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Performance and Emission Characteristics of S.I. Engine with Oxygenates

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Abstract: ***In modern world transportations play a vital role, in that S.I. engines are the mostly preferred for their luxurious transportation. Alternative fuels are prepared to trim down the dependency of gasoline as a fuel and it is to increase the performance of the engine and to reduce the emission. In this study, effects of oxygenates one such di-isopropyl ether (DIPE) and isopropyl alcohol (IPA) were blended with-gasoline on different volume basis (10%, 20%, 30%) and tested for its performance, and emission characteristics on a single cylinder four stroke spark ignition engine (petrol engine) and compared with normal gasoline. DIPE and IPA are selected for its similarities of properties with gasoline. The results has been tabulated and compared by plotting graphs. The mechanical efficiency of 10% DIPE is found to be 22% higher when compared to petrol, Emission are almost been reduced on higher loads.***

I. INTRODUCTION

The transport sector is the single largest consumer of petroleum products. Engine emissions are the main contributors to air pollution problems. Vehicles contribute about 50% of the total emissions worldwide. In India vehicles in major metropolitan cities are estimated to account for 70% of CO, 50% of HC, 30–40% of NOx, 30% of solid particulate matter(SPM), and 10% of sulphur dioxide (SO2) of the total pollution load of these cities, of which approximately 67% is contributed by two wheelers alone. To reduce the contributions made by spark ignition engines we use oxygenates as additives with gasoline in variable ratios in order to reduce the emission. Di-iso propyl ether and Di-Iso propyl alcohol are non-corrosive, so it doesn't cause any corrosion on internal parts of engine.Generally Alcohols have more oxygen content, so there is huge possibilities for quick and complete combustion. Di-Iso propyl ether is secondary ether that is used as a solvent. It is colourless liquid that is slightly soluble in water but miscible with organic solvent. Di- iso propyl ether is used as an extract and oxygenates gasoline additives**.**

II. LITERATURE SURVEY

A. Alternate Fuel

V.Srinivasan, M.Francis Luther King and T.Purushothaman Middle East Journal of Scientific Research 22(2):205-209, 2014. This study common with the use of alternate fuels for automobiles. Since the automobiles are the main source of transportation, its usage increases day by day. Thereby it is necessary to identify cheaper fuel for it.

B. Performance of Spark Ignition Engine using Gasoline-91 and Gasoline-95.

Dahiru U. Lawal1, Binash A. Imteyaz2, Antar M. Abdelkarim3, Atia E. Khalifa4 IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 1 Issue 6, August 2014. In this study, we experimentally investigate the performance of a SI engine (Armfield CM11) using two commercially available fuels in the kingdom of Saudi Arabia: gasoline-91 and gasoline- 95.

C. Experimental Investigation of Four Stroke Spark Ignition Engine using Alcohol Petrol Blends

Mrs Tupkar1, Mrs. Manisha S. Lande2, Ms.Rupali S. Prerna S.Borkar3, Mr.V.S.Shende4 IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e-ISSN: 2278-1684, p-ISSN: 2320-334X PP 33-37. In this work we prepared different alcohol petrol blends and find out optimum petrol blend for S.I. Engine. Then find different performance parameters like brake power, brake specific fuel consumption, torque, thermal efficiency for four stroke engine by using different blends.

D. Emission and Performance Test on Petrol Engine Using Fuel Modification

V. Balaji Raman1, X. Alexander www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 3, Issue 6, June 2013). This work presents the cold-start exhaust gas emission levels and also performance test on a petrol engine by using the fuel

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blends. The vehicle, powered by gasoline fuelled engine, was used in the experiments.

E. Experimental Studies on a SI Engine Using Plastic Petrol Derived from Waste Plastic

Sudhir Kumar.Ja., Ravi.Kb, Satyanarayana.Dc, Venkata Subbaiah.Kd , V.V.Prasada Rao.Pe International Journal of Thermal Technologies, Vol.2, No.2 (June 2012). The experimental results show that plastic petrol under study shall conveniently be used as substitute to gasoline in the existing SI engines without any modifications in the aspect of in-cylinder response. Harmful emissions CO and NOX were observed to be low that gasoline at almost all working conditions.

