DPP No: 33

Maximum Time
50 Min

Chemistry
TARGET
JEE-MAINS

SYLLABUS : Elctrochemistry

1. The standard emf for the cell reaction $Zn + Cu^{2+} \longrightarrow Zn^{2+} + Cu$ is 1.10 volt at 25°C. The emf for the cell reaction when 0.1 M Cu^{2+} and 0.1 M Zn^{2+} solutions are used at 25°C is

(A) 1.10 volt (B) 0.110 volt (C) –1.10 volt (D) –0.110 volt

2. Consider the cell $\begin{matrix} H_2(Pt) \\ 1\,atm \end{matrix} \left| H_3O^+(aq) \right| \begin{matrix} pH = 5.03 \end{matrix} \left| \begin{matrix} Ag^+ \\ x\ M \end{matrix} \right|$ Ag. The measured EMF of the cell is 1.0 V. What is the value of x ? $E^0_{Ag^+,Ag}$ = + 0.8 V. [T = 25°C]

(A) 2×10^{-2} M (B) 2×10^{-3} M

(C) 1.5×10^{-3} M (D) 1.5×10^{-2} M

3. Which of the following is not concentration cells :

(A) $Pt, \underset{p_1}{H_2}(g) \mid \underset{(m)}{HCl} \mid \underset{p_2}{H_2}(g), Pt$ (B) $Cd, \underset{a_1}{(Hg)} \mid \underset{(m)}{Cd^{2+}} \mid \underset{a_2}{(Hg)}, Cd$

(C) $Zn\,(s) \mid \underset{m_1}{Zn^{2+}} \parallel \underset{m_2}{Cu^{2+}} \mid Cu$ (D) $Ag\,(s), AgCl\,(s) \mid \underset{m}{HCl} \parallel \underset{m}{HCl} \mid AgCl\,(s), Ag\,(s)$

4. $Zn \mid Zn^{2+}\,(C_1) \parallel Zn^{2+}\,(C_2) \mid Zn$. for this cell ΔG is negative if -

(A) $C_1 = C_2$ (B) $C_1 > C_2$ (C) $C_2 > C_1$ (D) None

5. The oxidation potential of a hydrogen electrode at pH = 10 at 1 atm

(A) 0.059 V (B) 0.59 V (C) 0.00 V (D) 0.51 V

6. The correct representation of Nernst's equation is :

(A) $E_{M^{n+}/M} = E^0{}_{M^{n+}/M} + \dfrac{0.0591}{n}\log(M^{n+})$ (B) $E_{M^{n+}/M} = E^0{}_{M^{n+}/M} - \dfrac{0.0591}{n}\log(M^{n+})$

(C) $E_{M^{n+}/M} = E^0{}_{M^{n+}/M} + \dfrac{n}{0.0591}\log(M^{n+})$ (D) None of these

7. $Pt\left|\begin{matrix} H_2 \\ (p_1) \end{matrix}\right| \begin{matrix} H^+ \\ (1M) \end{matrix} \left|\left| \begin{matrix} H^+ \\ (1M) \end{matrix} \right| \begin{matrix} H_2 \\ (p_2) \end{matrix} \right| Pt$ (where p_1 and p_2 are pressures) cell reaction will be spontaneous if :

(A) $p_1 = p_2$ (B) $p_1 > p_2$ (C) $p_2 > p_1$ (D) p_1 = 1 atm

8. What will be the emf of the given cell, $Pt \mid H_2(P_1) \mid H^+{}_{(aq)} \mid H_2(P_2) \mid Pt$

(A) $\dfrac{RT}{F}\log\dfrac{P_1}{P_2}$ (B) $\dfrac{RT}{2F}\log\dfrac{P_1}{P_2}$ (C) $\dfrac{RT}{F}\log\dfrac{P_2}{P_1}$ (D) None of these

9. $Pt \mid (H_2) \mid pH = 1 \parallel pH = 2 \mid (H_2)Pt$

1 atm 1 atm

The cell reaction for the given cell is :

(A) spontaneous (B) non - spontaneous

(C) equilibrium (D) none of these

10. The EMF of a concentration cell consisting of two zinc electrodes, one dipping into $\frac{M}{4}$ sol. of zinc sulphate & the other into $\frac{M}{16}$ sol. of the same salt at 25^0 C is

(A) 0.0125 V (B) 0.0250 V (C) 0.0178 V (D) 0.0356 V

11. Electrolysis involves oxidation and reduction respectively at :

(A) Anode and cathode (B) Cathode and anode

(C) At both the electrodes (D) None of these

12. During electrolysis, the species discharged at cathode are :

(A) Ions (B) Cation (C) Anion (D) All of these

13. The two aqueous solutions, A ($AgNO_3$) and B (LiCl) were electrolysed using Pt. electrodes. The pH of the resulting solutions will

(A) increase in A and decrease in B (B) decrease in both

(C) increase in both (D) decrease in A and increase in B.

