

# The fuel cell

## ■ What is a fuel cell and how it works

A **fuel cell** produces electricity through chemical reactions using a fuel, usually hydrogen, and causing it to react with the oxygen contained in the air.

From this point of view, a fuel cell is similar to a battery; however, a fuel cell can neither be used to store energy nor be recharged and it needs a continuous supply of fuel to produce electricity.

A fuel cell consists of two electrodes: a negative electrode, or anode, and a positive electrode, or cathode, separated by an electrolyte. Hydrogen is fed to the anode, and air, containing oxygen, is fed to the cathode. A **catalyst** at the anode separates hydrogen molecules into protons and electrons, which take different **paths** to the cathode. The electrons go through an external circuit, creating a flow of electricity; the protons migrate through the electrolyte to the cathode; here, they combine with oxygen, producing water, which is the only waste product resulting from the process.

## ■ How fuel cells are employed

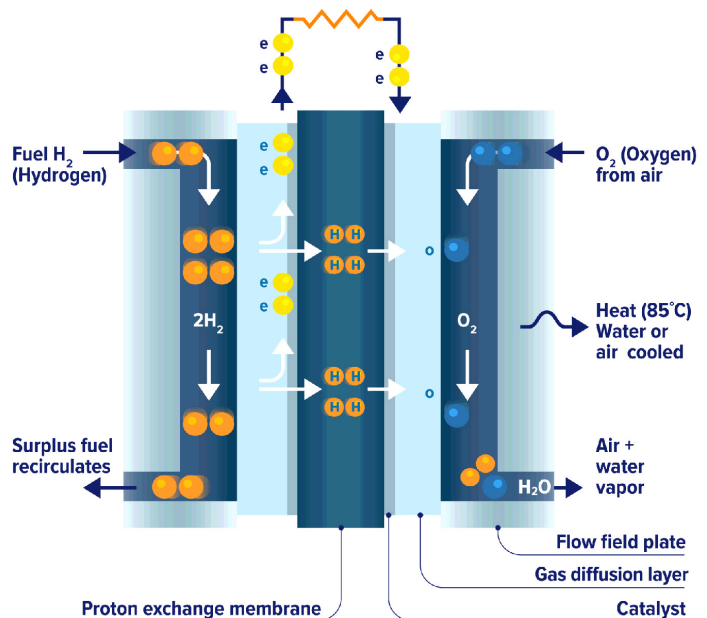
Hydrogen fuel cells are currently employed to power the electrical system in spacecraft. In everyday life, small fuel cells are employed to power electronic devices, such as laptops or smartphones; they could also be used in remote areas which are not connected to the grid. However, the latest innovation in the applications of fuel cell technology is to power vehicles. Several of the most famous car manufacturing companies in the world have already produced, or at least made a prototype of, cars running on hydrogen, and technology is developing in improving these cars' performances and cost.

## ■ Advantages and disadvantages

Fuel cell technology allows the production of electricity in a totally clean way, as it does not create pollution. Moreover, hydrogen is renewable and abundant, as it is extracted from water. However, fuel cells have some **drawbacks** that prevent them to be widely used as a source of energy:

- hydrogen must be extracted from water through electrolysis, which is a process that needs a great amount of energy;
- a fuel cell has a high cost due to the price of hydrogen and the use of precious metals, such as platinum, as catalysts;
- storage and transportation of hydrogen is quite complex as hydrogen is **flammable**.

Hydrogen could be a very good solution to satisfy the growing demand of energy; however, this requires constant research, together with the political **will** to invest money on this technology.



**catalyst:** catalizzatore  
**drawback:** svantaggio  
**flammable:** infiammabile  
**path:** percorso  
**will:** volontà

## 1 Write the words from the text that correspond to the definitions.

1. A substance that accelerates a chemical reaction. ....
2. The process of decomposing compounds using electric current. ....
3. Something that is easily set on fire. ....
4. Material that is burned to produce heat or power. ....
5. A chemical element whose symbol is H. ....
6. A precious metal similar to silver. ....
7. To supply a device with electrical energy. ....
8. A liquid or paste containing ions usually employed in batteries. ....

## 2 Put the sentences in the correct order to describe the functioning of a fuel cell.

- a. ☐ The electrons flow through an external circuit and create an electric current.
- b. ☐ Protons combine with oxygen, producing water.
- c. ☐ A catalyst separates hydrogen molecules into protons and electrons.
- d. ☐ Hydrogen is fed to the cell's anode, oxygen to the cathode.
- e. ☐ They take different routes to the cathode.
- f. ☐ The protons go to the cathode passing through the electrolyte.

## 3 **GROUP WORK** Go online and look for infographics or videos that explain how hydrogen fuel cells work and their possible employment. Compare the results with your mates and agree on the best resources.