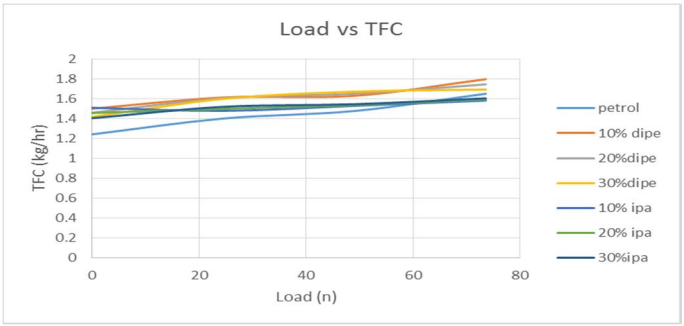
F. Engine Performance and Exhaust Emissions of an SI Engine using Acetic Acid, Ethanol, and M. Attallaa, A.M.A. Solimana and Mahmoud Gasoline Blended Fuel

A. Torky International Journal of Engineering & Technology IJET-IJENS Vol:13, No:05. This paper investigated experimentally the effect of using acetic acid-ethanol-gasoline blended fuel on SI engine performance and exhaust emissions. A two stroke, SI engine (nonroad - type Gunt CT-153) was used for conducting this study.

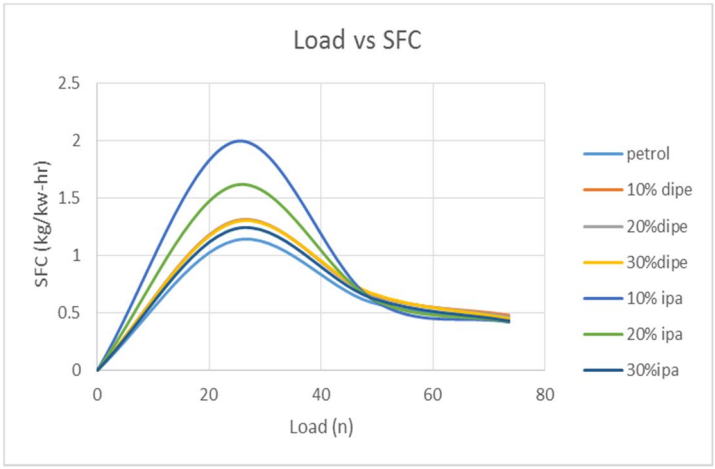
III. METHODOLOGY

A. To compensate the demand of petrol.
B. Increasing the efficiency to the maximum.
C. Reducing the emission to the minimum.
D. For full combustion in Engines.
E. To increase the life of the Engine.

IV. RESULT AND DISCUSSION



This graph shows the TFC of the all the samples and petrol, almost all the blends has more TFC. On comparison the sample containing 30% of Iso Propyl Alcohol is comparatively good.



This graph shows the SFC of the all the samples and petrol, almost all the blends has less SFC. On comparison all the samples are

