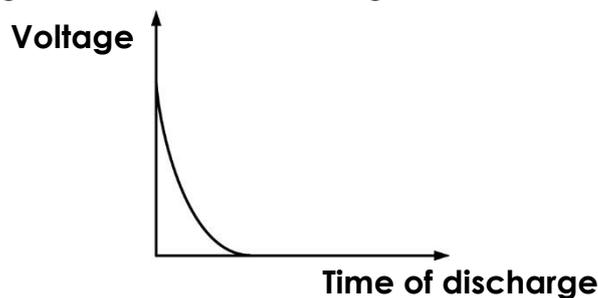


Quiz (Chemical Cells in our Daily Life)

Section A: Multiple Choice

- Which of the following statements about a chemical cell is INCORRECT?
 - It is a device in which chemical energy is converted into electrical energy.
 - It must contain two electrodes.
 - It must contain a solution of electrolyte.
 - The discharge of a chemical cell is a chemical change.
- Which of the following cells is NOT a primary cell?
 - An alkaline manganese cell
 - A lithium ion cell
 - A silver oxide cell
 - A zinc-carbon cell
- Which of the following cells has the largest voltage?
 - An alkaline manganese cell
 - A lead-acid accumulator
 - A nickel-metal hydride cell
 - A silver oxide cell
- Which of the following are the reasons of using silver oxide cells to power calculators?
 - Silver oxide cells can provide a steady current over a long period of time.
 - Silver oxide cells are cheap.
 - Silver oxide cells are small in size.
 - (1) and (2) only
 - (1) and (3) only
 - (2) and (3) only
 - (1), (2) and (3)
- Which of the following cells is normally used to power a digital camera?
 - Alkaline manganese cells
 - Lead-acid accumulators
 - Lithium ion cells
 - Silver oxide cells
- The following diagram shows the discharge curve of a cell.



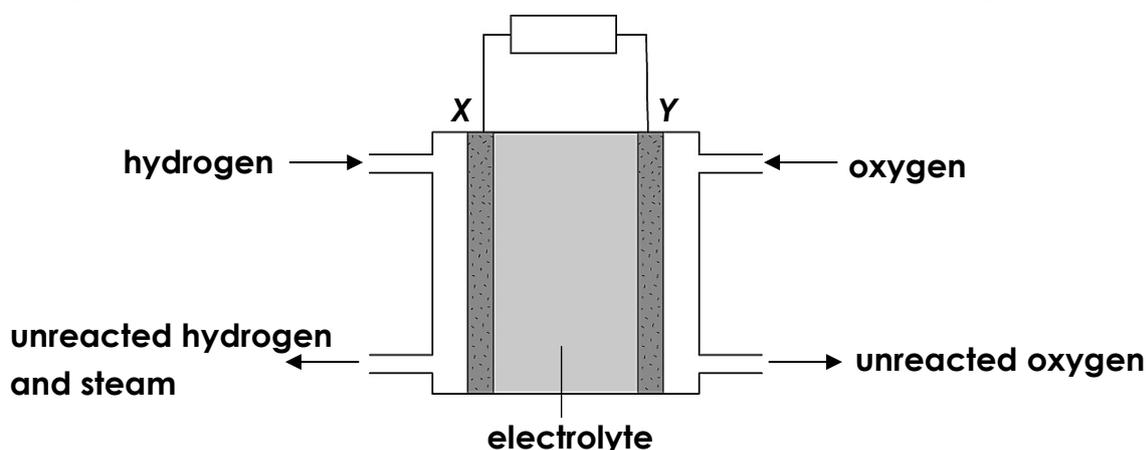
The cell is probably

- a zinc-carbon cell.
 - an alkaline manganese cell.
 - a lithium ion cell.
 - a lead-acid accumulator.
- Ammonium chloride is the electrolyte in
 - alkaline manganese cells.
 - nickel-metal hydride cells.
 - silver oxide cells.
 - zinc-carbon cells.

8. Which of the following statements correctly explain that the use of zinc-carbon cells is environmentally unfriendly?
- (1) It may contain mercury in the electrode.
 - (2) It cannot be recharged.
 - (3) It has a short shelf life.
- A. (1) and (2) only B. (1) and (3) only
C. (2) and (3) only D. (1), (2) and (3)
9. Which of the following statements about a hydrogen-oxygen fuel cell are correct?
- (1) It is a primary cell.
 - (2) The fuel is fed into the anode compartment.
 - (3) It can be used as backup power sources.
- A. (1) and (2) only B. (1) and (3) only
C. (2) and (3) only D. (1), (2) and (3)
10. Methanol can be used as the fuel in a fuel cell. Which of the following half equations represents the reaction of methanol in alkaline medium in the fuel cell?
- A. $\text{CH}_3\text{OH} + \text{H}_2\text{O} \rightarrow \text{CO}_2 + 6\text{H}^+ + 6\text{e}^-$
B. $\text{CH}_3\text{OH} + 6\text{OH}^- \rightarrow \text{CO}_2 + 5\text{H}_2\text{O} + 6\text{e}^-$
C. $\text{CO}_2 + 6\text{H}^+ + 6\text{e}^- \rightarrow \text{CH}_3\text{OH} + \text{H}_2\text{O}$
D. $\text{CO}_2 + 5\text{H}_2\text{O} + 6\text{e}^- \rightarrow \text{CH}_3\text{OH} + 6\text{OH}^-$

Section B: Structural Question

The diagram below shows a simplified structure of a hydrogen-oxygen fuel cell.



- (a) Explain why the electrodes in the cell are porous.
- (b) Write half equations for the reactions at electrodes X and Y respectively.
- (c) State the direction of electron flow in the external circuit of the fuel cell.
- (d) Suggest an electrolyte in the fuel cell.
- (e) State ONE advantage and ONE disadvantage of using a hydrogen-oxygen fuel cell.

Suggested Answer

Section A

1.	C	6.	A
2.	B	7.	D
3.	B	8.	A
4.	B	9.	D
5.	C	10.	B

Section B

- (a) It allows the flow of hydrogen, oxygen and steam into and out of the compartments.
- (b) At electrode X: $\text{H}_2(\text{g}) + 2\text{OH}^-(\text{aq}) \longrightarrow 2\text{H}_2\text{O}(\text{l}) + 2\text{e}^-$
 At electrode Y: $\text{O}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l}) + 4\text{e}^- \longrightarrow 4\text{OH}^-(\text{aq})$
- (c) Electrons flow from X to Y.
- (d) Concentrated potassium hydroxide solution
- (e) Advantage: It can produce a steady supply of electricity. / It has a high efficiency of energy conversion. / The only product of hydrogen-oxygen fuel cells (water) is non-polluting.

Disadvantage: It is not easy to store and transport hydrogen and oxygen. / Hydrogen-oxygen fuel cells are very expensive.