



19CH101– ENGINEERING CHEMISTRY

Unit-5 ENERGY SOURCES AND STORAGE DEVICES

ELECTRIC VEHICLES

An electric vehicle (EV) is a vehicle that uses one or more electric motors for propulsion. It can be powered by a collector system, with electricity from extravehicular sources, or it can be powered autonomously by a battery (sometimes charged by solar panels, or by converting fuel to electricity using fuel cells or a generator). EVs include, but are not limited to, road and rail vehicles, surface and underwater vessels, electric aircraft and electric spacecraft.

Types of Electric Cars

Different types of electric cars changed and are developed continuously giving users and potential users choices. Today the world is increasingly familiar with the terms BEV, HEV, PHEV and FCEV. How does an electric car work? How an electric vehicle works is depend on the type. This article will briefly discuss the types and working principles of electric cars or vehicles marketed in the World and Indonesia today.

An **electric car** is a vehicle that is fully or partially propelled by electric motors, using energy stored in rechargeable batteries. The first practical electric cars were produced in the 1880s. Electric cars were popular in the late 19th century and early 20th century. Innovation and advanced development in internal combustion engines (ICE) and mass production of cheaper gasoline vehicles has led to a decline in the use of electric vehicles.

The development of energy storage technology, especially battery technology, makes electric cars become more popular again at this time. So how an electric car work really?

How Does An Electric Car Work?

When pedal of the car is pressed, then:

- Controller takes and regulates electrical energy from batteries and inverters
- With the controller set, the inverter then sends a certain amount of electrical energy to the motor (according to the depth of pressure on the pedal)
- Electric motor converts electrical energy into mechanical energy (rotation)
- Rotation of the motor rotor rotates the transmission so the wheels turn and then the car moves.



FUEL CELLS:

Definition

Fuel cell is a voltaic cell. It converts chemical energy of the fuels directly into electricity without combustion. In these cells, the reactants and electrolytes are continuously supplied to the cell.

Fuel + Oxygen ----- > Oxidation products + Electricity.

Examples : Hydrogen - oxygen fuel cell.

Hydrogen - oxygen fuel cell

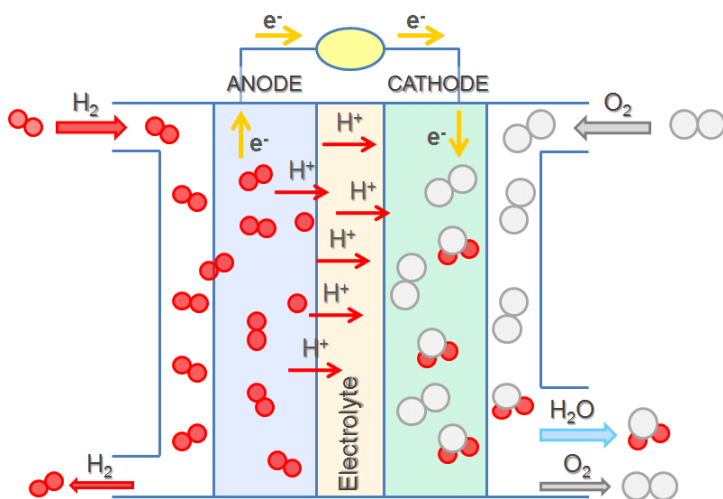
It is the simplest and most successful fuel cell. The fuel-hydrogen and the oxidiser-oxygen and the liquid electrolyte are continuously supplied to the cell.

Description

The cell has two porous electrodes, anode and cathode. The electrodes are made of compressed carbon containing a small amount of catalyst (Pt, Pd, Ag). Between the two electrodes an electrolytic solution, 25% KOH is filled

Working

Hydrogen passes through the anode compartment, where it is oxidised. Oxygen passes through the cathode compartment, where it is reduced.





Advantages of Fuel Cells

- They are efficient and instant in operation.
- They are pollution free.
- They produce electric current directly from the reaction of a fuel and an oxidiser.
- They are light in weight

Disadvantages

- Fuel cells cannot store electric energy.
- Electrodes are expensive and short lived.
- H₂ should be pure.

Applications

- H₂ - O₂ fuel cells are used in space crafts, submarines to get electricity
- In H₂ - O₂ fuel cell, the product water is a valuable source of fresh water for astronauts