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Performance Analysis of Hydrogen and Naphthalene Fueled Two Stroke Spark Ignition Engine

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Abstract: *The threat posed by climate change and the striving for securities of energy supply are issues high on the political agenda these days. Governments are putting strategic plans in motion to decrease primary energy use, take carbon out of fuels and facilitate modal shifts. Taking a prominent place in these strategic plans is hydrogen and naphthalene as a future energy carrier. Energy stored in hydrogen and naphthalene would be available at any time and at any place on Earth, regardless of when or where the solar irradiance, the hydropower, naphthalene or other renewable sources such as biomass, ocean energy or wind energy was converted. The fundamental variations in the times and places of solar energy supply and human energy demands can be overcome using hydrogen and naphthalene. Hydrogen gas and naphthalene combined with the standard air/fuel mixture increases the mileage. This form of alternative fuel is provided by a hydrogen and naphthalene generator mounted in the vehicle.*

Keywords: *Hydragon Fuel; Naphthalene; Two Stroke Engine; Mileage improvement;*

I INTRODUCTION

Combustion of fossil fuels has caused serious problems to the environment and the geopolitical climate of the world. The main negative effects on the environment by Fossil fuel combustion are emissions of NO_x, CO, CO₂, and unburned hydrocarbons. There are several possible solutions to alleviate the problems of using fossil fuels, but most of them would require years of further development and additional infrastructure. The method which involves burning hydrogen and naphthalene gas along with hydrocarbon fuels in engines. Hydrogen and naphthalene has long been recognized as a fuel having some unique and highly desirable properties, for application as a fuel in engines. It is the only fuel that can be produced entirely from the plentiful renewable resource water and atmosphere, through the expenditure of relatively much energy. Its combustion in oxygen produces uniquely only water but in air it also produces some oxides of nitrogen. These features make hydrogen and naphthalene an excellent fuel to potentially meet the ever increasingly strict environmental controls of exhaust emissions from combustion devices, including the reduction of greenhouse gas emissions [6&8].

Volumetric analysis of hydrogen and naphthalene including flow rate and variations in the amount of hydrogen and naphthalene with variations in the supply current. High sensitive flow rate measuring instruments are can be used for the measuring hydrogen and naphthalene flow rate. Quantity of hydrogen and naphthalene produced can be increased when the supply voltage is increased and the corresponding improvements in the mileage can be assessed [3].

Exhaust gas analysis which includes variations in the quantities of the various combustion products including nitrogen oxides, carbon monoxides, sulfur dioxides etc. When hydrogen and naphthalene is employed the harmful emissions can be reduced since the

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combustion product of hydrogen is water vapors only[6] Variation in combustion characteristics on adding hydrogen and naphthalene including ignition delay, effect on knocking the effect on cylinder lining as a result of hydrogen and naphthalene combustion[8]. Efficiency of the electrolysis can be increased. The conventional modes of electrolysis have efficiency of about 50 to 70 %. PEM [polymer electrolyte membrane] electrolysis is a new method of electrolysis which have efficiency above 80%. Use of such methods increase the production of alternate fuels [1,4&7].

This paper focuses for hydrogen and naphthalene mixture will also produce the proper ratio of combustion in the SI engine which we can also expect on the performance, the power generated will be more than the current hydrocarbon fossil fuel mixture.

II. Experimental Details

The following diagram Fig.1 explained with the detailed circuit for the working model.

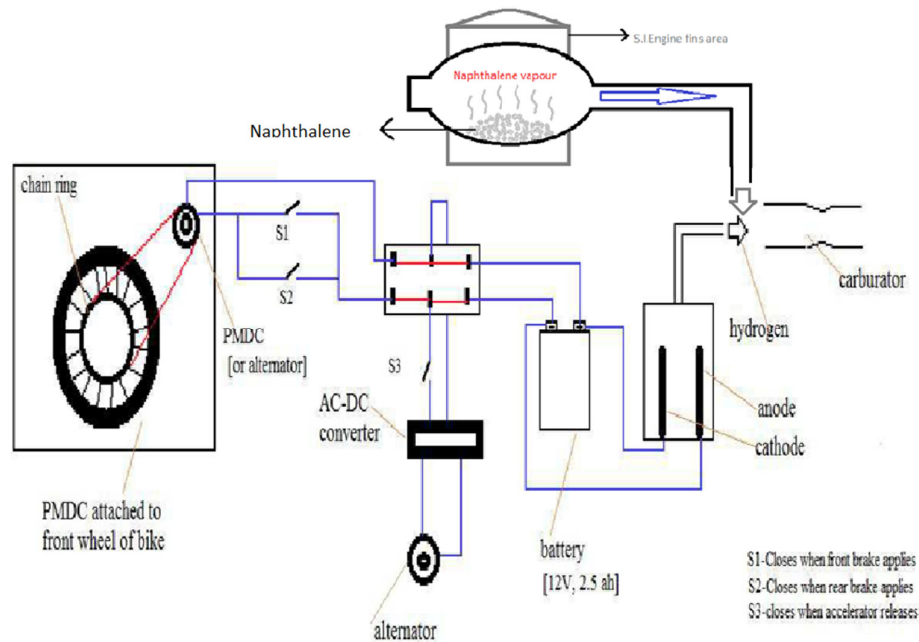


Fig.no:1

Principle of Electrolysis

An electrical power source is connected to the two electrodes materials which are placed in the water. Hydrogen bubbles will appear at the anode (the positive charged electrode, where electrons enter the water), and oxygen will appear at the cathode material (the negatively charged electrode).ie reduction at cathode and oxidation at anode occurs.

