

Hydrogen & Fuel Cells

Use your notes from class to answer the following questions.

1. What is the most abundant element on the planet?
How many protons and electrons does it have?
2. Define electrolysis.
3. What are some renewable sources of electricity that can be used to provide the electrical energy to split water molecules?
4. Today, 95% of the hydrogen produced in the United States is produced through what process?
5. Name at least one other way that hydrogen can be produced, that doesn't involve electricity or your answer to #5.
6. Fuel cells combine what two elements to produce energy?
7. Fuel cells produce what byproduct, other than energy?
8. Write the equation for the production of energy from the combining of hydrogen and oxygen.

Now go to the following web link to learn a little more about hydrogen and fuel cells, and then answer the questions using what you have read.

(Note: The web page is also linked from Smith's Integrated Science page.)

<http://auto.howstuffworks.com/fuel-efficiency/alternative-fuels/fuel-cell.htm>

9. Name at least three different types of fuel cells.

10. Which type of fuel cell is most likely to be used in transportation applications? What about this type makes it so good for transportation?

11. Give a brief definition for each of the following parts of a fuel cell:

Anode -

Cathode -

Proton Exchange Membrane -

Catalyst -

12. Use the animation and the paragraph after it to fill in the following blanks:

The _____ gas is fed into the channel on the anode side of the cell, and a molecules of this gas splits into two _____ and two _____ when it comes into contact with the catalyst. The _____ are conducted through an external circuit, able to do work as they flow.

Meanwhile, the _____ gas is fed into the channel on the cathode side of the cell, where the molecules are split into two charged atoms. They then attract the protons from the hydrogen on the other side. When the protons from the hydrogen combine with the charged oxygen atoms, and also with the electrons arriving back from their journey through the external circuit, they all combine to form _____.

13. What is something that you learned about fuel cell efficiency (or battery and fuel cell efficiency)?

14. Describe at least three problems with fuel cells being used for large-scale transportation applications.