

Thermal Analysis Of Exhaust Gas Of Compression Ignition Engine Using Diesel And Biodiesel Blend....

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ABSTRACT

On the face energy crises in the world is becomes necessary to focus the alternative of conventional fuel. To overcome this extra energy due to which this crisis persist and to investigate these substitutes of conventional fuels . It is also necessary to examine them in a well manner so that they can fulfill the requirement of energy in an economic way. This paper is focused to analysis the thermal performance use such resource that is biodiesel derived from waste cooking oil (WCO) and its blend by setting up experimental setup in compression ignition engine.

In this paper the thermal analysis of exhaust gas of an engine has been carried out by measuring the temperature of exhaust as with respect to different values of power out put along with the fuel consumption . The biodiesel is blend with pure diesel in different proportion as B5,B10,B20,B40,B60,,B80,And B100 and same in used in CI engine in varying load condition .Power is measured by electrical load through ac alternator couple with diesel engine. The observations have been recorded and resulted have been obtained by load variation from no load to 3kw.

Keyword: CI engine, WCO biodiesel, alternative source, biodiesel blends.

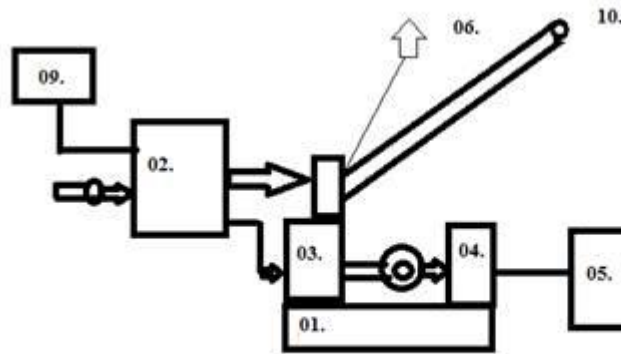
I. Introduction

Thermal analysis of exhaust gas of internal combustion engine is concerned with heat energy that is wasted in our environment. This energy is nothing but a part of energy supplied as a fuel having a great cost today. So object is to just analyses that what variation takes place in exhaust gas leaving the internal combustion engine in different working situations where fuels are supplied in different manner using diesel and diesel blend. In diesel blend other fuel is blended with diesel in different proportions and results will be discussed according to proportion of diesel blend.

Here diesel blend is concen with the blend of bio fuel incorporated with diesel in different proportions . Another very important aspect of this paper is to understand the relevance of temperature of exhaust gases when biodiesel incorporated with diesel because as we know that impact of conventional fuels in our envirement so it becomes necessary to analysis the temperature distribution in exhaust of CI engine using biodiesel as fuel. As we are aware that in internal combustion engine energy supplied in the form of fuel as diesel ,petrol, gasoline etc. is wasted in the form of heats

through different parts of the engine. It means that (25to 35)% of total energy is used as mechanical work and (75 to 65)% of total energy is lost in the form heat to the environment [1]. The heat lost in the environment takes places through exhaust gas about 30% of total energy which increases entire temperature of our atmosphere and become very harmful for future scenario. Heat lost through exhaust gases is measured in terms of temperature of gases which is measured by temperature sensing device like digital thermometer ,thermocouples ext. in this context comparative analysis of temperature of exhaust gases is done by using diesel and bio diesel blend in various proportions. A survey of literature is done through the review of various papers,journals and research work for obtaining the way of experiment on the compression ignition engine. Study about types of biodiesel ,their production,blending and application in CI engine is covered in the literature survey .The parameters of experiment on diesel engine such as exhaust gas temperature ,break power , fuel consumption are identified in the survey .so an effective approach is found from literature survey for preceding the experiment in the CI engine[3-16].

II. Experimental Setup



List Of The Ingredients Used In The Experiment Setup-

1.Foundation Structure	2. Steel Frame Mountings
3.Internal combustion Engine	4. AC alternator
5. Electrical Load Panel	6.Temperature sensing device
7. Speedometer (Tachometer)	8.air intake measurement system
9. Fuel Intake Measurement system	10. Exhaust Manifold & pipe
11. Diesel & WCO Bio Diesel fuel	

III. Specification Of Diesel Engine Used In The Experiment Setup:-

For conducting the experiments on CI engine a four stroke, single cylinder, vertical and water cooled diesel engine has employed made from Kirloskar oil engine India. Engine has employed made from Kirloskar oil engine India. Engine has the compression ratio 17.5:1, stroke and bore are 110mm. & 87.5mm., rated power output 7.5hp/5.2KVA & rated rpm. is 1500 rpm. Engine is hand start & direct injection type.

