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Design of Eco Friendly Gasoline Engine using Bio Gasoline for Energy Conservation

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Abstract - *Now a days the usage of gasoline has been considerably increased because of the increase in the population. The usage of vehicles has increased the pollution from the vehicle , Also we are facing demand over petroleum products so we are in need to find an alternate source of energy in the form of bio fuels. Through this we found a solution of using methanol as an alternate source of energy by mixing it with petroleum. Through this we were able to obtain a result of increase in performance and efficiency when compared with the fossil fuel like petroleum. Though we found there is decrease in the emission like CO,HC,NOX.*

Key Words: **Bio fuel, Pollution, Petroleum, Alternate source of energy, Biofuel, Performance, Emission.**

1.INTRODUCTION

The Air pollution and the fuel crisis are some of the major issues throughout the worldwide. This happens because of increase in the development of science & technology, increase in population, increase in the number of vehicles and decline in fuel production. Hence this situation should need to be replaced in order to reduce high emission of fossil fuel by renewable fuel which is more environment friendly. One of the alternate energy biomass products which has the opportunity to become an alternative fuel is methanol.

Methanol is generally an alternate source of fuel generally used for internal combustion engine and other engines too, whether by using it directly with the engine or by mixing it with petroleum in the suitable ratio. Methanol is used as a fuel in racing cars in most of the countries. In the country like United States of America ,Methanol fuel has only received less attention for using it as an alternative for the petroleum based fuel apart from ethanol. In general, ethanol has higher energy density although methanol is less expensive to produce sustainably, it is a less expensive way to reduce the carbon footprint. Methanol may be made from hydrocarbon or renewable resources, in particular natural gas and biomass respectively. It can also be synthesized from carbon di oxide and hydrogen.

1.1 Problem Identification

Now a days more pollution is caused due to the usage of fossil fuels and this is also because of the increase in the population of the vehicle. Due to this increase in population and pollution the emission plays a major threat to the environment sustainability and human beings. An alternate fuel should need to be found because of the rapid depletion of the source of fossil fuel energy.

1.2 Overview

By analyzing the above literatures there are lot of research were gone in order to find out the perfect extract for gasoline. There are the extracts like mixtures using alcohols, fruit kernels, microorganisms, acids etc., Most of them were successful and some were not but all of them have tried their best in order to identify some perfect blend. Based on the availability and the reliability factor methanol plays a vital role, the effect of using the methanol also increases the performance of the vehicle (verified using reliable source paper prepared by Mohamad Rifal, Nazaruddin Sinaga). Whereas there are many ongoing researches over methanol blend with gasoline so we prefer Methanol (CH3OH) due to the above mentioned advantages.

1.2 Summary

With the research over the above literature and the overview we are going to use the fuel blend as Methanol-Gasoline mixture. We are using methanol as an alternate fuel based on the properties of this fuel and by testing it in VCR engine based on its performance and fuel consumption.

2. METHODOLOGY

With the determination of the alternate source, further process should be done in order to attain the perfect blend configuration. This process consists of the test regarding the performance, efficiency, emission.

2.1 Determination of Suitable Ratio

In order to achieve the correct combustion inside the engine there should need to be a proper blend, according to the various report ,we have finally determined the ratio of fuel mixture of Methanol-Gasoline as 30-70%, 20-80%, respectively. Here is the comparison between the properties of gasoline and methanol.

Table -1: Fuel Properties

Property	Methanol	Gasoline
RON	106	88

Stoichiometry air/fuel ratio	6.5	14.7
Density (kg/l)	0.79	0.77
Oxygen content by mass (%)	50	0
Volumetric energy content (MJ/l)	15.0	31.7
Heat of vaporization (kJ/kg)	1100	180-350
Specific CO2 emissions (g/MJ)	68.44	73.95
Lower heating value (MJ/kg)	20.09	42.9
Energy per unit mass of air (MJ/kg)	3.12	2.95
Reid vapour pressure (psi)	4.6	7
Adiabatic flame temperature (*C)	1870	2002
Initial boiling point	64	74
50	64	125
90	65	180
End boiling point	66	215

Table -2: Proposed Blend Design

BLEND DESIGN	GASOLINE (%)	METHANOL (%)	RESPONSES TO STUDY
D1	100	-	1. SFC
D2	80	20	2. Exhaust emissions
D3	70	30	

3. RESULT ANALYSIS

3.1 Fuel consumption

The fuel consumption is noted with the test undergone in VCR Engine (Variable Compression Ratio). This test is done with two different compression ratios like CR9,CR10 and the blends like methanol (M20,M30) with gasoline.

