

Fuel Cell (FC)

A fuel cell is an electrochemical system, which directly converts fuel's chemical energy to electric energy. Various fuels such as hydrogen, methanol, and natural gas may be used to operate the fuel cells. Some of the advantages of fuel cells are high efficiency, near zero air and noise pollution, long life span, high power density (power to weight ratio), and uninterrupted operation as long as fuel is supplied.

There are different types of fuel cells based upon the type of the electrolyte. If a solid polymer electrolyte is used, the fuel cell is named polymer electrolyte membrane (PEM) fuel cell.

After the hydrogen and oxygen produced in the electrolyzer enter the fuel cell, hydrogen combines with oxygen producing electricity and water through an electrochemical reaction. The reaction within the fuel cell is the inverse of the reaction within the electrolyzer. In a fuel cell, instead of fuel the combustion, chemical energy is directly converted to electric energy through electrochemical reactions. The basic components of a fuel cell are:

- 1-Anode
- 2-Cathode
- 3-Electrolyte

Figure 6 - Polymer Electrolyte Membrane Fuel Cell

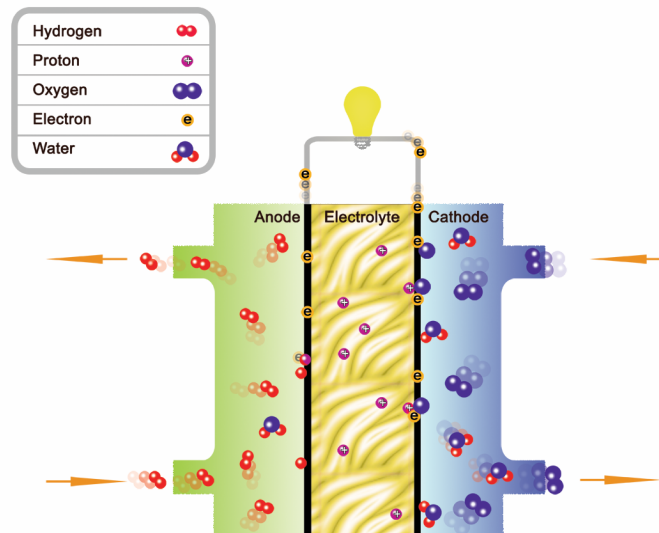
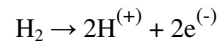


Figure 6

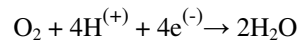
How does a fuel cell work?

1. Hydrogen enters the anode. Hydrogen is oxidized in the anode and produces electrons and hydrogen ions.



2. These electrons then flow through the external circuit producing electricity. Simultaneously, hydrogen ions move through the membrane toward the cathode.

3. Oxygen enters the cathode. In the cathode, oxygen, hydrogen ions and electrons react together.



4. The only by-product in this reaction is water which exits the fuel cell.
5. The overall reaction in fuel cell is:

