International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 05 | May - 2021 ISSN: 2582-3930

HYDROGEN FUEL CELLS AN INTRODUCTION

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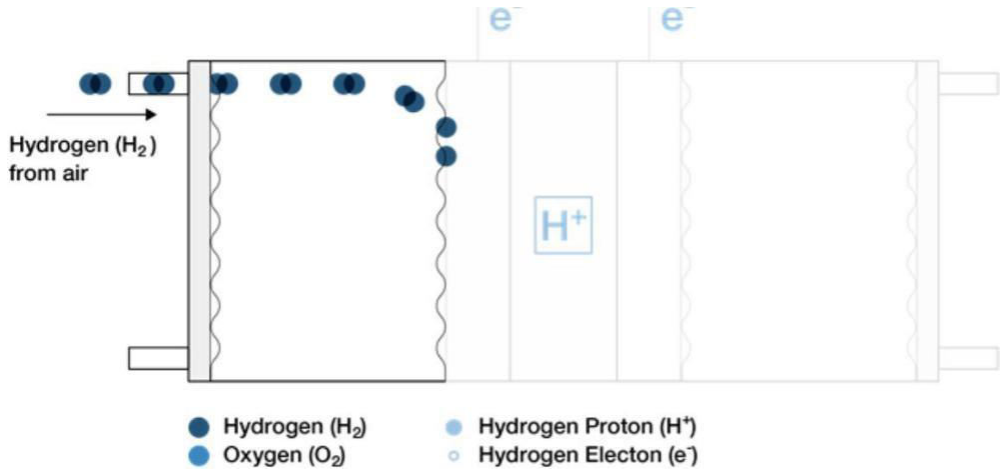
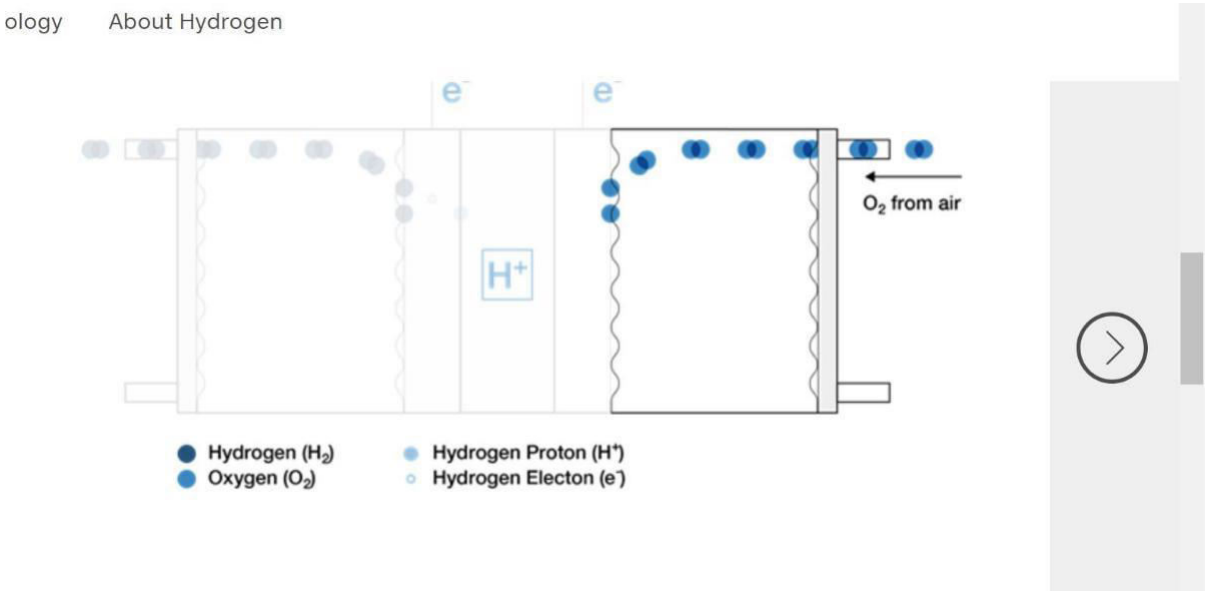
When it comes to power sources for an engine there is an extensive use of fossil fuels such as petroleum which is later distilled to produce diesel. The fuel cell lags behind right now but it is believed that hydrogen fuel cars will be the future of transportation. Hydrogen fuel cars are cars powered by an electric motor, thus they come under the category of e-cars or electric cars.The fuels that are in use all over the world are mostly extracted from non- renewable sources, and these sources are depleting fast. Thus we would have to move to other alternatives to power our vehicles. Hydrogen fuel cells are a renewable source of energy as they form electricity by the combustion of hydrogen. With water being the only byproduct hydrogen cars are less pollut-ing than petroleum powered vehicles.

