International Journal of Advanced Technology in Engineering and Science
Vol. No.5, Issue No. 02, February 2017
www.ijates.com
ijates
ISSN 2348 - 7550

WATER POWERED HYDROGEN GAS WELDING & CUTTING

[1]Prof. K. H. Borse, [2]J. S. Chavan, [3]A. P. Ingale, [4]K. S. Jejure, [5]S. A. Bakal

[1] Lecturer, Department of Mechanical Engineering Guru Gobind Singh Polytechnic, Nashik, (India)

[2345]Student, Department of Mechanical Engineering Guru Gobind Singh Polytechnic, Nashik, (India)

ABSTRACT

This paper is all about designing an efficient Hydrogen-Hydrogen-Oxygen (HHO) gas generator by which we can produce Hydrogen gas which can be replaced by oxyacetylene gas which is used in Oxyacetylene gas welding and cutting. The proposed HHO generator which is compact and less costly. Although people use HHO generator in practice which installed in IC engine and a very little research has been carried out on it that it can be used for welding & cutting. In this research we focused on finding an efficient and less costly gas. An efficient system is supposed to produce a large volume of Hydrogen gas using a very little power. Therefore, such a system can be replaced by oxyacetylene gas used for oxyacetylene gas welding. As the hydrogen gas is eco-friendly and it has no carbon deposition. Gasoline fuel emits greenhouse gases such as methane, CO2, etc. but the HHO gas does not emits such greenhouse gases which are harmful to environment and living beings. As we know the fossil fuels are going to vanish in closest future hence the alternative arrangement for fossil fuels is the HHO gas also some scientist called the HHO gas as a fuel to the future. Making fuel from water is very revolutionary idea because water is available in anywhere also in cheap cost. After the Kyoto protocol the whole world is working for reducing the temperature of earth surface and also reduce the carbon emission.

Keywords - HHO generator, Welding and cutting, Hydrogen, Kyoto protocol

I. INTRODUCTION

The increase in demand of fuel has resulted in huge increase in crude oil prices and also the gases which are used in automobiles & some manufacturing devices such as Oxyacetylene gas which is used for welding & cutting. There is also increment in carbon dioxide in our atmosphere, to get over these problems there is need in implementing renewable sources of energy which has low or no carbon deposition like hydrogen fuel cell. In this project we are going to produce hydrogen gas by using hydrogen dry cell .this is basically an electrolysis process in which water is ionized with an electrolyte sodium hydroxide (NaOH) in a generator which is made of 60 plates of steel of 202 grade in between each steel plate there is an circular rubber gaskets and this whole system is covered with acrylic sheets. The current is supplied to the steel plates, the positive terminal is known as cathode and the negative terminal is known as anode, it requires only 12v electricity supply due to this ionization process stars and the water

is separated in to hydrogen and oxygen in the form of gas which is then carried to the water reservoir through pipe from both sides. Then the pure hydrogen gas is collected on top side of reservoir which is then carried to the welding torch through rubber tube and then flamed up and then used for further welding & cutting. We can generate HHO gas anywhere only we have to carry the cell which we manufacture which also easy to manufacture and the catalyst. Generation of HHO gas is very simple it is only a simple electrolysis. In HHO gas generator we breakdown the molecules of water in that there are two molecules of hydrogen gas and one molecule of oxygen gas.

II. CURRENT SCENARIO

Nowadays we use gasoline fuel in industry and in automobile that increases temperature of earth which called as global warming. In gasoline we mostly use petrol, diesel, LPG, etc. that emits CO, CO2, NOx, hydrocarbons which are harmful for our environment and living beings also so reduce that the HHO gas is the alternative solution for gasoline fuel. Now in industry we are using oxy acetylene gas for welding and cutting but we are going to introduce the HHO gas for gas welding and cutting because the existing gas is produce very much amount of hazardous gases, by HHO gas we can eliminate this and also the cost is also less of the HHO gas.

