

Solution sheet model 7 – Fuel cell charging station / chemical energy

Topic task

- Twice as much hydrogen is produced as oxygen.
- Energy conversion: Decomposition of water caused by electrical current into hydrogen and oxygen. $2 \text{H}_2\text{O} \rightarrow 2 \text{H}_2 + \text{O}_2$
 Anode (+): $4 (\text{H}^+) + 4 (\text{e}^-) + \text{O}_2 \leftarrow 2 \text{H}_2\text{O}$
 Cathode (-): $2 \text{H}_2 \leftarrow 4 (\text{e}^-) + (\text{H}^+)$
 - Water electrolysis: Hydrogen reacts with oxygen to form water, which is continually removed from the fuel cell. The chemical equation corresponds to the oxohydrogen reaction, but the reaction occurs in a regulated fashion instead of an explosive one. $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$.
 Anode (+): $4 (\text{H}^+) + 4 (\text{e}^-) + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$
 Cathode (-): $2 \text{H}_2 \rightarrow + 4 (\text{e}^-) + 4 (\text{H}^+)$
- Cold combustion*. This reaction is restrained in the fuel cell, occurring in a controlled manner and at room temperature. In this case, hydrogen does not react directly with the oxygen in the air, but instead transmits its electrons to the platinum anode, which works as a catalyst.

Experimental task

- When the vehicle is driving around a tight curve, the motor requires more energy than when the vehicle is driving straight ahead. Therefore, more hydrogen is consumed when the vehicle is driving in circles.
- The speed and duration of driving time change, depending on whether the driven wheel is on the inside or outside
- Differential gear. This is also called a differential, since it compensates for the different distances travelled by the interior and exterior wheels on an axis around a curve, as well as the differences between the front and rear axles in all wheel drive. It was patented in 1827 by Frenchman Onésiphore Pecqueur (1792–1852).