CBSE NCERT Based Chapter wise Questions (2025-2026)

Class-XII

Subject: Chemistry

Chapter Name : *Electrochemistry* (Chap : 2)

Total : 7 Marks (expected) [MCQ-1 Mark, A/R-1 Marks, VSQ-2 Mark, SQ-3 Marks]

Level - 2 [Higher Oder]

I. MCQ (One correct Answer)

1. An electrochemical cell can behave like an electrolytic cell when_____.

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

[Hints : CBSE Board questions]

2. What is the EMF of a galvanic cell if $E^0_{cathode} = 0.80V$ and $E^0_{anode} = -0.76V$.

Ⓐ +1.56 V Ⓑ – 1.56 Ⓒ + 0.04V Ⓓ – 0.04V

[Hints : $C^o_{cell} = E^o_{cathode} - E^o_{anode}$]

3. Which of the following is correct for spontaneity of a cell?

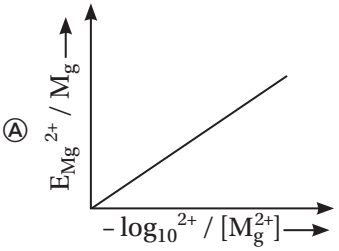
Ⓐ $\Delta G = -$ ve, $E^0 = +$ ve Ⓑ $\Delta G = +$ ve, $E^0 = 0$ Ⓒ $\Delta G = -$ ve, $E^0 = o$ Ⓓ $\Delta G = +$ve, $E^0 = -$ve

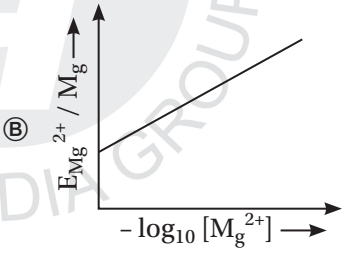
[Hints : CBSE Board Questions; $\Delta G^0 = -nFE^0$]

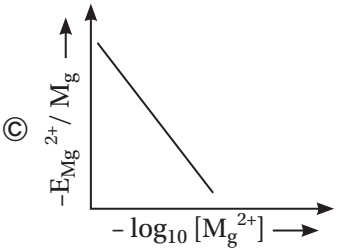
4. Electrode potential from Mg electrode varies according to the equation.

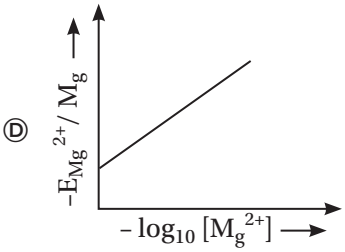
$$E_{Mg^{2+}/Mg} = E^0_{Mg^{2+}/Mg} - \frac{0.059}{2}\log_{10}\frac{1}{[M_g^{2+}]}$$

The graph of $E_{Mg^{2+}/Mg}$ Vs Log$[Mg^{2+}]$ is:

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

[Hints : NCERNST'S equation]

5. The equilibrium constant for a cell reaction, $Cu(s) + 2\,Ag(aq) \longrightarrow Cu^{2+}(aq) + 2Ag(s)$ is 4×10^{16}. Find E^0_{cell} for the cell reaction

Ⓐ 0.63V Ⓑ 1.23V Ⓒ 0.49V Ⓓ 3.24V

[Hints : $E^0_{cell} = 0.0591$]

II. Assertion (A) and Reason (R). Of the two statements, mark the correct answer from the options given below:

A) Both A and R are true and R is the correct explanation of A.

B) Both A and R are true but R is not the correct explanation of A.

C) A is true but R is false.

D) A is false but R is true.

6. **Assertion (A) :** Equivalent conductance of all electrolytes decreases with increasing concentration
   Reason (R) : Lesser number of ions are available per gram equivalent at higher concentration
   Ⓐ A Ⓑ B Ⓒ C Ⓓ D

[Hints : NCERT, Vol-I, Pg-45]

7. **Assertion (A) :** Iron is protected from corrosion by connecting magnesium metal with it.
   Reason (R) : Iron acts as a cathode and magnesium as anode which gradually disappears
   Ⓐ A Ⓑ B Ⓒ C Ⓓ D

[Hints : NCERT, Vol-1, Pg-57]

8. **Assertion (A) :** Zinc can liberate H_2 form aquous solution of HCl
   Reason (R) : Zinc has +ve reduction potential
   Ⓐ A Ⓑ B Ⓒ C Ⓓ D

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

9. **Assertion (A) :** Copper sulphate solution can be kept in a zinc vessel.
   Reason (R) : The position of zinc is higher than copper in the electrochemical series.
   Ⓐ A Ⓑ B Ⓒ C Ⓓ D

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

10. **Assertion (A) :** For CH_3COOH, the molar conductance of 0.1M CH_3COOH and equivalent conductance of 0.1(N) CH_3COOH is same.
    Reason (R) : These do not depend upon concentration.
    Ⓐ A Ⓑ B Ⓒ C Ⓓ D

[Hints : NCERT Pg-47]

III. Very Short Answer Questions carrying 2 marks each Question.

11. Give two points of differences between electrochemical and electrolytic cells.

[NCERT, Pg-321, CBSE 2020]

12. State Kohlrausch's law of independent migration of ions. Write and expression for the molar conductivity of acetic acid at infinite dilution according to Kohlrausch's law.

