

ELECTROCHEMISTRY

Assertion and Reason Type

In the following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

- (i) Assertion and reason both are correct statements and reason is correct explanation for assertion.
- (ii) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
- (iii) Assertion is correct statement but reason is wrong statement.
- (iv) Assertion and reason both are incorrect statements.
- (v) Assertion is wrong statement but reason is correct statement.

1. **Assertion** : Cu is less reactive than hydrogen.
Reason : $E^\circ_{\text{Cu}^{+2}/\text{Cu}}$ is negative.
2. **Assertion** : E°_{Cell} should have a positive value for the cell to function.
Reason : $E_{\text{cathode}} < E_{\text{anode}}$
3. **Assertion** : Conductivity of all electrolytes decreases on dilution.
Reason : On dilution number of ions per unit volume decreases.
4. **Assertion** : Λ_m for weak electrolytes shows a sharp increase when the electrolytic solution is diluted.
Reason : For weak electrolytes degree of dissociation increases with dilution of solution.
5. **Assertion** : Mercury cell does not give steady potential.
Reason : In the cell reaction, ions are not involved in solution.
6. **Assertion** : Electrolysis of NaCl solution gives chlorine at anode instead of O_2 .
Reason : Formation of oxygen at anode requires overvoltage.
7. **Assertion** : For measuring resistance of an ionic solution an AC source is used.
Reason : Concentration of ionic solution will change if DC source is used.
8. **Assertion** : Current stops flowing when $E_{\text{Cell}} = 0$.
Reason : Equilibrium of the cell reaction is attained.
9. **Assertion** : $E_{\text{Ag}^+/\text{Ag}}$ increases with increase in concentration of Ag^+ ions.
Reason : $E_{\text{Ag}^+/\text{Ag}}$ has a positive value.
10. **Assertion** : Copper sulphate can be stored in zinc vessel.
Reason : Zinc is less reactive than copper.

Multiple Choice Questions

1. Which cell will measure standard electrode potential of copper electrode?
 - (i) $\text{Pt(s)}/\text{H}_2(0.1\text{bar})/\text{H}^+(1\text{M})//\text{Cu}^{+2}(1\text{M})/\text{Cu}$
 - (ii) $\text{Pt(s)}/\text{H}_2(1\text{bar})/\text{H}^+(1\text{M})//\text{Cu}^{+2}(2\text{M})/\text{Cu}$
 - (iii) $\text{Pt(s)}/\text{H}_2(1\text{bar})/\text{H}^+(1\text{M})//\text{Cu}^{+2}(1\text{M})/\text{Cu}$
 - (iv) $\text{Pt(s)}/\text{H}_2(1\text{bar})/\text{H}^+(0.1\text{M})//\text{Cu}^{+2}(1\text{M})/\text{Cu}$
2. Which of the following statement is correct?
 - (i) E_{Cell} and ΔrG of cell reaction both are extensive properties.
 - (ii) E_{Cell} and ΔrG of cell reaction both are intensive properties.
 - (iii) E_{Cell} is an intensive property while ΔrG of cell reaction is an extensive property.
 - (iv) E_{Cell} is an extensive property while ΔrG of cell reaction is an intensive property.
3. Which of the statements about solutions of electrolytes is not correct?
 - (i) Conductivity of solution depends upon size of ions.
 - (ii) Conductivity depends upon viscosity of solution.
 - (iii) Conductivity does not depend upon solvation of ions present in solution.
 - (iv) Conductivity of solution increases with temperature.
4. The cell constant of a conductivity cell _____.
 - (i) Changes with change of electrolyte.
 - (ii) Changes with change of concentration of electrolyte.
 - (iii) Changes with temperature of electrolyte.
 - (iv) Remains constant for a cell.

5. Which of the following statement is not correct about an inert electrode in a cell?
- It does not participate in the cell reaction.
 - It provides surface either for oxidation or for reduction reaction.
 - It provides surface for conduction of electrons.
 - It provides surface for redox reaction.
6. The difference between the electrode potentials of two electrodes when no current is drawn through the cell is called _____.
- Cell potential
 - Cell EMF
 - Potential difference
 - Cell voltage
7. While charging the lead storage battery _____.
- PbSO₄ anode is reduced to Pb.
 - PbSO₄ cathode is reduced to Pb.
 - PbSO₄ cathode is oxidised to Pb.
 - PbSO₄ anode is oxidised to PbO₂.
8. $\Lambda^\circ_{m(\text{NH}_4\text{OH})}$ is equal to _____.
- $\Lambda^\circ_{m(\text{NH}_4\text{OH})} + \Lambda^\circ_{m(\text{NH}_4\text{Cl})} - \Lambda^\circ_{m(\text{HCl})}$
 - $\Lambda^\circ_{m(\text{NH}_4\text{Cl})} + \Lambda^\circ_{m(\text{NaOH})} - \Lambda^\circ_{m(\text{NaCl})}$
 - $\Lambda^\circ_{m(\text{NH}_4\text{Cl})} + \Lambda^\circ_{m(\text{NaCl})} - \Lambda^\circ_{m(\text{NaOH})}$
 - $\Lambda^\circ_{m(\text{NaOH})} + \Lambda^\circ_{m(\text{NaCl})} - \Lambda^\circ_{m(\text{NH}_4\text{Cl})}$
9. In the electrolysis of aqueous sodium chloride solution which of the half cell reaction will occur at anode?
- $\text{Na}^+(\text{aq}) + \text{e}^- \longrightarrow \text{Na}(\text{s}); \quad E_{\text{cell}} = -2.71\text{V}$
 - $2\text{H}_2\text{O}(\text{l}) \longrightarrow \text{O}_2(\text{g}) + 4\text{H}^+(\text{aq}) + 4\text{e}^-; \quad E_{\text{cell}} = 1.23\text{V}$
 - $\text{H}^+(\text{aq}) + \text{e}^- \longrightarrow \frac{1}{2} \text{H}_2 \quad E_{\text{cell}} = 0.00\text{V}$



10. Electrode potential for Mg electrode varies according to the equation

$$E_{Mg^{2+}|Mg} = E_{Mg^{2+}|Mg}^{\ominus} - \frac{0.059}{2} \log \frac{1}{[Mg^{2+}]} . \text{ The graph of } E_{Mg^{2+}|Mg} \text{ vs } \log [Mg^{2+}] \text{ is}$$

