Introducing HHO Gas Completely Eco-friendly And UN Harm to Nature

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ABSTRACT:

This is completely UN harmful to nature and this does not emit carbon dioxide. This tech can be installed in all kinds of engines like cars, truck, bus... Etc.

Brown's gas (HHO) has recently been introduced to the auto industry as a new source of energy. The present work proposes the design of a new device attached to the engine to integrate an HHO production system with the gasoline engine. The proposed HHO generating device is compact and can be installed in the engine compartment. This auxiliary device was designed, constructed, integrated and tested on a gasoline engine.

Characteristic of Brown Gas

(i) Brown Gas is implosive nature; when burned in its pure mixture.

(ii) The Brown's Gas flame is about 135 in open air.

(iii) Brown Gas can cut materials that ordinary torches cannot touch, like iron oxide because the Brown Gas flame instantly causes the material to raise its own temperature until it is sufficient to melt or burn itself.

(iv) Brown Gas power potential is much greater than 50,000btu/lb.

(v) It appears that the unique nature of the extreme thermal energy produced by Brown Gas is from interactive effects with the particular material being heated.

(viii) It has the intense heat concentration of the flame

Keywords:
Internal combustion engine
(IC engine)
eco-friendly, healthy environment .Brown's gas (HHO)
Fuel cell (FC)

1. Introduction

The increasing demand for petroleum fuel associated with limited non-renewable stored quantities has resulted in a huge increase in crude oil prices. In the last few years, ordinary people experienced this by paying more at the pumps. Consequently we have seen a shift toward automobiles that consume less fuel. This has encouraged researchers to seek an alternative fuel that can be used in engines without the need for a dramatic change in the vehicle design. It has been shown that using pressurized hydrogen gas as a fuel in internal combustion engines (IC engines)[1] has many advantages such as more engine power and lower pollutant concentrations in exhaust gases [1,2]. As part of this advancement, studies on improving the performance of the internal combustion engine have been developed at Mutah University laboratories in the last few years. Some of these studies have focused on the reduction of cylinder liner wear, the filtration process, fuel mixing processes and the introduction of the fuel cell (FC). Research findings on the FC are presented in this work. An auxiliary circuit, with the FC being its main part, was designed and tested after installation on an actual engine. Many advantages were gained after installing the device behind the carburetor of the engine, as shown in Fig. 1. These include but are not limited to the following: a relatively efficient mixing of the elements (gasoline and air) inside the intake manifold, improved fuel economy, increased stability of the engine and reduced emission. The scope of this work is to introduce some of the hydrogen advantages while maintaining the original specifications of the engine. This may be attained by introducing an HHO cell to the

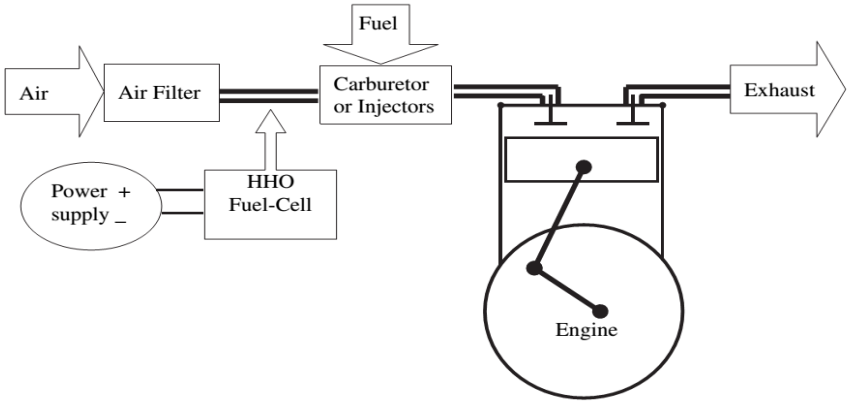

Fig. 1 – Schematic illustration of the designed fuel cell installed on the engine.

2. Theoretical background

2.1. *Properties and use of hydrogen*

There is a considerable research effort in the United States, Europe, and Japan directed towards developing a "hydrogen economy", in which hydrogen would replace oil and natural gas for most uses, including fuel for transportation [3], according to Shinnar. He also listed six inherent fallacies of the supposed advantages of the hydrogen economy, as compared to the electric economy based on a mixture of fossil fuels, solar and nuclear energy. In both cases, the ultimate phase would be an economy based on solar and nuclear energy [3].

