



## FUEL CELL

### Definition

- Fuel cell is a voltaic cell, which converts the chemical energy of the fuels directly into electricity without combustion.
- It converts the energy of the fuel directly into electricity.
- In these cells, the reactants, products and electrolytes pass through the cell.



**Ex:** Hydrogen –oxygen fuel cell, methyl alcohol-oxygen fuel cell

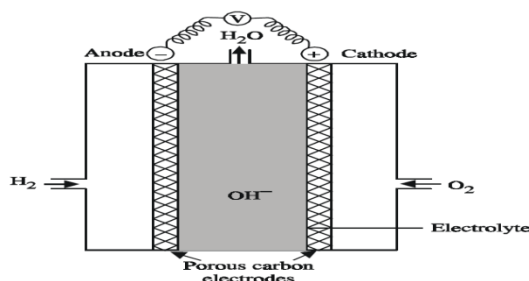
## HYDROGEN –OXYGEN FUEL CELL

### Description

- It consists of two porous electrodes anode and cathode.
- These porous electrodes are made of compressed carbon containing a small amount of catalyst (Pt, Pd, Ag).
- In between the two electrodes an electrolytic solution such as 25% KOH or NaOH is filled.
- The two electrodes are connected through the volt meter.

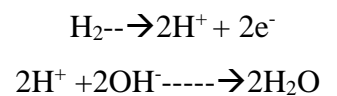
### Working

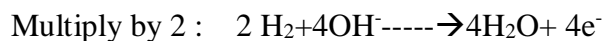
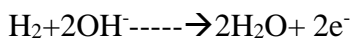
Hydrogen (the fuel) is bubbled through the anode compartment, where it is oxidised. The oxygen (oxidiser) is bubbled through the cathode compartment, where it is reduced.



### At anode

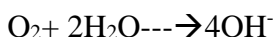
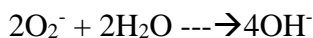
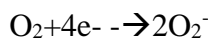
Hydrogen gas, passed through the anode, is oxidized with the liberation of electrons which then combine with hydroxide ions to form water.



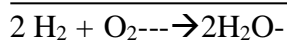


**At cathode:**

The electrons, produced at the anode, pass through the external wire to the cathode where it is absorbed by oxygen and water to produce hydroxide ions.



**Overall reaction:**



**The emf of the cell = 0.8 to 1.0V**

**Applications:**

1.  $\text{H}_2$ - $\text{O}_2$  fuel cells are used as auxiliary energy source in space vehicles, submarines (or) other military-vehicles.
2. In case of  $\text{H}_2$ - $\text{O}_2$  fuel cells, the product of water is proved to be a valuable source of fresh water by the astronauts.

**FUEL BATTERY:**

When a large number of fuel cells are connected in series, it forms fuel battery.

**Advantages of fuel cells**

1. Fuel cells are efficient (75%) and take less time for operation.
2. It is pollution free technique.
3. It produces electric current directly from the reaction of a fuel and an oxidizer.
4. It produces drinking water.

**Disadvantages:**

1. Fuel cells cannot store electric energy as other cells do.
2. Electrodes are expensive and short lived.
3. Storage and handling of hydrogen gas is dangerous.