Build a Hydrogen Fuel Cell

Instructions

1. The only moving “parts” in a H₂ fuel cell are the fuels! The molecules of fuel are
   hydrogen = H₂ = ⬦ and oxygen = O₂ = ⫡
   Color the H₂ red and the O₂ blue in the fuel cell diagram.

2. Before the H₂ and O₂ can join to become water (H₂O) the molecules must be pulled apart. The material that separates the molecules is called a catalyst and is made of platinum. Our catalyst looks like tiny seeds. Add more catalyst by drawing extra “seeds” on the carbon particles in the close-up diagram.

3. Between the anode and cathode is the PEM. PEM can mean either Proton Exchange Membrane or Polymer Electrolyte Membrane. Color the PEM yellow on both diagrams.

4. The fuel molecules are pulled apart where the fuel, catalyst, and PEM all come together. On the close-up diagram use a red pencil to trace more paths for the H₂ through the maze of the carbon anode to the reaction center. Use a blue pencil for the O₂.

5. The H₂ molecules are torn apart on the anode side. First the two atoms are separated, and then the atoms themselves are broken into proton and electron parts.

   H₂ \rightarrow \text{H} + \text{H} \rightarrow \text{proton} + \text{electron} + \text{proton} + \text{electron}

   proton = ⬦ electron = ⫡

   On the fuel cell diagram add electrons to the anode. Add protons in the PEM with arrows to show them moving toward the cathode.

6. The electrons move along the anode and out of the fuel cell on a wire. This flow of electrons creates electricity that can run a motor or light a bulb. Draw arrows to show the direction of electron flow and add electrons to the wires going into and out of the fuel cell. The electrons travel down the cathode, too. Add electrons to the cathode.

7. On the cathode side the O₂ molecules are torn apart by the platinum catalyst. Now, because they are alone, they can join with the protons that came through the PEM and the electrons from the cathode to make water = H₂O = ⫡

   On the fuel cell diagram draw water molecules below the O₂ molecules and in the “water out” area.

8. When the water is formed heat is released. Show the heat coming from the oxygen side of the fuel cell by drawing red wavy arrows above and below the words “heat out.”

Q 1: What fuels are used in a PEM fuel cell?

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Q 2: What 3 things do you get out of a fuel cell?

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Q 3: What material is the PEM catalyst made of?

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Q 4: What material is used for the anode and cathode?

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