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# USING HYDROXYL GAS (HHO) WITH PRIMARY FUEL LIKE PETROL AND DIESEL

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## ABSTRACT

In this paper, we are going to discuss the use hydroxyl gas (HHO) with primary fuel. Using HHO helps in complete combustion of air fuel mixture which decreases the emission of harmful pollutant like HC, CO, $NO_X$ and $CO_2$. HHO also increases the engine efficiency and reduce fuel consumption. Another crucial benefit of using HHO with primary fuel is that, it reduces the deposition of carbon particle inside the cylinder and lengthen the oil changing period and reduce the maintenance period. Using HHO increases the cooling rate of engine by 10-20% than engine with only primary fuel.

**Keywords:** HHO, Fuel Consumption, Emission, Maintenance Period, Cooling Rate.

## I. INTRODUCTION

The hydroxyl (HHO) gas is produced from water using electrolysis process. Electrolysis process decomposes the water into hydrogen and oxygen. This process uses the two plates dipped into water which is generally made from inert metals like steel or platinum and DC current of 2.3V pass through this plate, which decomposes the hydrogen at cathode and oxygen at anode after production of HHO gas it injects in air after filtration and before carburetor.

## II. BODY OF PAPER

The HHO gas is produces using electrolysis of water. Conductivity of pure water is millionth time greater than sea water. So, electrolysis of pure water requires excessive energy. Electrolysis of pure water without excessive energy take place very slowly or not at all. To increase the rate of electrolysis some catalysts are add into pure water they are salt, acid or base. Process of electrolysis use the two electrodes plate generally made up of inert metals like steel or platinum. This electrode plates are dipped into water and DC current of 2.3 V is supplied to electrode then this current decomposes the water into hydrogen and oxygen element. Element of hydrogen are double than the element of oxygen.

Electrolysis reaction takes place as follows.

**Electrolysis: $2\ H2O \rightarrow 2\ H2 + O2$**

Reduction reaction takes place at negatively charged cathode. Which lost the electrons ($e^-$) and become hydrogen ion to produce hydrogen element.

**Cathode (Reduction) Reaction: $2H+ 2e- \rightarrow H\ (g)$**

Oxidation reaction takes place at positively charged cathode which gives the electron to cathode and form oxygen

**Anode (Oxidation) Reaction:**

**$2H2O(l) \rightarrow O2(g) +4H(aq) + 4e-$**

**Overall Reaction: $2H2O(l) \rightarrow 2H2\ (g) + O2\ (g)$**

The amount of gas produce depends upon mainly three things one is how well the amperage travel through water? Amperage is nothing put flow of electrons. Second thing is how much amperage reaches across the electrode plate? And area of electrode plate.

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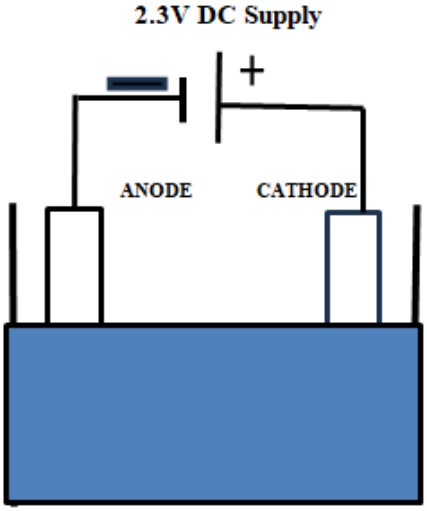


**Fig 1.** Electrolysis process

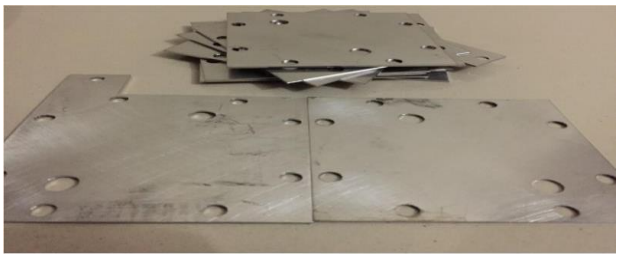

**Fig 2.** Stainless steel electrode plate

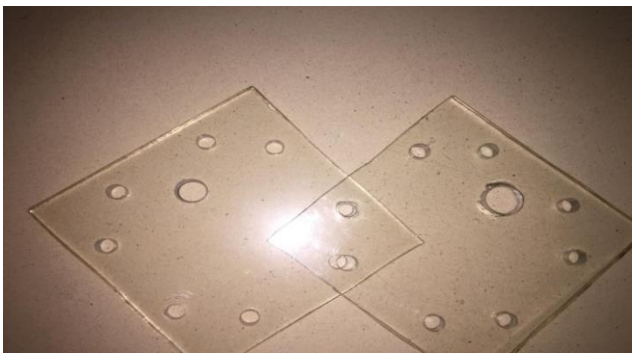

**Fig 3.** Acrylic cover plate

**Table 1.** Standard component used

| Component | Material | Dimensions |
|---|---|---|
| Transparent Hose | Std. | Diameter= 10 mm |
| Pipe Fittings | Std. | Diameter= 10 mm |
| Heat Shrink Tube | Std. | Diameter= 6 mm |
| Rubber Joiner | Std. | Diameter= 10mm |
| Crocodile Pin | Std. | - |
| M6 Std. Nuts and | Std | M6 x 65 |