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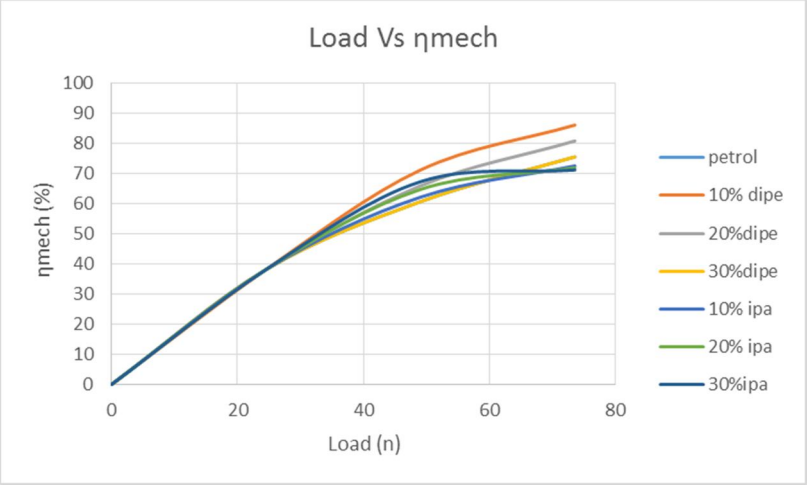
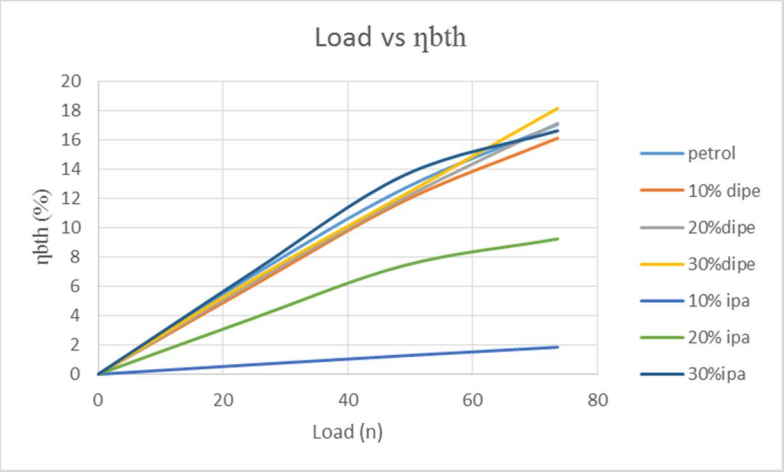
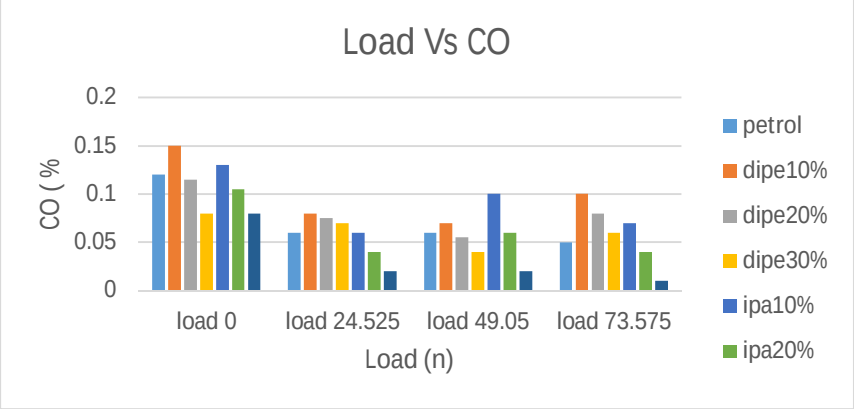
having the same amount of specific fuel consumption.



This graph shows the Mechanical efficiency of the all the samples and petrol, almost all the blends has more mechanical efficiency. On comparison the sample containing 10% of Di Iso Propyl Ether is comparatively good.



This graph shows the Break thermal efficiency of the all the samples and petrol, almost all the blends has more break thermal efficiency. On comparison the sample containing 30% of Di Iso Propyl Ether is comparatively good.



This graph shows the CO emission of the all the samples and petrol, almost all the blends have more emission on initial stage and on applying load the emission comparatively the alternative blends has very low emission. On comparison 30% of Iso Propyl Alcohol