[NCERT Pg-49]

13. Calculate the maximum work and log K_c for the given reaction at 298K.

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

Given : $E^0_{Ni^{2+}|Ni} = -0.25V$, $E^0_{Ag+/Ag} = +0.80V$,
$1F = 96500\ C\ mol^{-1}$

[NCERT Pg-39, 40]

14. State Faraday's first law of electrolysis. How much charge, in terms of Faraday, is required for the reduction of 1 mol Cu^{2+} to Cu?

[NCERT Pg-51, 52]

15. Calculate emf of the following cell at 298K for

$Mg(s) | Mg^{2+}(0.1M) || Cu^{2+}(0.01M) | Cu(s)$
$[E^0_{cell} = +2.71V, 1F = 96500C\ mol^{-1}, \log 10 = 1]$ [CBSE 2023]

[Hints : Nernst's equation, CBSE 2023]

IV. Short Answer Type Question

16. Rahul set-up an experiment to find resistance of aqueous KCl solution for different concentrations at 298 K using a conductivity cell connected to a Wheatstone bride. He fed the Wheatstone bridge with a.c. power in the audio frequency range 550 to 5000 cycles per second. Once the resistance was calculated from null point he also calculated the conductivity κ and molar conductivity A_m and recorded his readings in tabular from.

Sl. No.	Conc. (M)	κ S cm^{-1}	A_m S cm^2 mol^{-1}
1.	1.00	111.3×10^{-3}	111.3
2.	0.10	12.9×10^{-3}	129.0
3.	0.01	1.41×10^{-3}	141.0

Answer the following questions:

(a) Why does molar conductivity increase though the conductivity decreases with dilution?
(b) If A_m^0 of KCl is 150.0S cm^2 mol^{-1}, calculate the degree of dissociation of 0.01 M KCl.
(c) If Rahul had used HCl instead to KCl then would you expect the A_m values to be more or less than per KCl for a given concentration. Justity.

Or

(d) Amit a classmate of Rahul repeated the same experiment with CH_3COOH solution instead of KCl solution. Give one point that would be similar and one that would be different in his observations as compared to Rahul. [Hint.: CBSE 2023]

17. Read the passage given below and answer the questions that follow:

A lead storage battery is the most important type of secondary cell having a lead anode and a grid of lead packed with PbO_2 as cathode. A 38% solution of sulphuric acid is used as electrolyte (density = 1.294g mL^{-1}). The battery holds 3.5L of the acid. During the discharge of the battery, the density of H_2SO_4 falls to 1.139g mL^{-1} (20% H_2SO_4 by mass).

Answer the following questions:

(a) Write the reaction taking place at the cathode when the battery is in use.
(b) How much electricity (in Coulombs) is required to carry out the reduction of one mole of PbO_2?
(c) (i) What is the molarity of sulphuric acid before discharge?
(ii) What is the mass of sulphuric acid in the solution after discharge?

Or

(d) (i) Write the products of electrolysis when dilute sulphuric acid is electrolysed using plantinum electrodes.

(ii) Write the reaction anode in lead storage battery.

[Hints : CBSE, Sample Paper 2019-20]

18. Read the passage given below and answer the questions that follow.

Electrochemical cells involve the redox reactions in which the energy released by a spontaneous reaction is converted to electricity. In these cells, oxidation and reduction take place separately at the anode and the cathode, respectively, and the electrons flow through an external circuit. The difference in electrode potentials between the two electrodes gives the electromotive force (e.m.f). The Nernst equation gives the relationship between the cell emf and the concentrations of the reactants and the products. For example, for the reaction.

$$aA + bB \longrightarrow cC + dD$$

Emf is given by

$$E = E^0 - \frac{RT}{nF} \text{ In } Q$$

Where Q is the reaction quotient.

The emf is related to htermodynamic quantities such as ΔG and K. The decrease in free energy of the system in a spontaneous redox reaction is equal to the electrical work done by the system, i.e., $\Delta G = -nFE$. The equilibrium constant for a redox reaction can be found from the standard electromotive force of the cell.

Answer the following questions:

(a) Is e.m.f. extensive or intensive property?

(b) What happens when external potential applied becomes greater than E^0_{cell} of an electrochemical cell?

(c) The standard free energy change for the following reaction is – 210kJmol^{-1}:
$2H_2O_2(aq) \longrightarrow 2H_2O(l) + O_2(g)$
What is the standard cell potential? OR

(c) What is the e.m.f. of the cell.
$Mg|Mg^{2+}(0.10M) \,||Ag^+ (0.0001M) \,| Ag.$
Given $E^0 = 3.17V$.

[Hints : Nernst's equation]

ANSWER

1. ©

2. Ⓐ + 1.56V; $E^0_{cell} = 0 \;\; 80 - (- 0.76V) = + 1.56V$

3. Ⓐ $\Delta G^0 < 0$, $E^0_{cell} > O$,

4. Ⓑ

5. Ⓑ $E^0 cell = \frac{0.0591}{2} \log_{10} K_c$

6. ©

7. ©

8. ©

9. Ⓓ

10. ©

11. —

12. —

13. —

14. —

15. (i) 2 × 96500C (ii) 2.6805v

16. (a) — ∝ = 0.94
(b) —
(c) — or (c) —

17. (a) —
(b) ∠93200C
(c) 5.02, 3986.5g or (c) —

18. (a) —
(b) —
(c) 1.09v or (c) 3.02v