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ABSTRACT

Purpose:

To study Solar and Fuel Cell, types of Alternative Energy Technologies.

Aim:

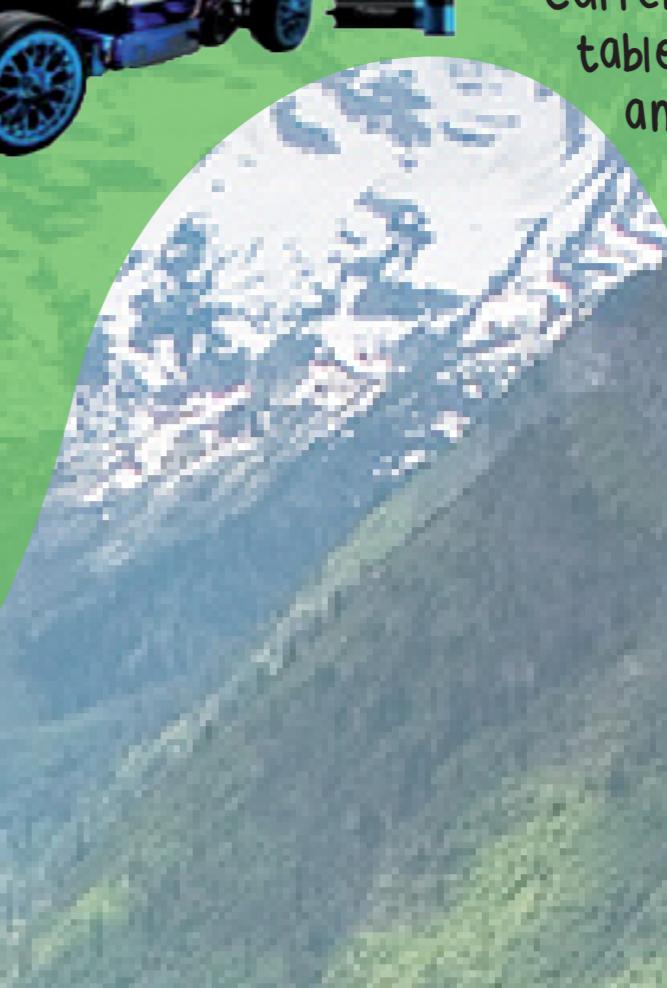
To Understand the operating principles of a Solar fuel-cell car.

Process:

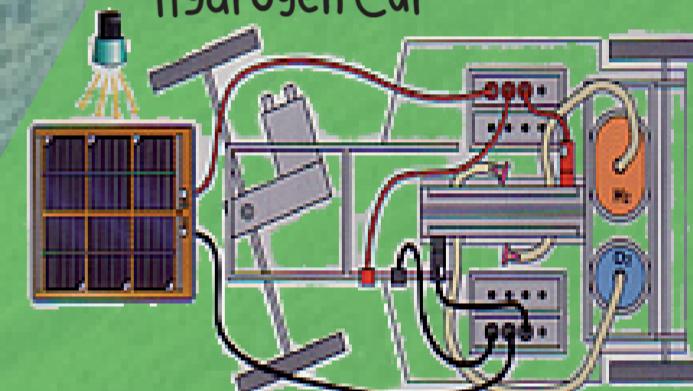
We will construct a miniature vehicle powered by solar and fuel cell. Water used in the miniature solar fuel-cell vehicle will be separated into hydrogen and oxygen gases which will power the vehicle. Solar cell will provide alternate power to the vehicle.

METHODOLOGY

- Find the relationship between short circuit current and distance of table lamp to solar panel and the relationship between no-load voltage and distance of table lamp to solar by plotting graphs
- Split water by electrolysis
- Measure the generative rate of gas and calculate the efficiency of electrolysis
- Complete splitting of water in the fuel cell
- Measure gas retention
- Test the efficiency of fuel cell car
- Set up Hybrid Solar Hydrogen Car



MINIATURE SOLAR FUEL-CELL VEHICLE



INTRODUCTION

Our project aims to find the most suitable energy that causes the vehicle to move by relying on the solar energy and fuel cell, which is powered by gases including hydrogen and oxygen. In this project, a miniature solar fuel-cell car which is powered by solar energy will be collected from solar cell and converted to electrical energy by photovoltaic effect, and powered by PEM (Proton Exchange Membrane) fuel cell as well, is used for our study.

RESULTS / DATA

The distance between the table lamp and the no-load voltage is linearly related. When the distance is greater, lesser voltage is linearly related. When the distance is greater, lesser voltage is recorded and lesser solar energy is stored by the solar panel. With lesser light intensity, there would be lesser solar energy produced. The IV characteristic curve obtained with different resistance value is similar to typical IV characteristic curve.

The gases obtained by electrolysis are oxygen and hydrogen. The reversible reaction of hydrogen and oxygen stored in the fuel can produce lots of energy by the PEM fuel-cell. The car is charging and operating the motor when sunlight is shining on the solar cell. But when the solar cell is blocked, it uses the secondary energy source which is the gases in the fuel tank!

CONCLUSION

Taking into account all the experiments we did, our hypotheses are mostly supported by the results, and we can safely conclude that the fuel cell can operate the motor when sunlight is shining on the solar cell, which produces higher voltage to make the car move further with higher light intensity. However, solar fuel-cell vehicle highly relies on the weather condition. Where sunlight is not available, the car uses a secondary energy source, which is the gases in the fuel tank. The gases are produced by electrolysis in advance and collected separately in two fuel tanks. This process can be reversed and energy can be generated to operate the car through fuel cells. With the two energy sources, the hybrid solar hydrogen car is able to move regardless of weather conditions but the efficiency is low, and the power produced by fuel cell may not support the car to move much. Our future research will focus on improvements on the efficiency of the car and reducing the cost to make the hybrid solar hydrogen car pervasively usable.