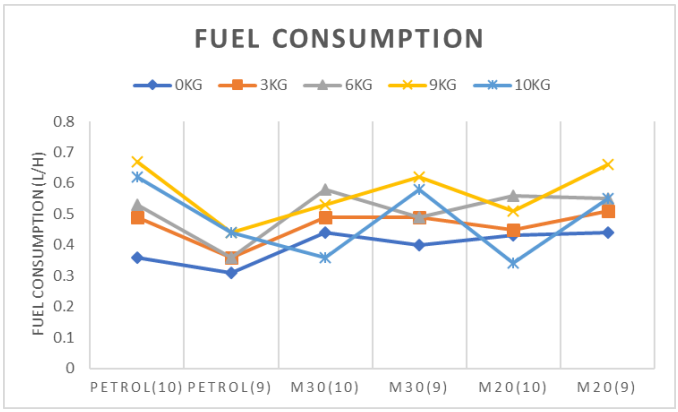

Chart -1: The effect of methanol on Fuel consumption

3.2 CO Emission

The CO Emission is noted with the test undergone in VCR Engine (Variable Compression Ratio). This test is done with two different compression ratios like CR9,CR10 and the blends like methanol (M20,M30) with gasoline.

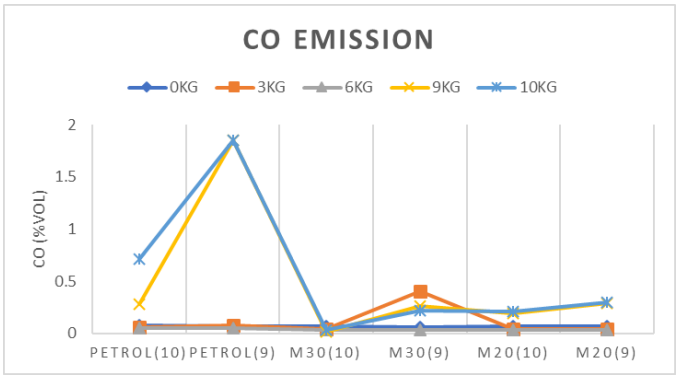

Chart -2: The effect of methanol on CO Emission

3.3 CO_2 Emission

The CO2 Emission is noted with the test undergone in VCR Engine (Variable Compression Ratio). This test is done with two different compression ratios like CR9,CR10 and the blends like methanol (M20,M30) with gasoline.

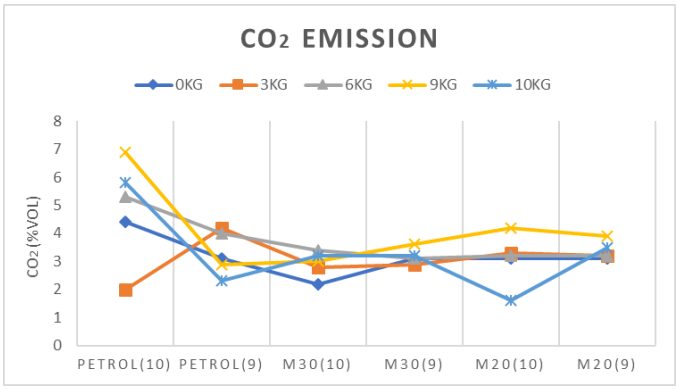

Chart -3: The effect of methanol on CO_2 Emission

3.4 HC Emission

The HC Emission is noted with the test undergone in VCR Engine (Variable Compression Ratio). This test is done with two different compression ratios like CR9,CR10 and the blends like methanol (M20,M30) with gasoline.

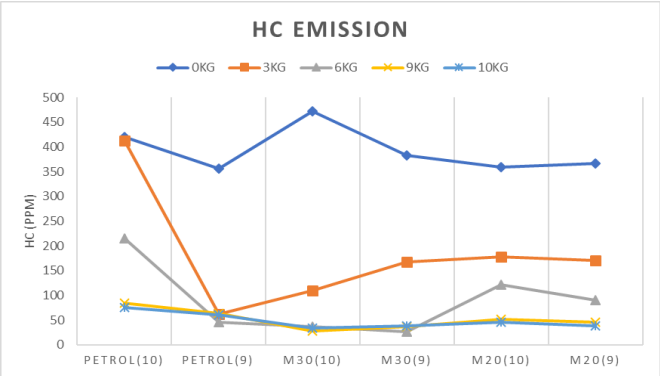

Chart -4: The effect of methanol on HC Emission

3.5 NOx Emission

The NOx Emission is noted with the test undergone in VCR Engine (Variable Compression Ratio). This test is done with two different compression ratios like CR9,CR10 and the blends like methanol (M20,M30) with gasoline.