Hydrogen being the most abundant element on earth would be able to power cars with ease. Hydrogen also can be produced by natural gas reforming which uses methane or other gases to produce hydrogen using high temperature steam. Other methods of producing hydrogen include fermentation and renewable liquid reforming which reacts ethanol at high temperature at steam to produce hydrogen.

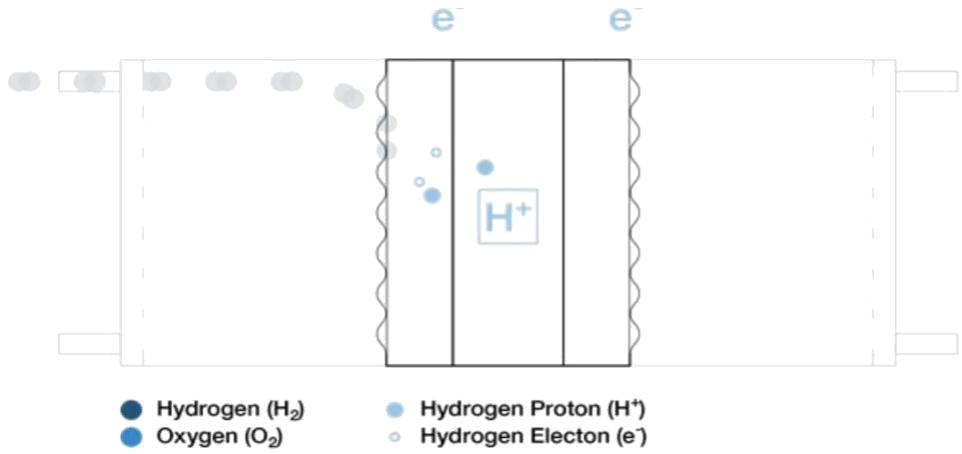
Fewer pollutants, less noise and a constant source of energy are among the many great hopes for electrically powered vehicles. Hydrogen powered cars are essentially electric cars, but the one thing which differentiates hydrogen cars from other electric vehicles is that hydrogen pow-ered vehicles produce the electricity themselves and not from a built in battery. Hydrogen cars have their own efficient power plant on board. So how do these fuel cells work? Fuel cells are like batteries just that they don't need recharging, they keep on producing heat and electricity as they are supplied with fuel.All the magic takes place in the fuel cells where the electricity is pro-duced. A fuel cell is like an electrolysis cell.It consists of a negative electrode(cathode) and a positive electrode(anode) and between them is the electrolyte.Hydrogen comes in from the an-ode side where the electrochemical potential pulls it through the catalyst. The catalyst used in this process is platinum, it has catalytic properties because it's a transition metal.



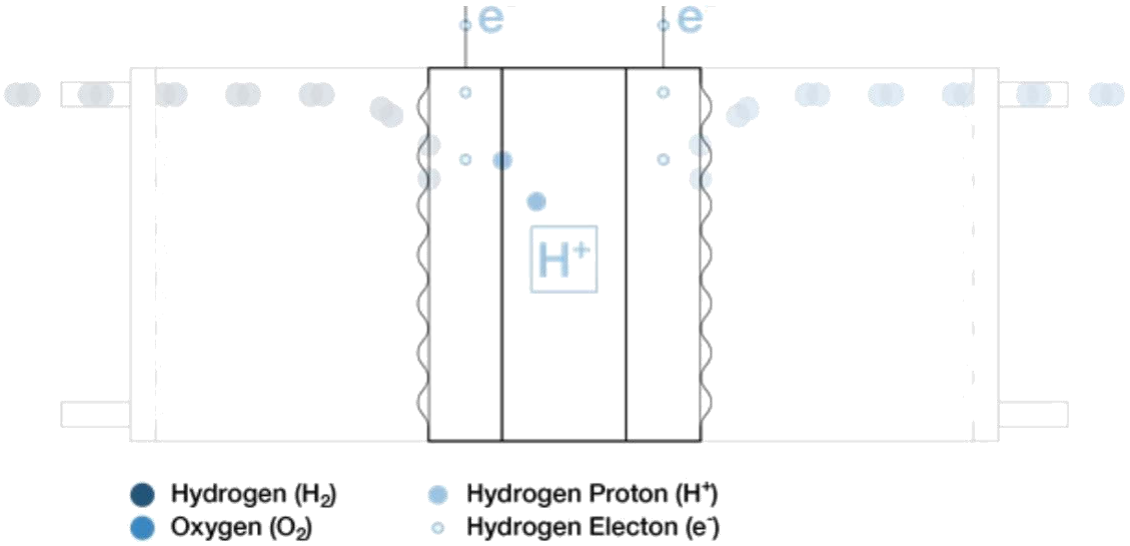
When hydrogen comes into contact with the catalyst it splits up into two protons (H+ ions) and two electrons(e-).



