterification process. all the blends fluids for phase separation is taken for half an hour and murkiness procedure is used to assess the state of being stable of the resulting suspension. The experimental procedure and experimental facility is descused by MozhiSelvan et al., (Arul MozhiSelvan, 2009; Arul MozhiSelvan, 2008). The engine load connected to the dynamometer. The fuel flow is measured a burette with two infrared optical sensor, airflow rate is measured to air flow sensor. The inlet and exhaust gas temperature is measured by K type thermocouples sensor the gas analyzer is used to measure the exhaust gas constituents such as Nox, CO, HC and the smoke meter is used for measure the smoke. Steady state condition recorded for all result conditions.

Fig.1: Experimental Setup (DI AV1 553DIESELENGINE)

III. RESULTS AND DISCUSSIONS

BrakeThermalEfficiency: Fig.2. Shows the variation of Brake Thermal Efficiency with Brake Power output for Waste cooking oil and its blends with Diesel in the test engine. Brake Thermal Efficiency for 25% blend of Waste cooking oil is very close to that of Diesel. Maximum Brake Thermal Efficiency is obtained at 4 Kw load. Brake Thermal Efficiency for 25% and neat Waste cooking oil is lower by 10.41% and 34.60% respectively compared to Diesel at rated load. This is attributed to lower calorific value, high viscosity coupled with density of the fuel.

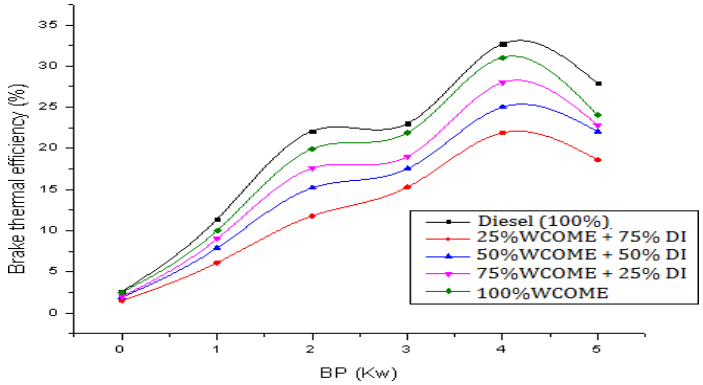

Fig.2.Break Thermal efficiency Vs Break Power

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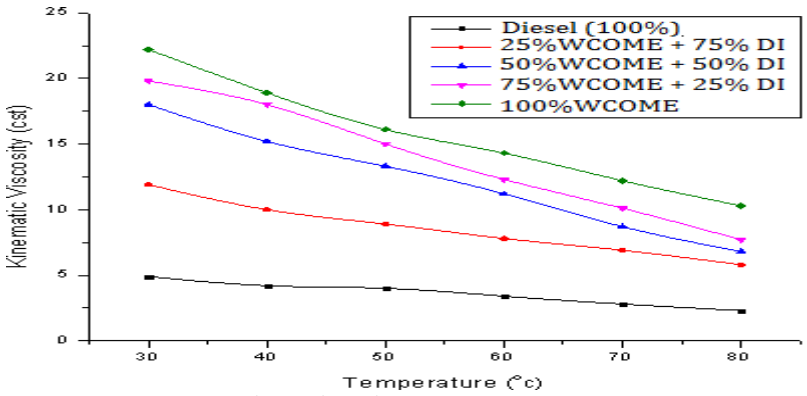

Fig.3.Viscosity Vs Temperature

Carbon Monoxide: Fig.4: shows the variation of Carbon Monoxide emissions with Brake Power output for Waste cooking oil and its blends with Diesel in the test engine. CO emission for 25% blend of Waste cooking oil is compared with Diesel at all loads. Neat Corn oil has the highest CO emission for all loads compared to all other blends. CO emission for Neat Corn oil at rated load is higher by 96% compared to Diesel. This is the result of incomplete combustion of the fuel.

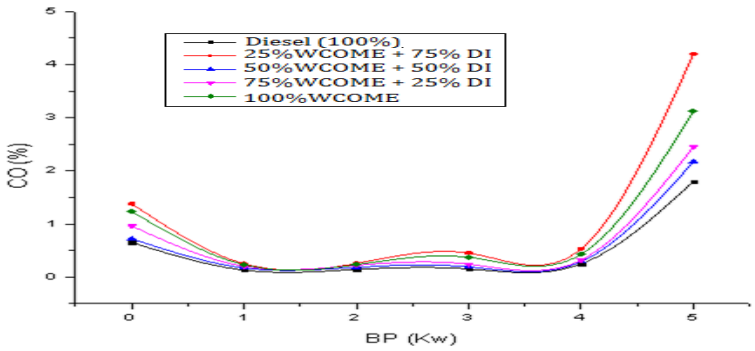

Fig.4.Carbon Monoxide Vs Break Power

Un-Burnt Hydrocarbons: Fig.5: shows the variation of Un-burnt hydrocarbon emission with Brake Power output for Waste cooking oil and its blends with Diesel in the test engine. 25% blend of Waste cooking oil has lower UHC emission compared to all other blends for all loads. UHC emission for 25% blend and Waste cooking oil is 79 ppm and 89ppm, whereas for Diesel it is 74 ppm. UHC emission for 25% blend and neat waste cooking oil at rated load is higher by 6.75% and 20.27% respectively compared to Diesel. In this phenomenon formation of rich air–fuel mixture plays a vital role.