The background of this hydrogen fuel cell started in nineteenth century, and the credit of development of this tool goes to Sir William Robert Grove, a Welsh judge and first researcher.

This fuel cells are recently used in cars for fuel supply the fuel cell used by them is wet cell which has some chances of explosion but we are using HYDROGEN DRY CELL which is more safer than wet cell.

There are not so many peoples who knows about this fuel cell which more effective & totally eco- friendly and that's why we can use it by replacing it with oxyacetylene *gas.*

III. WORKING PRINCIPLE OF HYDROGEN FUEL CELL

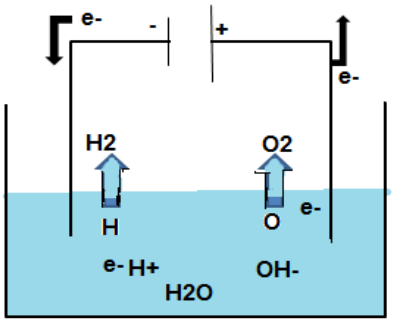
The fuel cell we are using is dry cell which have some main parts like steel plates, acrylic sheets, rubber tubes, a reservoir, a rechargeable battery, welding torch. In the dry cell first the water is supplied through it and at the same time the current is supplied to steel plates when current is supplied the electrolysis process takes place there and the following reaction takes place,

Electrolyte: $4H_2O \rightarrow 4H^+ + 4OH$

Cathode: $4H^+ + 4e^- \rightarrow 2H_2$

Anode: $4OH^- \rightarrow O_2 + 2H_2O + 4e^-$

So we see from anode &cathode reactions water is get separated into hydrogen and oxygen as the fuel cell is fully sealed with gasket there is no chance of leakage ,after this the gas is get extracted from the other end of cell and supplied to reservoir. Then in reservoir the gas is get collected at the upper side of reservoir then the gas is further used for welding & cutting which is extracted through tubes.

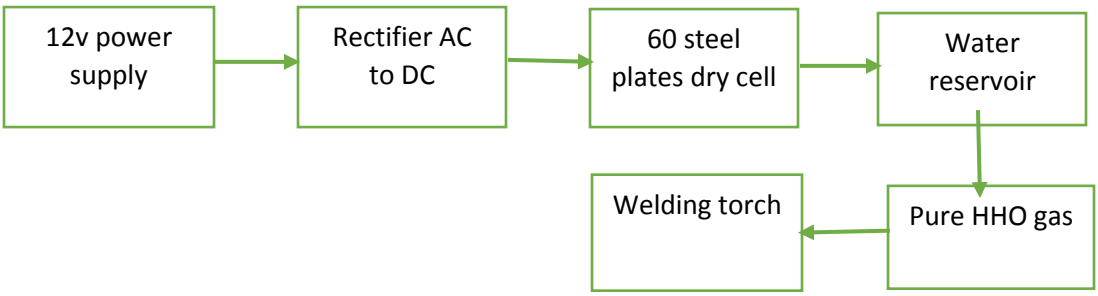


Electrolysis process takes place in fuel cell

IV. METHODS & EQUIPMENT'S

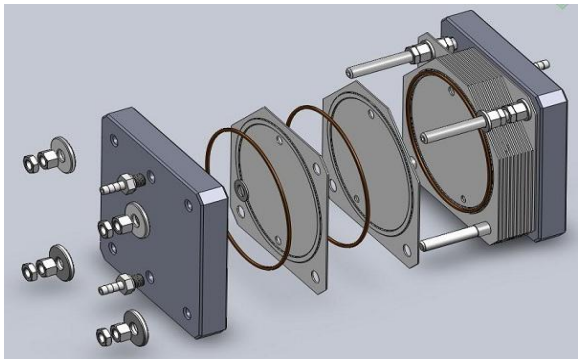
Generally the hydrogen gas is produced when power supply of 12v is supplied to steel plates of dry cell and due to electrolysis process water is splits up into hydrogen & oxygen. The ionized water is then carried out in the form of gas through the reservoir to the welding torch, where it is flamed up for welding purpose.