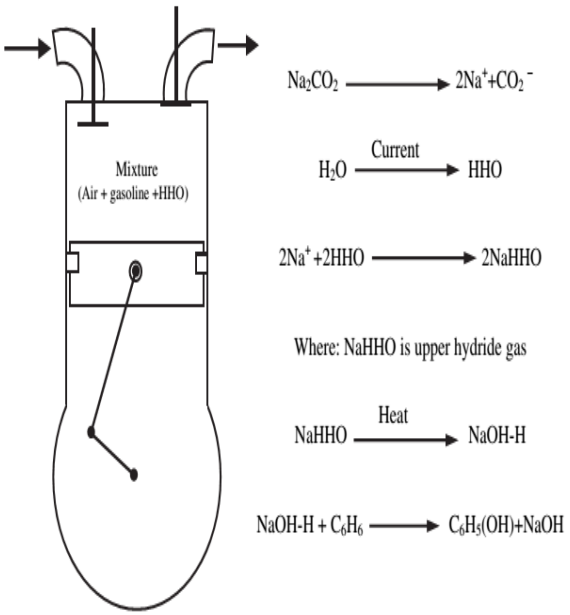

Fig. 2 – Schematic sketch of the engine showing the chemical reactions between air, gasoline, and HHO that take place inside the engine.

Momirlan, and Veziroglu [4] elaborated upon the hydrogen technology, economics, environmental impact, special system applications and hydrogen energy status around the world at the end of the 20th century. They also participated in establishing hydrogen organizations and associations, which organized projects, published periodicals and held conferences.

Santilli [5] showed that studies on the electrolytic separation of water into hydrogen and oxygen date back to the 19th

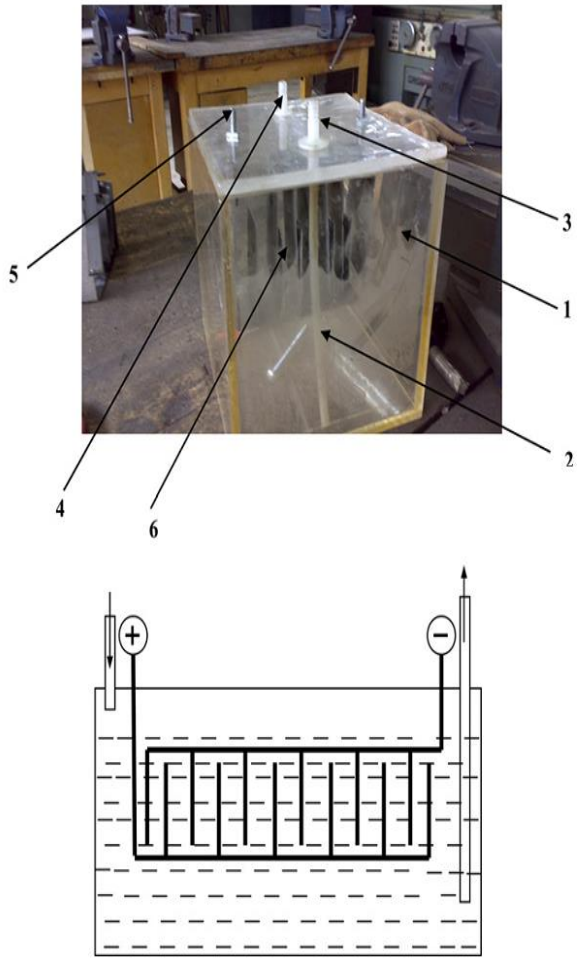

Fig. 3 – A photograph and a schematic diagram showing the main components of cell B (1-Plexiglas box, 2-Intake air tube, 3-Iintake valve, 4-Outlet valve, 5 -Electrode pole, 6-Stainless steel plates).

century. More recently, as Santilli mentioned, there has been considerable research in the separation of water into a mixture of hydrogen and oxygen gases. These studies were initiated by Yull Brown in 1977 via equipment generally referred to as electrolyzers and the resulting gas is known as "Brown's gas" or HHO.

