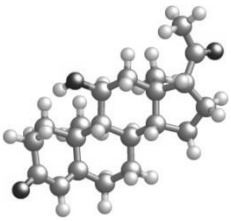

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Name: …… **( )**

Class: ……

Date: …… **/** …… **/** ……

Energy from Chemicals – Hydrogen Fuel Cells

In the future, hydrogen fuel cells may be used to power cars.
In a hydrogen fuel cell, the overall reaction is represented by the equation:

$$2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(l)}$$

a) Explain why this reaction is exothermic in terms of bond breaking and bond formation.

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b) The overall reaction in a hydrogen fuel cell can also represented in the following way:

$$H–H + H–H + O=O \rightarrow H–O–H + H–O–H$$

Using the average bond energies given below, calculate the overall energy change for the reaction.

H–H = 436 kJ/mol O=O = 496 kJ/mol O–H = 463 kJ/mol

c) Why are fuel cells described as being a “source of clean energy”?

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d) In what form does the energy created by a fuel cell exist?

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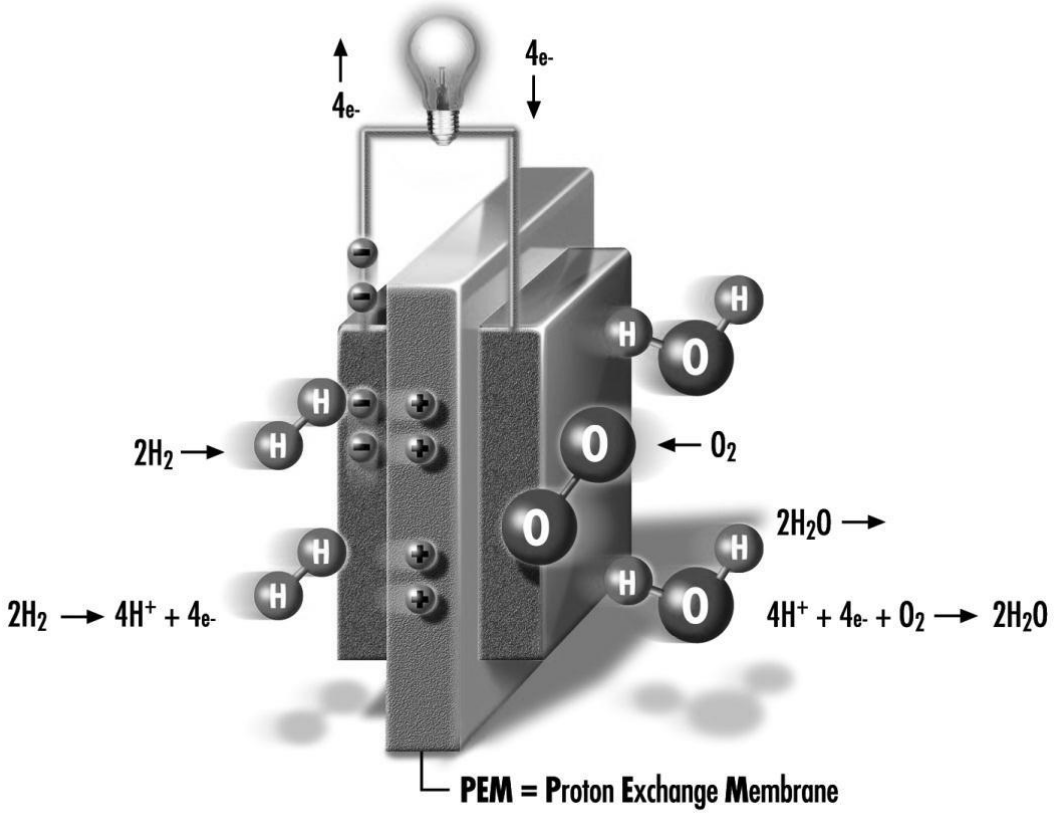
e) Study the diagram of the hydrogen fuel cell shown below:



Describe the chemical changes taking place inside a hydrogen fuel cell that allow it to generate electrical energy.

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f) What are the possible problems associated with hydrogen fuel cells?

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- Scan the QR Code below for the answers to this assignment.

http://www.chemist.sg/energy_changes/hydrogen_fuel_cells_ans.pdf