SUSTAINABLE PRODUCTION OF HYDROGEN FROM RENEWABLE ENERGY IN I.C ENGINE

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Keywords

Alkaline Electrolysis, Green Hydrogen, Solar energy, Electrodes,

Hydrogen gas sensor.

Introduction / background

Green Hydrogen is a method of producing Hydrogen from a renewable source and it can also be said as clean energy as the production process doesn't release any kind of pollutants like the other methods of production does.

The main component of producing Green Hydrogen process is the Electricity used to break the Hydrogen and Oxygen molecules and if the electricity is produced from the non-renewable sources, then that doesn't justify the title as Green Energy.
So, the alternative method of producing electricity is Solar Energy.
The electricity produced from solar and using it for the production process of Hydrogen makes it completely Green Energy.

Objectives

1. Production of Green Hydrogen through Alkaline Electrolysis.
2. Usage of Solar Energy.
3. Usage of 304 and 306 graded steel electrodes.
4. Coating of Nickel upon the electrodes.
5. Solar energy with battery storage (Li-ion batteries, due to their high energy density, high charging rate, and long life.)
6. concentrated alkaline solution (5M KOH/NaOH)
7. Evaluate the characteristics of Hydrogen gas as Fuel.
8. Cleanup and evaluate the produced gas to make it suitable for combustion in I.C engine.
9. Conversion of the I.C engine to use Hydrogen as Fuel to combust.

Methodology

Materials

1. AC to DC converter of 1amp capacity with voltage regulator.

2. Graded Hard plastic container suitable to operate up to 110°C.
3. Electrical wires.
4. Steel Electrodes of 304 and 306 grade.
5. Metal Alligator Clips.
6. Gas collection tubes.

Method/ Production process

The Alkaline Electrolyser cell of 15litres capacity had been setup by inserting electrodes having diameter of 10mm adjusting the height to the 80% of the cell. The voltage is supplied using and AC to DC converter with 1amp capacity and a voltage regulator from 0v to 12v connected to electrodes using alligator clips. The produced Hydrogen gas is collected from the top of cell using circular pipe to other container containing of water then to the final container.

Results and Conclusions

To verify the process and to confirm the hydrogen production, the work was carried out at smaller level using a 1 lite container, iron electrodes, 9v battery, electrical wires, KOH electrolyte and a ballon to collect gas. After the gas got collected in ballon, test was conducted to confirm the Hydrogen production by lighting a matchstick near the opening of ballon as a result a squeaky pop sound was observed.

After the sample experiment, larger setup has been done to collect Hydrogen using desirable electrodes.

What is the innovation in the project?

The current required to break the hydrogen and oxygen using solar energy might not be able throughout the year so

1. The excess energy is stored in Li-ion batteries.
2. Make the Hydrogen production as low investment setup.
3. Usage of Steel Electrodes having a coating of desirable materials.
4. Doing the changes in I.C engine suitable for Hydrogen combustion.

Scope for future work

The Green Hydrogen production from Renewable Energy sources would be a great alternative to save the fossil fuel used to produce Hydrogen, running of vehicles. For a larger setup of Hydrogen production, the hydrogen itself can be used to produce electricity making it less dependable on the other sources of electricity.