Dunn in his important paper [6] indicated that research and development, incentives and regulations, and partnerships with industry had sparked isolated initiatives. But stronger public policies and educational efforts are needed to accelerate the process. Decisions made today will likely determine which countries and companies seize the enormous political power and economic prizes associated with the hydrogen age now dawning.

Schulti et al. in [7], after reviewing the existing literature on acceptance, risk perception and customer satisfaction, described the development of a model that illustrates important aspects in influencing a person's attitude toward a new product. "Values", "wants" and "perception" are the three components found to influence acceptance. The consumers themselves are affected by "social background" and "experience". Schulti et al. gave suggestions on how to use marketing methods, education projects and product exposure in order to maximize the likelihood of a successful introduction of hydrogen as an alternative fuel.

On the other hand, Hekkert et al. [8] analyzed and evaluated the German Research and Development system related to the development of hydrogen technology for automobile applications over the period 1974–2002. Their paper focused on the analysis of the main technological trends, the role of governments in steering the transition and the evaluation of the speed and direction of the transition to hydrogen. They showed that the interest in hydrogen is increasing rapidly and that overall the variety in research projects is increasing. Different governments play an active role in stimulating research and development, which broadens the variety of research topics. However, the gap between governments and industry may be too large to lead a significant influence of policy efforts. In the end, they therefore recommend stronger policy coordination to counteract the risks of premature lock-in in suboptimal hydrogen technologies.

Barreto et al. [9] described a long-term hydrogen-based scenario of the global energy system in qualitative and quantitative terms illustrating the key role of hydrogen in a long-term transition toward a clean and sustainable energy future. They showed that FC and other hydrogen-based technologies play a major role in a substantial transformation toward a more flexible, less vulnerable distributed energy system which meets energy needs in a cleaner, more efficient and cost-effective way. Hydrogen is the most abundant element in our universe [10]. In addition to being a component of all living things, hydrogen and oxygen together make up water, which covers 70 percent of the earth. In its pure form, a hydrogen molecule is composed of two hydrogen atoms (H_2) which is a gas at normal temperature and pressure with only seven

3. CHEMICAL EQUATION

HHO is popular and common gas produced from Electrolysis .It is really a combination of two Gases hydrogen H2 and Oxygen O2.The simple Chemical equation for conversion of water (Liquid) to HHO (gas) can be written as

H2O (l) ➡ HHO

Connected with a help of Direct current to Electrolytic cells is to dissociate water into Hydrogen and oxygen.

2H2O (g) + ENERGY ➡ 2H2 + O2

The chemical process could be easily speed up by using catalyst and during the process the selected compound does not change its property. The main purpose of the catalyst is to reduce the Amount of energy required for conversion. The Following chemical equation describes the Function of catalyst.

2H2O + CATALYST+ ENERGY ⟶

2H2 + O2+ CATALYST

As a result,
Electrolysis: 2 H2O → 2 H2 + O2

4. Effect of HHO on Emissions and environment

Adding HHO to an internal combustion engine, results in a faster, more complete combustion of the existing fuel. Faster and more thorough combustion means that more energy is

Transferred mechanically to the engine, instead of wasted heat through the exhaust. This has a positive impact not only on power and fuel economy, but also in emissions (as exemplified in the test report by *Euro fins below). The much faster flame propagation speed of hydrogen is responsible for this and is often compared to a giant "spark plug" in the engine that ignites all the combustible fuel. In summary, vehicle emissions are mostly comprised of 5 gases (the 6th is applicable to diesel fueled engines):

1.HC

2.NOx

3.O2

4.CO

5.CO2

6. PM

1. HC – Hydro Carbons are essentially unburned particles of fuel that are Passed through the entire engine, through the exhaust and into the atmosphere. This is the gas that accounts for smog in our cities.

Hydrocarbons are typically reduced by 30-40%.