IV. Comparative Specification Of Diesel & Biodiesel Fuel:-

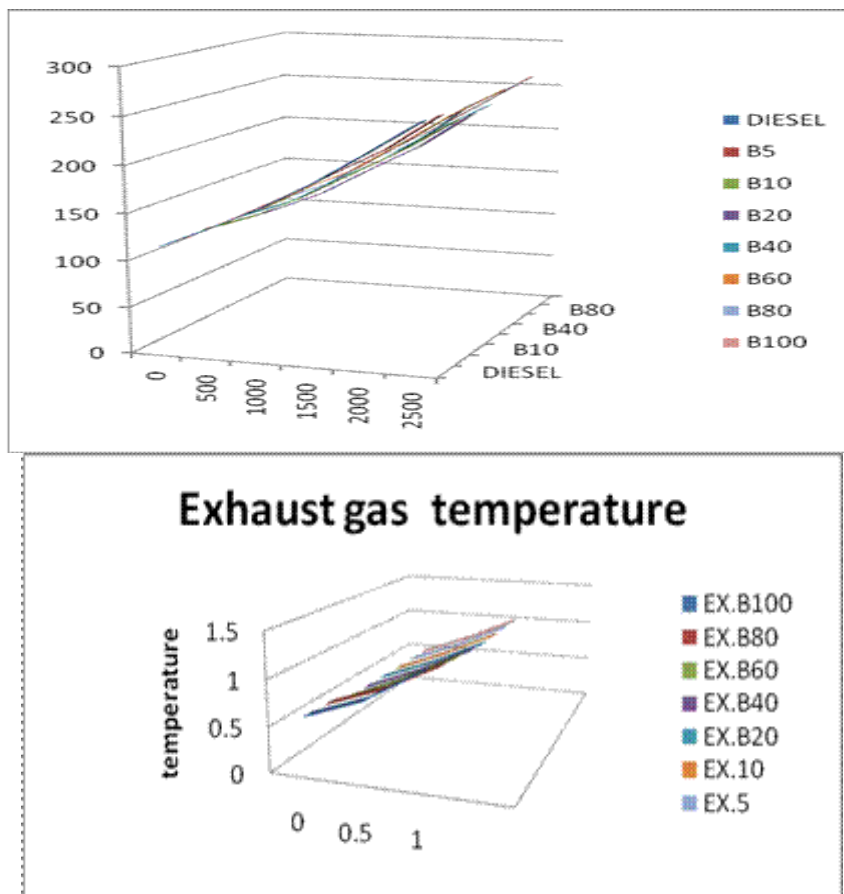
Specification of all properties of diesel & different WCO biodiesel blend are given in table no.1&2 in annexure.1

V. Observation:-

All observations have taken during the experiment and conducted on the particular compression ignition engine. Observations are taken using diesel & different biodiesel blends from no load to 3000 watt power for diesel, B5, B10, B20, B40, B60, B80, B100.

VI. Results & Discussion:-

(A.) Variation Of Exhaust Gas Temperature With Power For Diesel And Biodiesel Blends;
 (B.) Variation Of Exhaust Gas Temperature With Fuel Consumption For Diesel & Biodiesel Blends;



VII. References

- [1] INTERNATIONAL JOURNAL OF EMERGING TECHNOLOGY & ADVANCED ENGG. vol.03, issue 8, August 2013. by Neelesh Soni (Research Scholar , N.I.T. PATNA)

Annexure-1

Specification Of Different Biodiesel Blend Prepared For The Experiment

S.no.	Fuel type/ Proportion of fuel in volume(ml.)	Density kg/cu.mts
1	100% diesel	831
2	5% WCO biodiesel+95% diesel	833.78
3	10% WCO biodiesel+90% diesel	836.5
4	20% biodiesel+80% diesel	842
5	40% biodiesel+60% diesel	853
6	60% biodiesel+40% diesel	864
7	80% biodiesel+20% diesel	875

Comparative Specification Of Diesel & Biodiesel Fuel

Property	Unit	Acceptable limit	Diesel ASTM D975	WCO biodiesel
a. Density at 15 c	Kg/cu.m	860-900	831	886
b. kinematic viscosity at 40 c	m/s	(3.5-5)*10(micro)	(2.5-6)*10(micro)	4.3*10(micro)
C. flash point	c	Min. 100	51	>210
d. sulphur contents	ppm	Max 350	500	<120

e.water contents	w/w%	0.02-0.05	0.005	>0.04
f.calorific value	Mj/Kg	42	36.34

VIII. Conclusions

EXPOSER TO FUTURE SCENARIO :-

Although this review study entitled on “**Thermal Analysis Of Exhaust Gas Of Compression Ignition Engine Using Diesel & Biodiesel Blend** “ touches the enriched needs & concerning more efforts to reduce reliabilities on non-renewable resources either on **C.I. Engine or in Case Of S.I. Engine.**

Due to the encompassed observations & regarding data’s precisely interprets the merits to generate other alternatives methods of heat generating sources to overcome the losses (except 25 to 35% of total energy is used as mechanical work in case of C.I. engine). To achieving future sustainabilities for forthcoming generation as well as to fulfilled the criteria of “ **GO GREEN TO CONSERVATION**” consortium so, its time to adopt other alternatives.

A one more point to be exposed now to in built such a technology based on ergonomics – aerodynamics aspects as much as possible to concerning more efforts on “ **human powered energy efficient vehicle** ” **design.**

The motto of presenting this paper is to better approach for “**Survival For The Fittest**” in such conditions:-

“**HOW ABOUT BURNING FATS INSTEAD OF FUEL OVECOMES?**”

We have further continued the research studies “ **On Designing A Automated Carburetor**” to overcomes the losses of fuel energies in **S.I. Engine** case.