

Emission Control in S.I Engine Using Bio-Fuels by Catalytic Converter

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Abstract- Nowadays Pollution is the major concerns in our day to day Life. Pollution has many adverse effects on the Environment which needs to be controlled. S.I Engine is one of the primary modes of increasing pollution. There are various methods to control the emissions that are using Bio-Fuels (blends of gasoline), Exhaust Gas Recycling (EGR), Fuel Evaporation Control, Catalytic Converter, Adjusting Air inlet temperature, Air Injected Exhaust system. Our aim is concerned with the use of Catalytic Converter for the control of emission using Bio-Fuels. We are using a 3 way Catalytic Converter, it oxidizes CO₂, Hydrocarbon (HC) and reduces NO_x. As NO_x is more harmful, a three way Catalytic Converter is more suitable. Hence we are using a three way Catalytic Converter to control the emissions of the S.I Engines running on blends of Bio-Fuels. We are going to determine the emissions using gas analyzer.

Keywords- S.I Engines, Bio-Fuels, Three way Catalytic Converter, Emission Control.

I. INTRODUCTION

The automobiles are the most important sector for the social development; It has enhanced the life standards of the human beings. But these are causing a lot of pollution. Emissions are the major issues coming up this days. Decreasing emission from automobiles and increasing engine efficiency are necessary steps towards improving air quality and reducing greenhouse effect. It is well known that usage of blends in SI engine can reduce the exhaust emission and increase its efficiency. Usage of catalytic converter has always helped in converting harmful emissions into normal emissions and it is a necessary component of the vehicle. The main goal of the present work is using blends of turmeric oil and gasoline with mounted three way catalytic converter, on which optimization techniques will be performed so that there is more reduction in the emission.

II. LITERATURE SURVEY

On fuels used:-

Irimescu et al. had conducted various studies and experiments on emissions by SI engines using blends of

gasoline with methanol, ethanol, 2-methylfuran, iso-butenol as fuels. These studies and experiments showed reduction in emissions from the exhaust and were also found to increase the performance and efficiency of engine as well as that of catalytic converter.

Equipment (catalytic converter):-

Vaneman et al. had conducted various studies and experiments on the materials to be used for and in a catalytic converter. The engines used blends of gasoline as fuel. The materials that were used to test were ceramic monolith for the body and platinum, rhodium and palladium as catalysts in the mesh inside the converter. The studies conducted on the catalytic converter were used to find out the material suitable for the catalytic converter and also the best conditions in which the catalytic converter works the best.

Conclusion from the literature survey:-

From the above literature survey it can be concluded that:

1. Bio-fuels do give reduced emissions when used instead of pure gasoline.
2. The construction and materials of catalytic converter play an important role in the reduction of emissions. Also the conditions and the fuel on which the engine runs, affect the catalytic converter. But the emissions from SI engines are definitely reduced to a great extent before being released in atmosphere by a catalytic converter.

Objective:

To test the emissions from SI engine using a blend of turmeric oil and gasoline as fuel and emissions through a modified catalytic converter.

III. EXPERIMENTAL SETUP

A. Study of experimental setup

The engine selected for the performance test is very much popular in four wheelers. This is basically a three

cylinder four stroke air cooled spark ignition petrol engine. The experimental setup consists of spark ignition engine along with dynamometer, load cell, fuel input measuring system, air intake measurement system, and digital panel board, thermocouples for temperature measurement, digital tachometer, three way catalytic converter and gas analyzer. The specification of the engine used is given in table1. The set up enables the study of emissions. The performance tests were carried out on the spark ignition using pure gasoline and further tests are in progress which will be done using blends of turmeric oil-gasoline. The experimental data was generated from current performance tests using pure gasoline.

Table 1:-Engine specifications

1	Maruti 800 SI engine	37 BHP @ 5000 rpm
2	Cubic capacity	796 cc
3	No. Of cylinders	3 mlme
4	Maximum speed	6500 rpm
5	Compression ratio	8.8:1



Table 2:-Test fuels

1	T-5	Turmeric oil:- 5%, Gasolme:- 95%
2	T-10	Turmeric oil:-10%, Gasolme:- 90%

IV. IMPROVEMENT AS PER REVIEW COMMITTEE

We did research on the literature review as told by our review committee. Our aim towards the project became much clearer after our committee guidance.

V. RESULTS

The tests conducted till now have given the reference values for the result which is expected by us by the end of the project. The reference values that are taken now are taken on the same engines on which the further tests will be performed.

Emission results of maruti 800 engine (796cc) taken while testing it with a 3 way catalytic converter using 100% petrol:

Table 3 :- Emission in four wheeler

Sr.no	Parameters	Output emissions
1.	Carbon monoxide	0.164
2.	Hydro carbon	135 ppm

Emission results for a single cylinder KTM duke (200cc) engine without a catalytic converter using 100% petrol:

Table no 4 :- Emission in two wheeler

Sr. no.	Parameters	Output emissions
1	Carbon monoxide	0.36
2	Hydro carbon	200 ppm

VI. CONCLUSION

The conclusion till now is that the readings shown above in the results would be taken as reference readings as the test using bio fuel and modified catalytic converter would be conducted on the same engines as specified above. The engines would be tested using a blend of turmeric oil and gasoline so as to note the difference in the emissions.

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