2. NOx – Nitrogen monoxide and additional oxides are responsible for the "acid rain" pollution that is apparent in metro areas such as Los Angeles. NOx emissions are very strongly related to combustion temperature. As combustion temperatures exceeds 1527C (2870F), oxides of nitrogen are formed, and any increases in temperature will result in substantially higher emissions. When HHO is added to the engine, the resultant cooler combustion temperature helps lower this particular nauseous gas. Reductions of 20-25% are common in diesel engines. Typical reductions in gasoline vehicles are 50%. Results as great as 95% been reported in lean burning applications such as highly tuned gasoline and natural gas engines seeking large increases in fuel economy.

3. O2 – Oxygen is NON-POLUTING and necessary for our existence. Note the significant increase of clean oxygen as measured by 5-gas analyzers.

4. CO – Carbon Monoxide. This clear, odorless

Yet deadly gas gets reduced in the range of 25-50%.

5. CO2 – Carbon Dioxide, responsible for the "green house" effect on our planet is typically decreased by 40-60%

6. PM – Particulate Matter is the "solid particles

and liquid droplets" in the exhaust of diesel engines, more commonly referred to as "soot".

Cummins KTA-38
Eurofins test results onboard Hydrogen on demand generation.

Measurement	Without HHO		With HHO		Delta	Avoided emissions at 2500 running h
	% Vol mg/Nm3	g/h	% Vol mg/Nm3	g/h	%	Kg/year
O_2 (% Vol)	14,7	~	16,9	~	+14,97	~
CO_2 (% Vol)	4,6		2,3		- 50,00	159 ton/year
CO (mg/ Nm^3)	679	784	504	453	- 25,77	828
NOx (mg/ Nm^3)	1645	1898	1332	1189	- 19,03	1773
PM (mg/ Nm^3)	187	215,8	41,2	37,1	- 77,97	446,75

4.1 Emission parameters by Graph

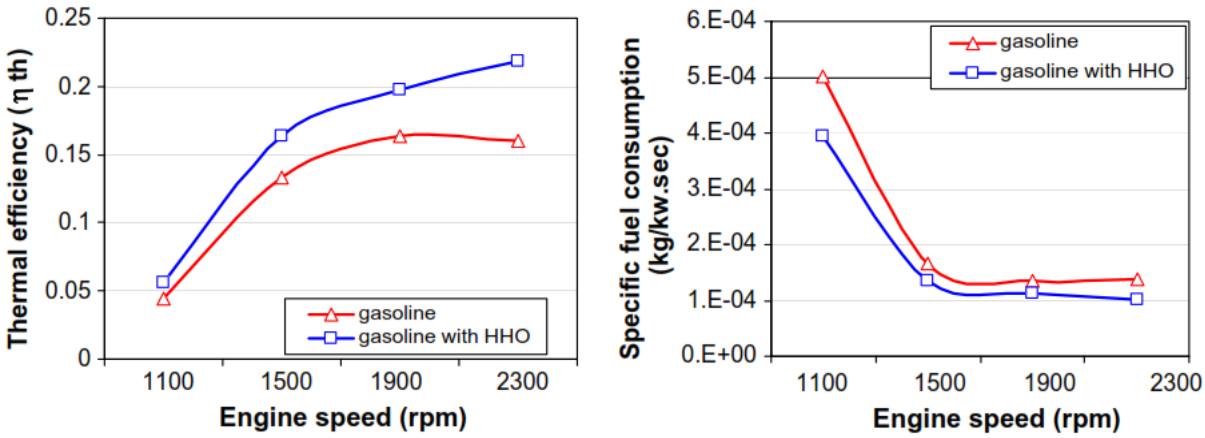

Fig.4- Effect of HHO gas on break efficiency and fuel consumption

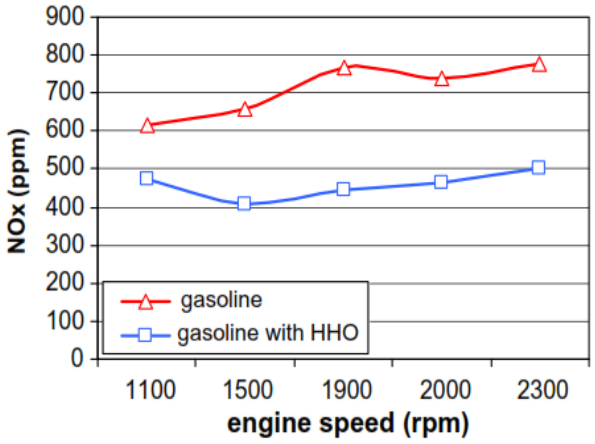

Fig. 5- Variation of nitrogen oxides (other than NO) Concentration with engine speed