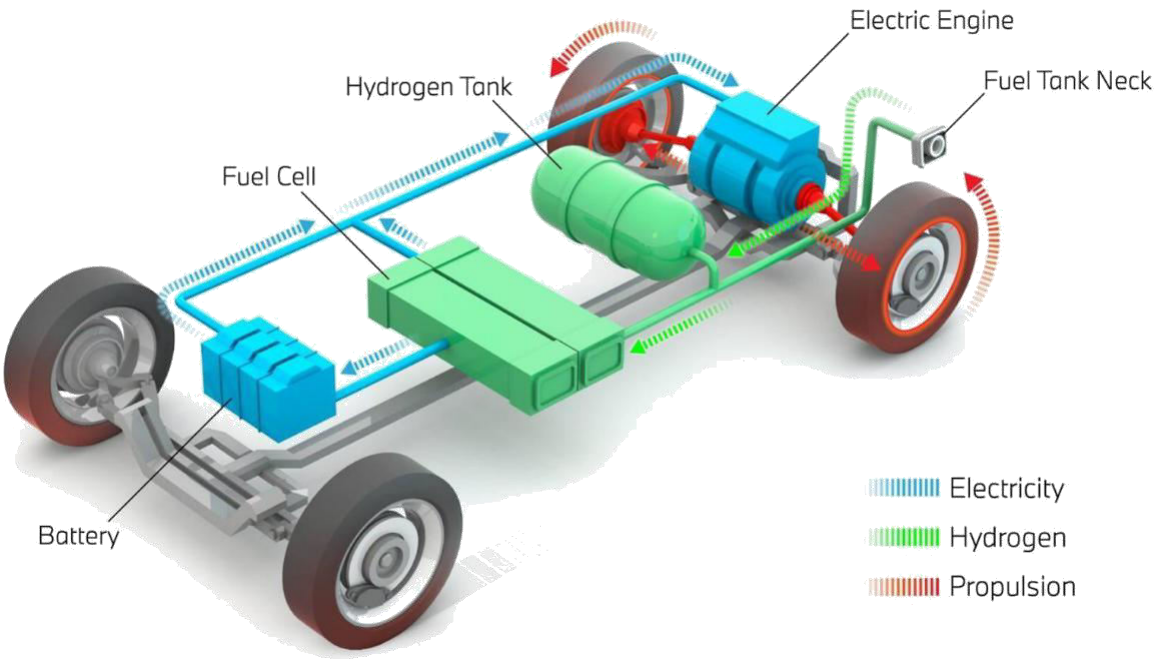
On the other hand at the cathode the oxygen is pulled in and forced through the catalyst, which splits it into two oxygen atoms.These atoms have a strong nega-tive charge thus they attract the positively charged hydrogen ions



When these two atoms react together they join forming water and heat. So we can see that this process of the fuel cell is totally environmentally friendly, thus it's a good option to consider for the future



Meanwhile the electrons simultaneously travel through the anode and to an external circuit where they generate electricity and return back to the cathode.



The above diagram shows a hydrogen fuel cell which is connected to the battery which supplies and stores electricity, which is passed to the electric engine which is used to move the vehicle. Fuel cells do bear many fruits but they also come with some down sights. Cost plays a big role in paving the future of fuel cells, platinum represents the largest cost component of production. The estimated cost for each car is 80,000 dollars which is about double the value of other e-cars.Other problems owners might face is of refuelling the cars, because hydrogen powered cars are refuelled at special fuel pumps. But there is a scarcity of such services around the globe, thus this would be a big task to overcome.With such scarce fuel stations the demand for such cars would be less thus the it wont allow for profitable mass production of vehicles.Thus with hardly any hydrogen cars on road operators will hesitantly expand their refuelling station network.

Looking at the various advantages fuel cells bring in I can surely say it will change the way the world sees transportation. The one crucial difference between electric cars and hydrogen fuel cars is that hydrogen cars are capable of producing electricity on their own. They don't have a built in battery that needs charging. Instead they are installed with their own power plant on board which produces electricity and powers the vehicle. Hydrogen cars just like other electric cars produce no engine noise, and give a lively start as electric cars produce full torque at low speeds too. Another plus point to hydrogen cars is that they have a low charging time due to their onboard plant, the car's battery is ready in under 10 minutes. With the capacity of upto 300 miles hydrogen cars will be able to come on top. Compared to other cars the range of the fuels does not change with a change in the outside temperature. Water being the only byproduct tells us that with almost no carbon emissions they don’t leave any carbon footprints when in use.

Some disadvantages include very high costs of raw materials such as platinum. Cost of pro-duction of the fuel cells are also very high.Hydrogen is a highly flammable fuel source, which brings understandable safety concerns. Hydrogen gas burns in air at concentrations ranging from 4 to 75%,thus it is seen to be dangerous.

So to conclude we could say that hydrogen fuel cell is the future of transportation and would change the face of the world due to the non polluting technology it brings with it. There are some downsides to such fuel cells but they can be looked into and fixed with the upcoming technological advancements.