4.1 Power supply setup



4.2 Dry cell structure

The dry cell consist of 60 stainless steel plates of 202 grade. The stainless steel plates have non-corrosive property that's why they can be used in this dry cell. These plates can retain 1000 degree c temperature easily and stainless steel is also cheap in cost because other than stainless steel we can use tungsten and platinum which are quiet costly. The current supply 12v is given to cell which sufficient for the electrolysis process. These plates are placed in series with one gasket between each and every plate these gaskets can retain 260 degree c of thickness 1.5. There are two acrylic plates used as supporters and two plastic nozzles are attached for input & output. And the cell is tighten by 8 nut & bolts which can bear up to 10.5 ton strength and they are non- corrosive also.



4.3 Reservoir

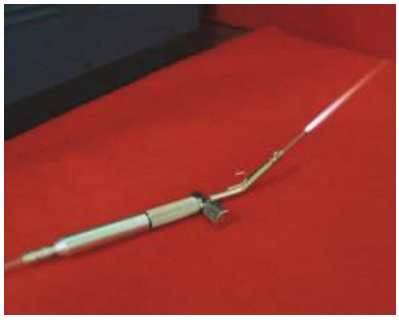
The plastic tank is used as a reservoir in which water is stored, there 3 plastic nozzle attached to reservoir. Two nozzles at bottom of it as input & output. At the reservoir one outlet is connected at top of the reservoir for outlet of gas the gas is less in weight than the water hence the gas floats on water hence it is easy to collect it from the upper side of the reservoir. There is chances of backfire of gas and danger of explosion hence to eliminate that we use one flash port at the outlet of the gas.

4.4 Flash Port

The flash port used plays very important role in this project, it is for safety purpose. It has a pressure relief valve, as it pops up when there is back fire of hydrogen gas. There are two springs used in it one at lower side one at upper side, at lower spring a glass ball is placed when back fire of hydrogen gas occurs the glass ball pops up at upper spring and the pressure of hydrogen gas is released at open part of flash port.

4.5 Gas torch

The purpose of gas torch is for welding and as well as cutting. It has single nozzle with hole of minimum for effective running. In gas torch there is arrangement for controlling the amount of gas which is going to use for further welding or cutting purpose. We can also control the amount of gas by controlling the amperage of the system, if we increase amperage the amount of gas is going to increase and if we decrease the amperage the amount of gases is going to decrease.



V. CONCLUSION

The successive experimental set up done for the HHO welding & cutting which results shows that:

- The flame of HHO gas does not deposit carbon hence cleaning is easier, and also resist corrosion.
- The gas is more efficient as a fuel either we use in industry or use in automobile.
- If we use this gas the health of instrument is increases and also reduces the process time.
- The HHO gas is less in cost and also ecofriendly.
- The HHO gas is colorless, odorless.
- The production of gas is a simple electrolysis process and the generator is also simple in construction.

REFERENCES

[1] Brown's Gas - Oxyhydrogen - HHO, What is it?, from *http://brownsgas.com/browns-gas-oxyhydrogen-hho-gas/what-is-browns-gas.html.*

[2] Brown's Gas, Oxyhydrogen Soldering, from *http://brownsgas.com/brown-gasoxyhydrogen-hho-gas-applications/welding-a-brazing/soldering.html.*

[3] http://auto.howstuffworks.com/fuelefficiency/alternative-fuels/fuel-cell.htm

[4] http://www.alternative-energynews.info/technology/hydrogen-fuel

[5] http://www.nasa.gov/topics/technology/hydrogen/hydrogen_2009.html

[6] http://www.renewableenergyworld.com/rea/tech/hydrogen