CBSE NCERT Based Chapter wise Questions (2025-2026)

Class-XII

Subject: Chemistry

Total : 9 Marks (expected) [MCQ-1 Mark, AR-1 Mark, SA-3, CBQ-4 Marks]

Chapter Name : *Electrochemistry* (Chap : 2)

Level - 1

SECTION – A **[1 Marks MCQ]**

1. Which of the following statement is correct?

Ⓐ E^{o}_{cell} and $\Delta_r G$ of cell reaction both are extensive properties

Ⓑ E_{cell} and $\Delta_r G$ of cell reaction both are intensive properties

Ⓒ E^{o}_{cell} is an intensive property while $\Delta_r G$ of cell reaction is an extensive property

Ⓓ E_{cell} is an extensive property while $\Delta_r G$ of cell reaction is an intensive property

[Hints : NCERT-Vol-I, Pg 40]

2. An electrochemical cell can behave like an electrolytic cell when _____:

Ⓐ $E_{cell} = 0$ Ⓑ $E_{cell} > Ext$ Ⓒ $E_{ext} > E_{cell}$ Ⓓ $E_{cell} = E_{ext}$

[Hints : NCERT-Vol-I, Pg-32]

3. Using the data given below find out the strongest reducing agent.

$E^{o}_{Cr_2O_7^{2-}/Cr^{3+}} = +1.33V,\ E^{o}_{Cl_2/Cl^{o}} = +1.36V,\ E^{o}_{MnO_4^{-}/Mn^{2+}} = +1.51V,\ E^{o}_{Cr^{3+}/Cr} = -0.74V$

Ⓐ $Cl^{\ominus}$ Ⓑ Cr Ⓒ Cr^{3+} Ⓓ Mn^{2+}

[Hints : NCERT; Vol-I, Pg-37]

4. Use the data given in Q3 & find out which of the following is the strongest oxidising agent?

Ⓐ $Cl^{\ominus}$ Ⓑ Mn^{2+} Ⓒ $MnO_4^{\ominus}$ Ⓓ Cr^{3+}

[Hints : NCERT: Vol-I, Pg-37]

5. $\lambda^{o}_{m(NH_4OH)}$ is equal to_____.

Ⓐ $\lambda^{o}_{m(NH_4OH)} + \lambda^{o}_{m(NH_4Cl)} - \lambda^{o}_{(HCl)}$ Ⓑ $\lambda^{o}_{m(NH_4Cl)} + \lambda^{o}_{m(NaOH)} - \lambda^{o}_{(NaCl)}$

Ⓒ $\lambda^{o}_{m(NH_4Cl)} + \lambda^{o}_{m(NaCl)} - \lambda^{o}_{(NaOH)}$ Ⓓ $\lambda^{o}_{m(NaOH)} + \lambda^{o}_{m(NaCl)} - \lambda^{o}_{(NH_4Cl)}$

[Hints : NCERT-Vol-I, Pg-50]

SECTION – B **[1 Marks ARQ]**

Assertion Reason Type Question:

Read the two statements carefully and select the correct option given below.

A: Assertion and Reason both are correct and Reason is the correct explanation of Assertion

B: Assertion and Reason both are correct and Reason is not the correct explanation of Assertion

C: Assertion is correct but Reason is wrong

D: Assertion is wrong but Reason is correct

6. **A:** According to Kohlrausch law, the molar conductivity of a strong electrolyte at infinite dilution is sum of molar conductivities of its ions.

R: The current carried by cation and anion is always equal.

[Hints : NCERT-Vol-I, Pg-49]

7. **A:** A saturated-solution of KCl with agar-agar is used for making salt bridge.

R: Ionic mobilities of K^+ and $Cl^{\ominus}$ are not comparable.

[Hints : NCERT-Vol-I, Pg-32,49]

8. **A:** 1 coulomb charge deposits 1g equivalent of a substance.

R: 1 Faraday is the charge carried by 1 mole of electrons.

[Hints : Faraday's law of electrolysis]

9. **A:** Cu is less reactive than hydrogen

R: $E^{o}_{Cu^{2+}/Cu}$ is negative.

[Hints : Electrochemical series]

10. **A:** Conductivity of all electrolytes decreases on dilution.

R: On dilution of number of ions per unit volume decreases.

[Hints : Conductivity]

SECTION – C **[3 Marks SAQ]**

11. Calculate the emf of the following cell at 298K:

$Fe(s)/Fe^{2+}(0.01M)/1+^{+}(1M)/H_2(g)/(1\ bar), Pf(s).$

[Given: $E^{o}_{cell} = +0.44V$]

[Hints : Nerft's equation]

12. Represent the cell in which of the following reaction take place. The value of E° for the cell is 1.260 V. What is the value of E_{cell}?

$$2Al(s) + 3Cd^{2+}(0.1M) \longrightarrow 3Cd(s) + 2Al^{3+}(0.01M)$$

[Hints : CBSE SQP 2022]

13. Calculate the emf of the following cell at 25°C:

$Al(s) \mid Al^{3+}(0.001\ M) \parallel (0.1)\ Ni^{2+} \mid Ni(s)$

Given: $E^{o}_{Ni^{2+}/Ni} = -0.25V;\ E^{o}_{Al^{3+}/Al} = -1.66V;$

$[\log_{50}2 = 0.3010, \log_{10}3 = 0.4771]$

[Hints : CBSE 2019]

14. Consider the following reaction:

$$Cu(s) + 2Ag^{+}(aq) \longrightarrow 2Ag(s) + Cu^{2+}(aq)$$

(a) Give the direction of flow of current

(b) Write the half-cell reactions taking place at cathode and anode.