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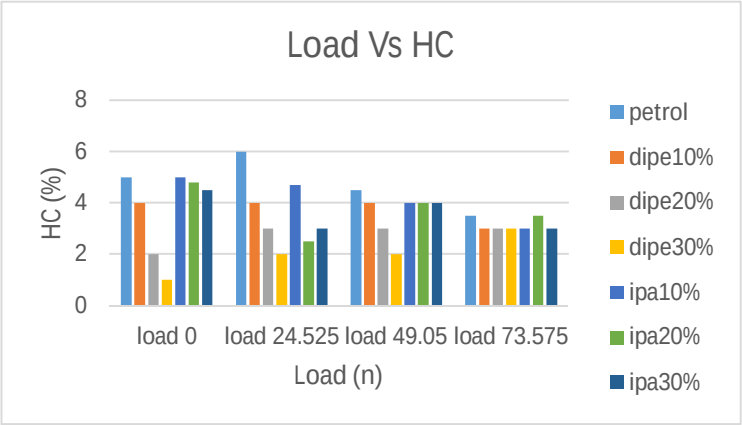
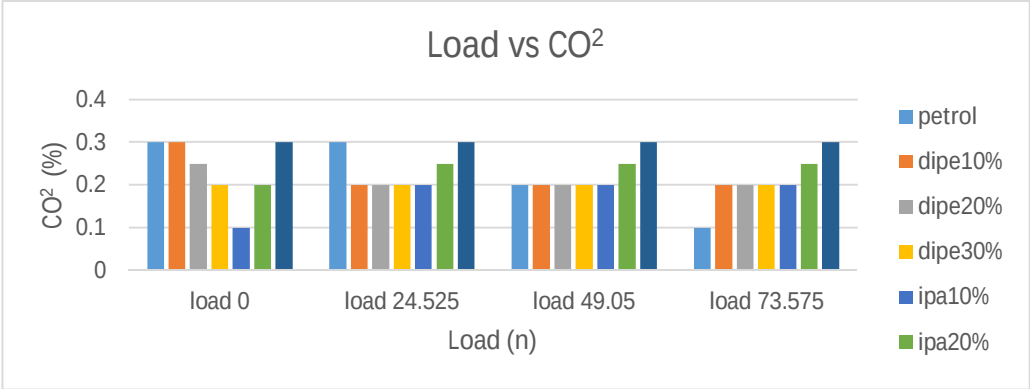
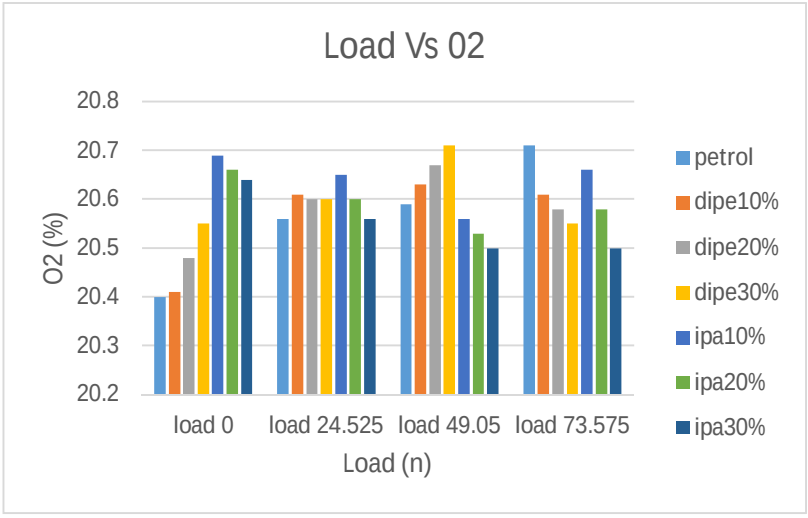
is comparatively good.



This graph shows the HC emission of the all the samples and petrol, almost all the blends has more emission on initial stage and on applying maximum load the emission comparatively the alternative blends has very low emission. On comparison all are mostly same and less than petrol.



This graph shows the CO^2 emission of the all the samples and petrol, almost all the blends has more emission when compared to petrol and on applying maximum load the petrol has very low emission. On comparison all are mostly equal and more than petrol.



shows the CO emission of the all the samples and petrol, almost all the blends has more emission on initial stage and on applying maximum load the emission comparatively the alternative blends has very low emission. On comparison all are mostly same and

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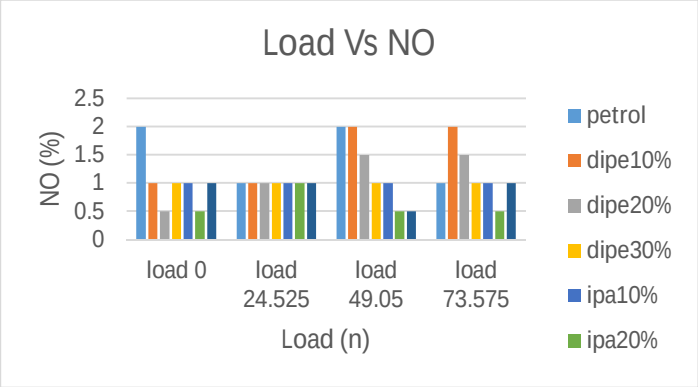
less than petrol



This graph shows the NO emission of the all the samples and petrol, almost all the alternative blends has very low emission. On comparison all are mostly same and less than petrol. On comparison 20% Iso Propyl Alcohol is comparatively good.

V. CONCLUSION

In this study, experimental investigation has been conducted with petrol and other alternative blends of different ratios on a S.I. Engine with constant 1500 rpm ,the following conclusion has been drawn from this study,

A. Performance

1) Petrol has the less total fuel consumption
2) Specific fuel consumption is almost same for all samples.
3) DIPE 10% has 22% more mechanical efficiency.
4) DIPE 30% has 10% more break thermal efficiency.

