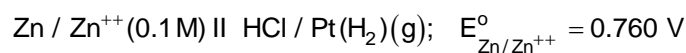


Class: 12
Subject: Chemistry
Topic: Electro Chemistry
No. of Questions: 26

1. Can we use direct current for experimental determination of resistance of a solution?
2. Why is a salt bridge not necessary in lead storage cell?
3. Colour of KI solution containing starch turns blue when Cl_2 water is added. Explain.
4. Why will Ag not react with dil. H_2SO_4 whereas zinc reacts?
5. What is the role of ZnCl_2 in a dry cell?
6. How much charge is required to reduce?
(a) 1 mole of Al^{3+} to Al and
(b) 1 mole of MnO_4^- to Mn^{2+} ?
7. An electric current of 100 Amp is passed through a molten liquid of sodium chloride for 5 hours. Calculate the volume of chlorine gas liberated at the electrode at N.T.P.
8. An ammeter and a copper voltameter are connected in series through which a constant current flows. The ammeter shows 0.52 amp. If 0.635 grams of copper is deposited in one hour, what is the percentage error of the ammeter?
9. Cadmium amalgam is prepared by electrolysis of a solution of CdCl_2 using a mercury cathode. Find how long a current of 5 amp. should be passed in order to prepare 12% Cd – Hg amalgam on a cathode of 2 g mercury. [Atomic mass of Cd = 112.40].
10. The equivalent conductivity of $\frac{N}{10}$ solution of acetic acid at 25°C is $14.3 \text{ ohm}^{-1} \text{ cm}^2 \text{ eq}^{-1}$. Calculate the degree of dissociation of CH_3COOH if $\Lambda_\infty \text{ CH}_3\text{COOH}$ is $390.71 \text{ ohm}^{-1} \text{ cm}^2 \text{ eq}^{-1}$.
11. Calculate the minimum amount of NaOH required to be added in R.H.S. to consume all the H^+ present in R.H.S. of the cell of emf +0.701 volt at 25°C before its use. Also report the emf of the cell after addition of NaOH.



1 Lit. 1 atm

12. For the galvanic cell
 $Ag / AgCl(s) , KCl(0.2 M) || KBr(0.001 M), AgBr / Ag$
 Calculate the emf generated and assign correct polarity to each electrode for the spontaneous process after taking into account the cell reaction at $25^{\circ}C$.
 Given $K_{sp} AgCl = 2.8 \times 10^{-10}$, $K_{sp} AgBr = 3.3 \times 10^{-13}$
13. The observed emf of the cell
 $Pt / H_2(1 atm) / H(3 \times 10^{-4} M) || H(M) / H(1 atm) / Pt$ is 0.154 V. Calculate the value of M_1 and pH of cathodic solution.
14. In a fuel cell H_2 and O_2 react to produce electricity. In the process H_2 gas is oxidised at the anode and O_2 is reduced at the cathode. If 67.2 Lit. of H_2 at NTP reacts in 15 minutes, what is the average current produced? If the entire current is used for electro – deposition of Cu from Cu^{++} , how many gram of Cu are deposited.
15. Neglecting the liquid – liquid junction potential, calculate the emf of the following cell at $25^{\circ}C$
 $H_2(1 atm) / 0.5 M HCOOH || 1 M CH_3COOH / H_2(1 atm)$. K_a for $HCOOH$ and CH_3COOH are 1.77×10^{-4} and 1.8×10^{-5} respectively.
16. A cell contains two hydrogen electrodes. The negative electrode is in contact with a solution of $10^{-6} M$ hydrogen ions. The emf of the cell is 0.118 Volt at $25^{\circ}C$. Calculate the concentration of hydrogen ions at the positive electrode.
17. Calculate the equilibrium constant for the reaction:
 $Fe^{2+} + Ce^{4+} \rightarrow Ce^{3+} + Fe^{3+}$
 Given that, $Fe^{3+} + e^{-} \rightarrow Fe^{2+}$; $E^{\circ} = 0.771 V$
 $Ce^{4+} + e^{-} \rightarrow Ce^{3+}$; $E^{\circ} = 1.61 V$
18. Iron is corroded by atmospheric oxygen under acidic condition to product Fe^{2+} (aq) ions initially. The standard reduction potential
 $E^{\circ} Fe^{2+}/Fe = -0.44 V$ and for the reaction $H_2O(l) \rightarrow 2H^{+}(g) + \frac{1}{2}O_2(g) + 2e^{-}$
 $E^{\circ} = -1.23 V$
 Find whether the formation of Fe^{2+} (aq) is thermodynamically favorable or not.
19. The emf of the cell reaction,
 $Zn(s) + Cu^{+2}_{(aq)} \rightarrow Zn^{+2}_{(aq)} + Cu(s)$
 Calculate the entropy change. Given that enthalpy of the reaction is $-216.7 KJ mol^{-1}$
 And $E^{\circ}_{Zn^{+2}/Zn} = -0.76V$ and $E^{\circ}_{Cu^{+2}/Cu} = +0.34V$.

20. For how long a current of three amperes has to be passed through a solution of AgNO_3 to coat a metal surface of 80cm^2 area with 0.005mm thick layers? Density of silver is 10.5 g / cc and atomic weight of Ag is 108 gm/mol .
21. Given the standard electrode potentials,
- $$\frac{\text{K}^+}{\text{K}} = -2.93\text{V}, \frac{\text{Ag}^+}{\text{Ag}} = 0.80\text{V},$$
- $$\frac{\text{Hg}^{2+}}{\text{Hg}} = 0.79\text{V}$$
- $$\frac{\text{Mg}^{2+}}{\text{Mg}} = -2.37\text{V}, \frac{\text{Cr}^{3+}}{\text{Cr}} = -0.74\text{V}$$
- Arrange these metals in their increasing order of reducing power.
22. How can you increase the reduction potential of an electrode?
For the reaction
 $\text{M}^{n+}(\text{aq}) + n\text{e}^- \rightarrow \text{M}(\text{s})$
23. How many grams of chlorine can be produced by the electrolysis of NaCl with a current of 1.02 A for 15 min ?
24. Why an electrochemical cell stops working after sometime?
25. Calculate the emf of the cell in which the following reaction takes place:
 $\text{Ni}_{(\text{s})} + 2\text{Ag}^+(0.002\text{M}) \rightarrow \text{Ni}^{2+}(0.160\text{M}) + 2\text{Ag}_{(\text{s})}$
Given that $E^0_{(\text{Cell})} = 1.05\text{ V}$
26. The conductivity of 0.20 M solution of KCl at 298 K is 0.0248 Scm^{-1} . Calculate its molar conductivity.