

Design and Fabrication of Hydrogen Generator

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Abstract: - This is the new alternative concept mostly suitable for vehicles. The concept of hydrogen generator is simple. The hydrogen was generated in the hydrogen generator, is used as an alternative fuel in vehicle. Nowadays the cost of petrol and diesel is too far and increase in pollution. The purpose of using hydrogen is to reduce pollution and expenses on fuel. We have designed a hydrogen generator that produces hydrogen from water by passing dc current. The main components used in this project are low density plastic, SMPs, sodium hydroxide and water.

Key Words— *Hydrogen, Low density, Plastic, Sodium Hydroxide.*

I. INTRODUCTION

HHO gas technology is still considered experimental, but it is a supplemental chemical is sorts that could help you increase mileage, increase horsepower, reduce emissions while providing a quieter and cleaner in engine block. Energy must be conserved in one way. so we are trying to implement to the future. This might be a good plan to save the environment society. It is clear from the various investigations and analyses through hydrogen have the potential to be a very promising eco-friendly fuel. There is a misconception about the Hydrogen gas, the demand is burning hybrid hydrogen or HHO gas or Brown's gas along with gasoline or diesel and due to this reason there should be increasing in the MPG (Miles per Gallon). But it is different way, it says that, HHO gas is a supplement or as additive to conventional engine fuel system, it helps improve combustion of the conventional engine fuels more efficiently & effectively. HHO gas is also called as Brown's gas or oxy-hydrogen gas, by using electrolysis process water was break in to two parts, hence it is converted into two mole of hydrogen & one mole of oxygen. There is a device ie., called a Hydrogen generator. It is uses a process known as electrolysis to separate and extract both hydrogen and oxygen out of water. Earlier developments for hydrogen generators were designed to extract HHO or sometimes referred to as Browns Gas. They were originally designed for welding and cutting purposes, but HHO can be used as a supplemental fuel for internal combustion engines, even diesel motors. One company have developed a patented pending design that is compact and can fit into almost any vehicles motor compartment.

II. DESCRIPTION OF PARTS

Parts:

- SMPs
- Electrodes
- Low Density Plastic Container
- Water
- Potassium Hydroxide
- Outlet Tubes

A. SMPS

A switched mode power supply (SMPS) is an electronic circuit that converts power using switching devices that are turned on and off at high frequencies and storage components such as inductors or capacitors to supply power when the switching device is in its non-conduction state.

Switching power supplies have high efficiency and are widely used in a variety of electronic equipment, including computers and other sensitive equipment requiring stable and efficient power supply.



Fig.1. SMPS

B. ELECTRODES

Stainless Steel Grade 316L is used where corrosion resistance and good mechanical properties are primary requirements. This cell generator is built with 12 concentric 316L grade stainless steel seamless pipes and spacers. SAE 316L grade stainless steel is the second most common austenitic stainless steel after 304. The addition of molybdenum provides greater corrosion resistance than 304, with respect to localized corrosive attack by chlorides and to general corrosion by reducing acids, such as sulphuric acid. Hence it is used in electrolysis process.

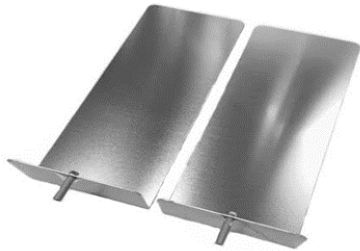


Fig.2. Electrodes

C. PLASTIC CONTAINER

Low density polyethylene (LDPE) is a high molecular weight polyolefin material. Like all polyolefin, LDPE is nontoxic, non-contaminating and exhibits a high degree of break resistance. It is lighter than water, easily withstands exposure a wide variety of common lab chemicals, and has a milky white translucent appearance. Low-density polyethylene (LDPE) is a thermoplastic made from the monomer ethylene. It was the first grade of polyethylene, produced in 1933 by Imperial Chemical Industries (ICI) using a high pressure process via free radical polymerization



Fig.3. Plastic Container

D. Sodium Hydroxide

Sodium hydroxide is a highly caustic base and alkali that decomposes proteins at ordinary ambient temperatures and may cause severe chemical burns. It is highly soluble in water, and readily absorbs moisture and carbon dioxide from the air. The commercially available "sodium hydroxide" is often this mono-hydrate, and published data may refer to it instead of the anhydrous compound. As one of the simplest hydroxides, it is frequently utilized alongside neutral water and acidic hydrochloric acid to demonstrate the pH scale to chemistry students.

Sodium hydroxide is used in many industries: in the manufacture of pulp and paper, textiles, drinking water, soaps and detergents, and as a drain cleaner. Worldwide production in 2004 was approximately 60 million tons, while demand was 51 million tons.

Working:

The hydrogen generator is a device that is designed to produce hydrogen gas from water by electrolysis process. It consists of a closed container containing 316L electrode rods and an aqueous electrolyte. Where the electrodes being connected to two terminals of the power unit. The container is made of low density plastic. The exit valve for the gas is situated at the middle of the container connected to hose. The electrodes are dipped in the aqueous solution of sodium hydroxide and water. This generator uses electricity to produce hydrogen and oxygen gases by electrolysis of aqueous solution of sodium hydroxide and water. Electric current is passed through the water to break down the molecules of water to produce hydrogen and oxygen gases. If there is partition in the generator chamber, the pure hydrogen and oxygen gases can be collected separately but in this case, they are collected together as a mixture of hydrogen and oxygen gases called hydroxide gas. The hydroxide gas is eventually passed through water to dissolve oxygen and liberate hydrogen gas.

III. SELECTION OF MATERIAL

A. Properties

The material selected must possess the necessary properties for the proposed application. The various requirements to be satisfied can be weight, surface finish, rigidity, ability to withstand environmental attack from chemicals, service life, reliability etc.

The following four types of principle properties of materials decisively affect their selection

- Physical
- Mechanical
- From manufacturing point of view

- Chemical

The various physical properties concerned are melting point, thermal Conductivity, specific heat, coefficient of thermal expansion, specific gravity, electrical conductivity, magnetic purposes etc.

The various Mechanical Properties Concerned are strength in tensile, Compressive shear, bending, tensional and buckling load, fatigue resistance, impact resistance, elastic limit, endurance limit, and modulus of elasticity, hardness, wear resistance and sliding properties.

The various properties concerned from the manufacturing point of view are,

- Cast ability
- Weld ability
- Forge ability
- Surface properties
- Deep drawing etc.

B. Manufacturing case

Sometimes the demand for lowest possible manufacturing cost or surface qualities obtainable by the application of suitable coating substances may demand the use of special materials.

C. Quality Required

This generally affects the manufacturing process and ultimately the material. For example, it would never be desirable to go casting of a less number of components which can be fabricated much more economically by welding or hand forging the steel.

D. Availability of Material

Some materials may be scarce or in short supply, it then becomes obligatory for the designer to use some other material which though may not be a perfect substitute for the material designed. The delivery of materials and the delivery date of product should also be kept in mind.

Space consideration Sometimes high strength materials have to be selected because the forces involved are high and space limitations are there.

IV. CONCLUSION

Our project entitled “DESIGN AND FABRICATION OF HYDROGEN GENERATOR” is successfully completed and the results obtained are satisfactory. Hydrogen gas can replace gasoline, in This hydrogen gas generator can easily to be replicated, thus making the shift from fossil fuel to sustainable fuel is easy. The hydrogen produced is a clean source of

energy which won't produce harmful gases and smoke. Only water vapor will produce after combustion of hydrogen. Step towards a clean environment, small domestic electricity was produced.

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