[Hints : CBSE 2018]

15. Calculate $D_rG°$ and $\log K_C$ for the following reaction at 298K.

$2Cr(s) + 3Cd^{2+}(aq) \longrightarrow 2Cr^{3}(aq) + 3Cd(s)$

[Given: $E^{o}_{cell} = +0.34V$, F = 96500 C mol^{-1}] Antilog of 34.5014 = 34.5014

[Hints : CBSE : 2017]

SECTION – D **[4 Marks CBQ]**

16. Read the passage given below and answer the following questions:

The calculation of cell potential for emf requires only the addition of the emf values for each half reaction, while the same cell potential calculation using standard potentials requires the usage of the following convention:

$$E^{o}_{cell} = E^{o}_{cathode} - E^{o}_{anode} \text{ or } E^{o}_{cell} + E^{o}_{red}$$

Each half-cell reaction has a standard potential reported as the potential of the reduction reaction vs the normal hydrogen electrode (NHE). In an electrochemical cell, there is a half-cell corresponding to the working electrode (WE), where the reaction under steady take place, and a reference half-cell. Experimentally the cell potential is measured as the difference between the potentials of the WE half-cell and the reference electrode/reference half-cell. The archetypal refere4nce electrode is the NHE, also known as the standard hydrogen electrode (SHE) and is defined, by convention, as 0.000 V for any temperature.

(i) EMF of a cell depends on:

Ⓐ nature of electrolyte Ⓑ concentration of electrolyte in two half cells

Ⓒ temperature Ⓓ all of the above

(ii) Electrical conductance _____ with increasing temperature.

Ⓐ decreases Ⓑ increases Ⓒ remains unaffected Ⓓ nullifies

(iii) A salt bridge maintains the _____ between solutions of both the half cells.

Ⓐ electricity Ⓑ electrical neutrality Ⓒ resistivity Ⓓ connectivity

(iv) Predict the value of EMF of a cell in which the chemical reactions achieve equilibrium

Ⓐ –1 Ⓑ +1 Ⓒ 0.5 Ⓓ Zero

17. Read the passage given below and answer the following questions:

It is well known that the theory of Arrhenius is unable to explain the way in which the conductivity of a 'strong' electrolyte changes with changing concentration. An alternative theory advanced by several writers supposes strong electrolytes in dilute aqueous solution to be completely dissociated, and attributes the diminution in equivalent conductivity with increase in concentration entirely to the electrical forces which exist between the ions. This theory has attracted attention especially since its recent mathematical development by Debye.

The objects of the present paper are to show that the postulation of complete dissociation is in complete harmony with the experimental data for very dilute aqueous solutions of univalent electrolytes; and to advance an empirical relationship which expenses the conductivity of such a solution in terms of the concentration, the mobilities of the ions present and a universal constant.

(In these questions, (Q. No. i-iv), a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true, but reason is not the correct explanation of assertion.

(c) Assertion is true, but reason is false.

(d) Assertion is false, but reason is true.

(i) **Assertion (A):** Equivalent conductance of an electrolyte solution increases with dilution.

Reason (R): Degree of ionisation of the electrolyte decreases with dilution.

(ii) **Assertion (A):** Fused sodium chloride conducts electricity.

Reason (R): Fused sodium chloride contains sodium and chloride ions.

(iii) **Assertion (A):** Gaseous hydrogen chloride is a very poor conductor of electricity but a solution of hydrogen chloride gas in water is a good conductor of electricity.

Reason (R): Molecule of hydrogen chloride remains unionised in water.

(iv) **Assertion (A):** Electrolytic conduction differs from metallic conduction.

Reason (R): The resistance of electrolytes decreases with increasing temperature.

ANSWER

1. Ⓒ
2. Ⓒ
3. Ⓑ
4. Ⓒ
5. Ⓑ
6. Ⓒ
7. Ⓓ
8. Ⓓ
9. Ⓒ
10. Ⓐ
11. 0.4991 V; $\left[E_{cell} = E^{o}_{Cu} - \frac{0.0591}{2} by \frac{0.01}{1} = 0.4991V\right]$
12. 1.269 V; $E_{Cu} = E^{o}_{Cu} - \frac{0.0591}{6}\log_{10}\frac{(0.01)^2}{(0.1)^3}[E^{o}_{Cu} = 1.26V]$
13. 1.439 V; $E^{o}_{Cu} = 1.41V; E_{Cu} = 1.41 - \frac{0.0591}{6}\log\frac{(10-3)}{(10-1)}$
14. (a) Cathode → Anode current flow

    (b) Cathode: $Ag^{+} + e^{\ominus} \rightarrow Ag$; Anode : $Cu \rightarrow Cu^{2+} + 2e^{\circ}$
15. $-196.86\ KJ(mol)^{-1}$; 3.192×10^{34}

    $\Delta G^{\circ} = -nFE^{o}_{Cu} = -6 \times 96500 \times 0.33\ J\ mol^{-1}$

    $= -196.80\ KJ\ mol^{-1}$

    $\Delta G^{\circ} = -2.303\ RT \log K.$
16. (i) (Ⓓ), (ii) (Ⓑ), (iii) (Ⓑ), (iv) (Ⓓ)
17. (i) (Ⓒ), (ii) (Ⓐ), (iii) (Ⓒ), (iv) (Ⓑ)