B. Emission

1) CO gas emission is same on initial load and on maximum load 30% IPA is very low up to 50%
2) NO gas emission are very low and on that 20% IPA is 45% lesser than petrol.
3) HC gas emission are more on initial stage and on maximum load all the emission rate of samples are same, lesser than petrol.

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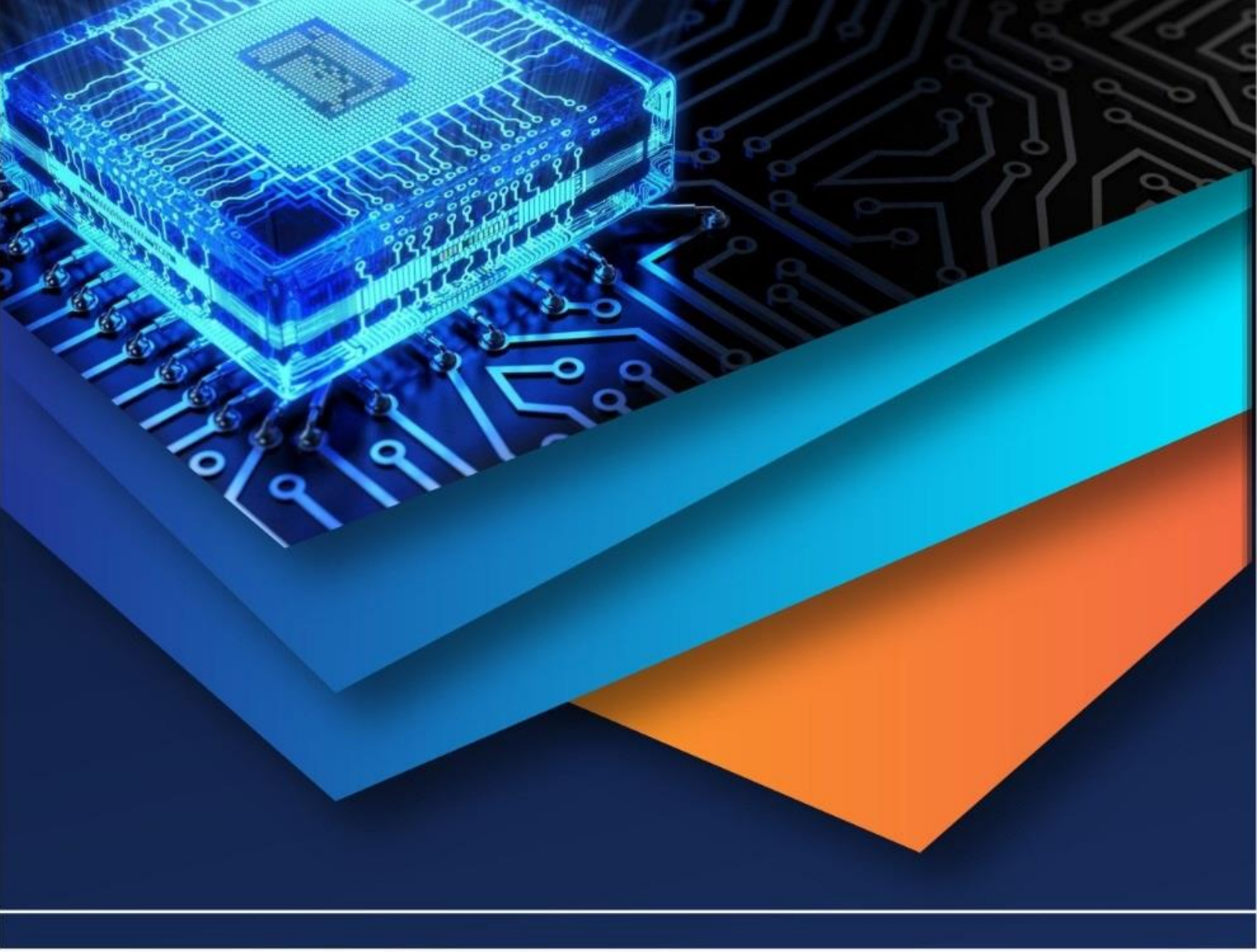

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