The Naphthalene is stored in the copper container which will be placed near to the fins of the cylinder where the heat transfer occurs, the copper is a good conductor of electricity and heat too, and the heat makes the naphthalene powder in to a vapour form

Electrolysis Unit and Working

Construction

Hydrogen is produced using a hydrogen generating unit. It consists of a sealed container that contains the high grade stainless steel/graphite electrodes distilled water and electrolyte solution. Source of power is an external battery provided. Battery can be recharged from a dynamo/alternator provided, which works when we apply brake & accelerator releases.

The Naphthalene is clamped near the cylinder and there is no required of battery for the naphthalene to vapour up only the heat is required to do the work, the heat is emitted from the fins of the engine. The construction of the Hydrogen And Naphthalene Fueled Two Stroke Spark Ignition Engine is by connecting the battery to the hydrogen kit which consist of the cathode and anode, in which

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the cathode the material used is the copper and in anode it's the stainless steel, for the battery recharge it's the regular principal of construction by permanent magnetic direct current (PMDC) to the AC-DC converter in the SI engines and the naphthalene is powdered and is filled in the copper container and fixed near the cylinder head of the two stroke vehicle. At the starting time the hydrogen and the fuel mixture goes to the engine and later when the naphthalene is vaporised then the supply of the fuel mixture will turn into only hydro naphthalene mixture This mixture will produce the efficient amount of power outlet, the power produced will be 7 to 11% higher than the efficiency of the regular fuel mixture They doesn't emit carbon contained gases after they get burnt only water vapour will be sent out to the atmosphere. This will also give excess of mileage in vehicle by increasing the fuel mixture ratio on it the working of the Hydrogen and Naphthalene Fueled Two Stroke Spark Ignition Engine is the battery is charged in the common process by the PMDC and the AC-DC converter to the battery through alternator.

Working

The hydrogen kit is first filled with the water in it with the presents of cathode and anode which are connected to the battery the copper (cathode) is heated by the battery supply (+ve) and the stainless steel (anode) reacts with the water and separates the hydrogen from water, oxygen and the stainless steel gets oxidize and forms a layer in the copper rod (cathode) and the hydrogen is sent to the carburetor

In the other side the naphthalene which is stored in the copper container will wait till the engine reaches the expected temperature and the copper absorbs the heat and the naphthalene powder inside will get vaporized and the naphthalene gas is sent to the carburetor

As these two fuels are sent to the carburetor the petrol ratio decreases and the mileage increases with less emission of carbon dioxide as outlet. This is the working principal of the Hydrogen and Naphthalene Fueled Two Stroke Spark Ignition Engine

III. Results and Discussions

From the above observations we observe that mileage of vehicle is increased in second case i.e. when we will mix with hydrogen petrol mixture. We can observe that on an average the mileage of vehicle is increased by 9 km/litre of petrol and hydrogen mixing of fuel.

From this paper we will expect that the millage will increase up to 25 km /Lit, and it controls the emission of Co2 and carbon up to 2128 g/Lit and 535 g/lit.

IV. Conclusions & Future Scope

Hydrogen and naphthalene is a fuel with heat content nearly three times that of gasoline. From our work we experimentally found out that the efficiency of an IC engine can be rapidly increased by mixing hydrogen and naphthalene with gasoline. Experiment with test rig and a road test with two wheeler. In both cases we observed reduction in fuel consumption. It is clear evidence that addition of hydrogen and naphthalene along with petrol can results in increase in the power of the engine or increase in mileage. Moreover the various emissions normally produced from IC engines can be reduced. Thus use of hydrogen and naphthalene in IC engines as a fuel can be considered a huge leap in the field of automobile engineering. In this project we have proved that the mileage of the bike can be increased up to 9-10% by adding hydrogen and naphthalene with the petrol.

References

1. Romdhane Ben Slama.2012. Hydrogen production by Water electrolysis, Effects of electrodes materials, Nature on the solar water electrolysis performances.
2. Delorme A, Rousseau A, Sharer P, Pagerit S, Wallner T, 2010, "Evolution of hydrogen fueled vehicles compared to conventional vehicles", SAE Paper No.01-08
3. Baiju B, Das L M, Gajendra Babu M K, 2008, Experimental investigations on a rubber seed oil methyl ester fueled compression ignition engine.
4. Baiju B, Das LM, Gajendra babu M K, 2008, the effect of using high FFA rubber seed based bio diesel with cold and hot EGR on performance and emission of CI engines.
5. Junzhi Zhang*, Xin Lu*, Junliang Xue*, and Bos Li*, 2007 Regenerative braking system for series hybrid city bus.
6. David H. Kroon and Lynne M. Ernes, 2007. MMO coated titanium anodes for cathodic protection and heating of naphthalene.
7. Utz-Jens Beister & Rudy Smaling, MTZ issue 10/2005 p.784.Hydrogen Enhanced Combustion. A romising concept for ultralean homogenous combustion
8. L. Zhou, Y. Zhou, Int. J.Hydrogen Energy 26, pp. 597-601, 2001.Determination of compressibility factor and fugacity coefficient of hydrogen and naphthalene in studies of adsorptive storage.
9. A Brent Strong. (3rd edition),36-37,68-72, Plastics: materials and processing

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