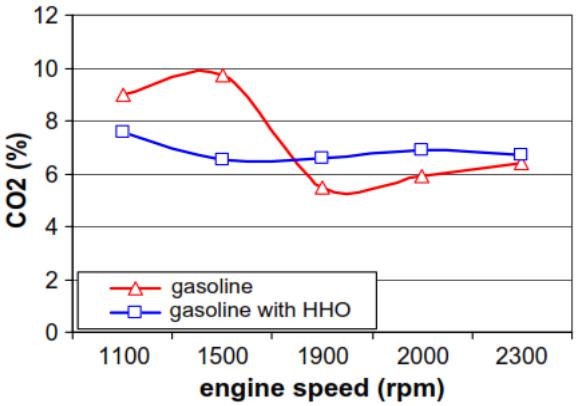

Fig.7-Variationofcarbondioxide concentration in the exhaust with engine speed.

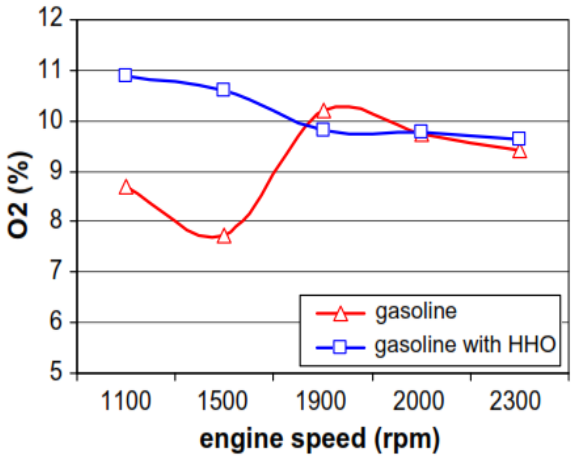

Fig. 6- Variation of oxygen concentration in the exhaust with engine speed.

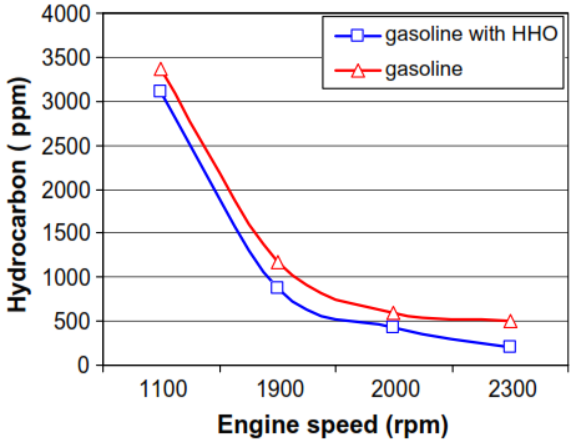

Fig. 8. Plot showing the effect of using HHO on hydrocarbon concentration in Exhaust gas with variable engine speed (rpm).

5. Conclusion

Experimental tests to investigate the effect of HHO gas on the emission parameters of a Honda G 200 engine have been carried out.

HHO gas has been generated by an electrolysis process in fuel cell. The generated gas is mixed with a fresh

Air just before entering the carburetor. The exhaust is sampled by a gas analyzer and the exhaust constituents have been identified and their concentrations have been evaluated. The following conclusions
Can be drawn.

1. HHO cell may be integrated easily with existing engine systems.
2. The combustion efficiency has been enhanced when HHO gasHas been introduced to the air/fuel mixture, consequently reducing fuel consumption
3. The concentration of nitrogen oxide has been reduced to almost 50% on average when HHO is introduced to the system.
4. When HHO is introduced to the system, the average concentration of carbon monoxide has been reduced to almost 20% of the Case where air/fuel mixture was used (no HHO).
5. The NOx average concentration has been reduced to about 54%of the case where HHO was not introduced.
6. HC concentration is highly affected by the engine speed and the

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