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| | | |
|---|---|---|
| bolts | | |
| M3 Std nuts and Bolts | Std. | M3 x 15 |
| Washers | Std | - |
| PVC End Caps | Std. | Diameter= 75 mm |
| Pipe U Clips | Std. | 25 mm |

**Table 2.** Manufactured component used

| Component | Material | Dimensions |
|---|---|---|
| Electrode Plates | S.S. (316-L) | 100x100x1.2 |
| Insulating Cover Plates | Acrylic | 115x115x5 |
| Rubber Gasket | Neoprene Rubber | 115x115x2 |
| Reservoir Tank (Cylinder) | Acrylic tube | 75mm |
| Backing Plate | Wood | Contour (Thickness=10mm) |

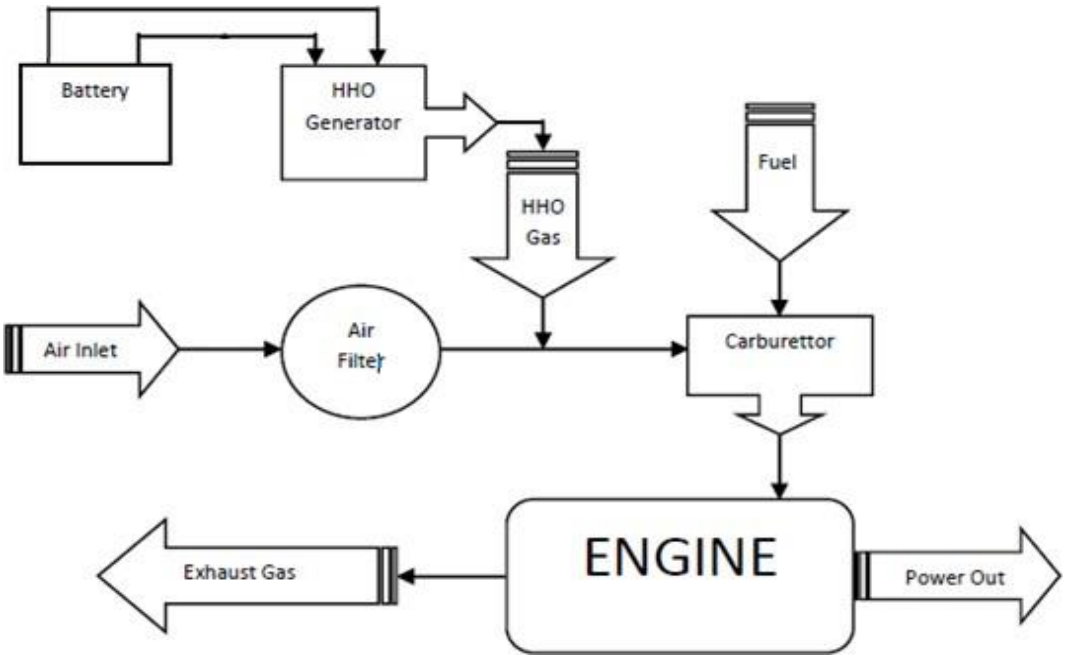


**Fig 4.** IC engine layout with HHO installation

## III. CONCLUSION

The purpose of this project is to reduce the fuel consumption and boost the mileage of vehicle using HHO gas. Another main advantage of it helps in complete combustion of air fuel mixture in engine chamber which reduces the emission of harmful pollutant like HC, CO, $CO_2$, $NO_X$. This reduces the air pollution and also reduce the effect on health of animal and birds. Further advantage of using HHO as secondary fuel is that it reduces the carbon deposition inside the cylinder which lengthen engine oil life and life of engine component too. Using HHO as secondary fuel increases cooling rate of engine by 10-20%.

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## ACKNOWLEDGEMENT

At the present time, most automobile vehicles work on the IC engine which uses the fossils fuels like petrol and diesel. These fossils fuels are non-renewable, it has limited amount of storage on earth. But, the nowadays the automobile are become the lifeline of human being which uses the tremendous amount of this fuels. Humans uses its 10-20% of its income for fuels, if this happens continuously then, one day storage of fossils fuel on the earth will vanish. On other hand these fuels after burning emits harmful gases like HC, $CO_2$, $NO_X$ and CO which badly affects the environment cycle, animal and birds. So, there is need to find the alternative fuel or the techniques that reduce fuel consumptions and emission. Using hydroxyl (HHO) as secondary fuel increases the efficiency of vehicle which obviously reduces the fuel consumption and its also help the complete combustion of fuel which decrease the harmful emission.

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