14. During the electrolysis of aqueous zinc nitrate

(A) Zinc plates out at the cathode (B) Zinc plates out at the anode

(C) Hydrogen gas, H_2, is evolved at the anode

(D) Oxygen gas, O_2, is evolved at the anode

15. During electrolysis of $CuSO_4$ using Pt-electrodes, the pH of solution

(A) increases (B) decreases

(C) remains unchanged (D) cannot be predicted

16. Three faradays of electricity was passed through an aqueous solution of iron (II) bromide. The mass of iron metal (at. mass 56) deposited at the cathode is -

(A) 56 g (B) 84 g (C) 112 g (D) 168 g

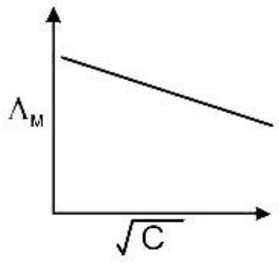
17. On passing 0.5 Faraday of electricity through NaCl, the amount of Cl deposited on cathode is :

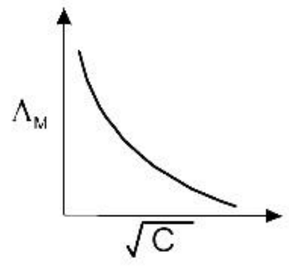
(A) 35.5 gm (B) 17.75 gm (C) 71 gm (D) 142 gm

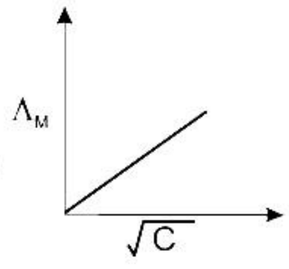
18. A current of 9.65 ampere is passed through the aqueous solution NaCl using suitable electrodes for 1000 s. The amount of NaOH formed during electrolysis is

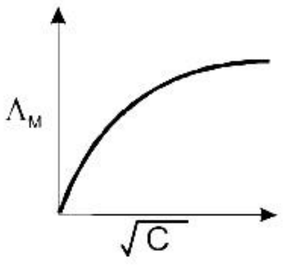
(A) 2.0 g (B) 4.0 g (C) 6.0 g (D) 8.0 g

19. Which of the following curve represents the variation of Λ_M with $\sqrt{C}$ for $AgNO_3$?

(A) 

(B) 

(C) 

(D) 

20. Conductivity of a strong electrolyte :

(A) Increases on dilution

(B) Does not change considerably on dilution

(C) Decreases on dilution

(D) Depends on density

21. The unit of equivalent conductivity is :

(A) Ohm cm

(B) $Ohm^{-1}\ cm^2$ (g equivalent)$^{-1}$

(C) Ohm cm^2 (g equivalent)

(D) S cm^{-2}

22. Resistance of decimolar solution is 50 ohm. If electrodes of surface area 0.0004 m^2 each are placed at a distance of 0.02 m then conductivity of solution is :

(A) 1 s cm^- (B) 0.01 s cm^- (C) 0.001 s cm^- (D) 10 s cm^-

23. The ionic conductance of H^+ and SO_4^{2-} are 350 and 80 S cm^2 equivalent^{-1}, hence equivalent conductance (S cm^2 equivalent^{-1}) and molar conductance (S cm^2 mol^{-1}) of H_2SO_4 will be:

(A) 430, 430 (B) 860, 430 (C) 215, 430 (D) 430, 860

24. Given the molar conductance of sodium butyrate, sodium chloride and hydrogen chloride as 83, 127 and 426 mho cm^2 mol^{-1} at 25°C respectively. Calculate the molar conductance of butyric acid at infinite dilution.

25. Calculate K_a of acetic acid if its 0.05 N solution has equivalent conductance of 7.36 mho cm^2 at 25°C. $(\lambda^{\infty}_{CH_3COOH} = 390.7)$.

Answer Key

1.	(A)	2.	(A)	3.	(C)	4.	(C)	5.	(B)	6.	(A)	7.	(B)
8.	(B)	9.	(B)	10.	(C)	11.	(A)	12.	(B)	13.	(D)	14.	(D)
15.	(B)	16.	(B)	17.	(A)	18.	(B)	19.	(A)	20.	(B)	21.	(B)
22.	(A)	23.	(D)	24.	382 mho cm^2 mol^{-1}.			25.	1.76×10^{-5} mole/litre.				