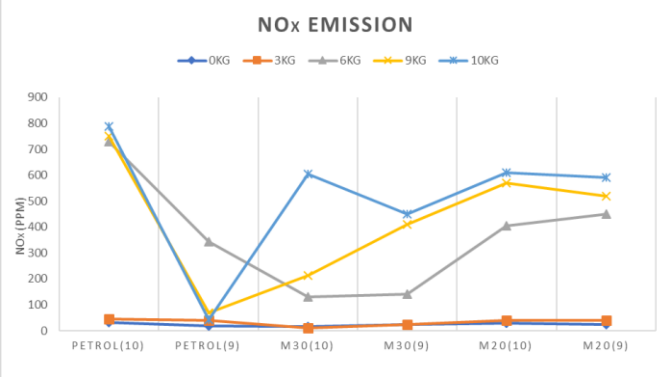

Chart -5: The effect of methanol on NOx Emission

4. CONCLUSIONS

In this study, the engine using the methanol-gasoline fuel blend, the fuel consumption has relatively decreases. This shows that the usage of methanol-gasoline blend can reduce the fuel consumption. This also results in the decrease in the emissions like HC, CO, CO2, NOX respectively. The heat of evaporation of methanol is higher than gasoline, during compression process the fuels containing methanol will absorb more heat from the combustion chamber, so the pressure decreases accordingly. Using the methanol-gasoline blend (M20) is more effective in our testing process, which reduces the emission and fuel consumption considerably than other blends.

4.1 Contribution to the Society

By using this project, we can reduce the emission of the vehicle while comparing with gasoline and it can be a alternate source for gasoline and this helps in solving the future gasoline scarcity problem.

REFERENCES

[1] T. Hu, Y. Wei, S. Liu, and L. Zhou,(2007) Energy & Fuels, **21**, 171–175.
[2] L. Zhu, C. S. Cheung, W. G. Zhang, and Z. Huang,(2010) *Sci.* Total Environ., **408**, 914–921.
[3] N. D. Brinkman, N. E. Gallopoulos, and M. W. Jackson,(1980) SAE Prog. Technol. **19**.
[4] H. Zhao, Y. Ge, C. Hao, X. Han, M. Fu, L. Yu, and A. N. Shah,(2010) Sci. Total Environ. **408**, 3607–3613.
[5] M. B. Çelik, B. Özdalyan, and F. Alkan,(2011) Fuel, **90**, 1591–1598.
[6] W. Yanju, L. Shenghua, L. Hongsong, Y. Rui, L. Jie, and W. Ying,.(2008) Energy Fuel, **22**, 1254–1259 .
[7] P. Dai, Y. Ge, Y. Lin, S. Su, and B. Liang,(2013) Fuel **113**, 10, 10–16 .
[8] M. Eyidogan, A.N. Ozsezen, M. Canakci, and A. Turkcan,(2010) Fuel **89**, 2713-2720 .
[9] Kjarstad J, Johnsson F.(2009) Resources and future supply of oil. Energy Policy;37:441–64.
[10] Demirbas A.(2011) Competitive liquid biofuels from biomass. Appl Energ;88:17–28.
[11] Stein K. (2011)Food vs biofuel. J Am Diet Assoc ;107:1870–8
[12] Pimentel D, Patzek T, Cecil G (2007) Ethanol production: energy, economic and environmental losses. Rev Environ Contam Toxicol ;189:25-41.
[13] Solomon BD, Barnes JR, Kathleen EH.(2007) Grain and cellulosic ethanol; history, economics, and energy policy. Biomass Bioenergy ; 31: 416-25
[14] Oak Ridge National Laboratory; 2012. Retrieved 9 February 2013.
[15] Van der Veer J. The Times; 2007, June 25.
[16] Solomon BD. Biofuels and sustainability. Ann NY Acad Sci 2010;1185:119–34.
[17] Goldemberg J. Ethanol for a sustainable future. Science 2007;315:808–10.

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