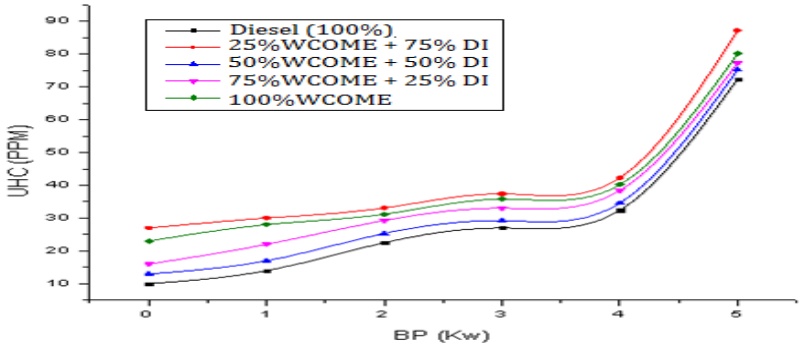

Fig.5.Un-Burnt Hydro Carbon Vs Break Power

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Nitrogen oxides: Fig.6: shows the variation of Nitrogen Oxide emission with Brake Power output for Waste cooking oil and its blends with Diesel in the test engine. Diesel has higher NOx emission compared to all other blends. NOx emission for 25 % blend of Waste cooking oil is well compared with Diesel at all loads. NOx emission for 25% blend of Waste cooking oil at rated load is 55 ppm, whereas for Diesel it is 58 ppm. The difference is 3 ppm. i.e. waste cooking oil NOx emission is lower by 5.45% compared to Diesel. Lower peak combustion temperature in the combustion chamber influences this factor.

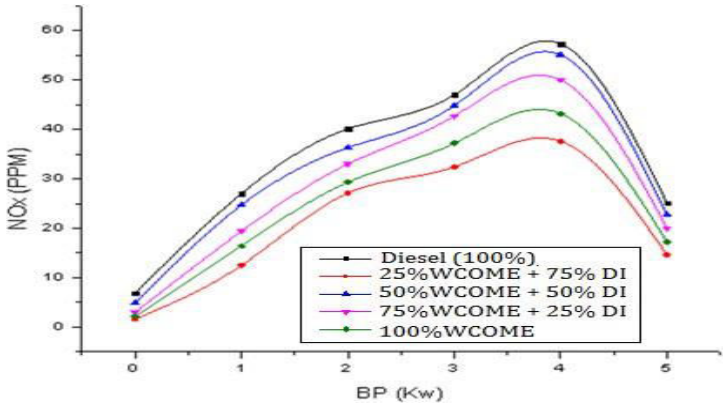

Fig.6. Nitrogen Oxide Vs Break Power

Smoke: Fig.7: shows the variation of Smoke emission with Brake Power output for Waste cooking oil and its blends with Diesel in the test engine. 25% blend of Waste cooking oil has lower Smoke emission compared to all other blends and slightly higher than Diesel. Waste cooking oil has the highest smoke opacity compared to all other blends for all loads. Smoke emission for 25% blend is compared to Diesel. Smoke emission for 25% blend and Waste cooking oil at rated load is higher by 8.43%and 31.32% respectively compared to Diesel. The effect of incomplete combustion leads to this result.

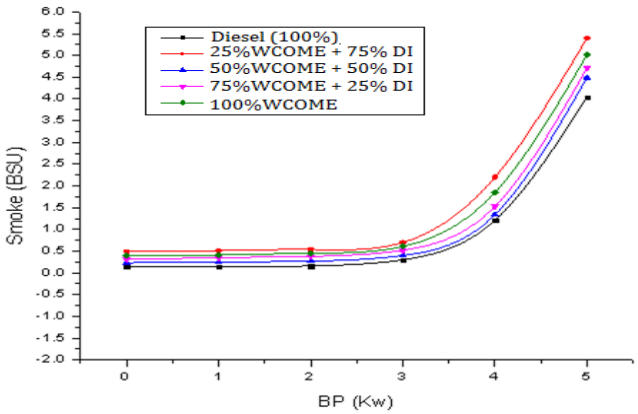

Fig.5. Smoke Vs Break Power

IV. CONCLUSION

- Brake Thermal Efficiency for Neat Pongamia, Palm, Waste cooking oil, Sunflower oil and Karanja oil is lower by 25.21%, 27.06%, and 34.60%, 22.55% and 27.56% respectively compared to Diesel". This is due to lower calorific value and high viscosity of the oils.
- Neat Pongamia, Palm, Waste cooking oil, Karanja and sunflower oil BSFC is higher by 45.23%, 40.47%, 54.76%, 40.47% and 47.61% respectively compared to Diesel at rated load. This is result of high viscosity of the fuels.
- EGT for Neat Pongamia, Palm, Waste cooking oil,karanja and Sunflower oil is higher compared to Diesel.

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- The brake thermal efficiency of the diesel biodiesel ethanol blends is low than pure diesel.

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