INDIAN SCHOOL MUSCAT

CHEMISTRY DEPARTMENT

QUESTION BANK

Electrochemistry

1. Define the term – Electrode potential?   1

2. Define the term – standard electrode potential?   1

3. Single electrode potential cannot be determined. Why?   1

4. What is SHE? What is its electrode potential?   1

5. What does the positive value of standard electrode potential indicate?   1

6. What would happen if Nickel spatula is used to stir a solution of $CuSO_4$?   1

    $E^0Cu^{2+} / Cu = 0.34$ V, $E^0 Ni^{2+} / Ni = -0.25$V?

7. Write Nernst equation for a Daniel cell?   1

8. What do you understand by the term- conductivity?   1

9. How is molar conductance related to conductivity of an electrolyte?   1

10. Write an expression relating cell constant and conductivity?   1

11. What do you understand by strong and weak electrolytes?   1

12. State kohlrausch's Law?   1

13. How many faradays are needed to reduce 3g mole of Cu^{2+} to Cu metal?   1

14. Give the reaction taking place in lead storage battery when it is on charging?   1

15. What are fuel cells?   1

16. What is the electrolyte used in a dry cell?   1

17. What is an electrochemical series? How does it predict the feasibility of acertain redox reaction?   2

18. How is standard electrode potential of a cell related to :-   2

    i) Equilibrium constant?

    ii) Gibbs free energy change.

19. The conductivity of an aqueous solution of NaCl in a cell is 92 Ω^{-1} cm^{-1} theresistance offered by this cell is 247.8Ω. Calculate the cell constant?   2

20. The molar conductivity of 0.1M CH_3COOH solution is 4.6cm^2 mol^{-1}.What is the conductivity and resistivity of the solution?   2

21. The conductivity of metals decreases while that of electrolytes increaseswith increases in temperature. Why?   2

22. The measured resistance of a cell containing 7.5 x 10^{-3} M solution of KCl at 25^{0}C was 1005 Ω calculate,   2

    (a) Specific conductance and

    (b) Molar conductance of the solution. Cell Constant = 1.25 cm^{-1}

23. How is Limiting molar conductivity related to   2

    i) degree of ionization and ii) dissociation constant

24. State Faraday's Laws of electrolysis?   2

25. How many gram of chlorine can be produced by the electrolysis of molten NaCl with a current of 1 amp for 15 min?   2

26. How many electrons flow when a current of 5 amps is passed through a solution for 193 sec. Given F = 96500 C. N_A=6.002 $\times$ 10^{23} mol^{-1}?   2

27. Silver is deposited on a metallic vessel by passing a current of 0.2 amps for 3 hrs.   2

Calculate the weight of silver deposited.

(At mass of silver = 108 amu, F = 96500 C?

28. Name the cell used for low current devices like hearing aids, watches etc. Also give   2

    thehalf cell reactions for such a cell?

29. Rusting of iron is quicker in saline water than in ordinary water .Explain?   2

30. Enlist the factors affecting corrosion? [2

31. What do you mean by primary and secondary battery?   2

32. Explain construction and working of standard Hydrogen electrode?   3

33. What is the cell potential for the cell at 25^0C 3

    $Cr / Cr^{3+}(0.1 \text{ M}) \| Fe^{2+} (0.01M) /Fe$

    $E^0Cr^{3+}/Cr = -0.74V$;$E^0 Fe^{2+}/Fe = - 0.44V$.

34. Calculate ΔG^0 for the reaction at 25^0 3

    $Zn (s)/ Zn^{2+} (0.0004M) Cd^{2+} (0.2m) 1 Cd (s)$

    $E^0Zn^{2+}/Zn = -0.763V$, $E^0Cd^{2+}/Cd = -0.403V$, F=96500 C Mol^{-1} , R = 8.314 J/K.

35. Calculate Equilibrium constant K for the reaction at 298K   3

    $Zn (s) + Cu^{2+} (aq) \rightarrow Zn^{2+}/aq) +Cu$

    $E^0Zn^{2+}Zn = -0.076V$; $E^0Cu^{2+}Cu = +0.34V$.

36. For what concentration of Ag^+ (aq) will the emf of the given cell be zero at 25^0C ,if   3

    the concentration of Cu^{2+} (aq) is 0.1 M ?

    $Cu (s) / Cu^{2+} (0.1M)// Ag^+ (aq) / Ag(s)$

    $E^0 Ag^+ /Ag = +0.80V$; $E^0 Cu^{2+} /Cu = 0.34$ V

37. Calculate the standard free energy change for the cell- reaction.   3

    $Fe^{2+} (aq) + Ag^+ (s) \rightarrow Fe^{3+} (aq) + Ag(s)$

How is it related to the equilibrium constant of the reaction?

$E^0Fe^{3+}/Fe^{2+} = + 0.77V$, $E^0Ag^+/Ag = +0.08V$ F= 96500 C/mol.

38. Predict the products of electrolyzing of the following   3

(a) A dil. Solution of H_2SO_4 with Pt. electrode

(b) An aqueous solution of $AgNO_3$ with silver electrode