Q1. How much copper will be deposited on the cathode of an electrolytic cell containing copper sulphate solution by the passage of a current of 2 amperes for 30 minutes? (At. mass of Cu = 63.5)

Q2. Calculate the electrode potential of the following electrode at 25°C Zn/Zn^{+2} (conc. = 0.1M)

Q3. Calculate the emf of the cell $Zn|\ Zn^{+2}$ (0.1M)$||\ Cd^{+2}$ (0.1 M)| Cd at 298 K

Q4. The specific conductivity of N/50 solution of KCI at 298 K is 0.002765 S/cm if the resistance of the same solution, placed in the cell is 2000 ohms, what is cell constant?

Q5. Following cell Is set up between copper and silver electrodes $Cu_{(s)}\ |Cu^{+2}\ ||\ Ag^{+}|\ Ag_{(s)}$ If its two half cells work under standard conditions, calculate the e.m.f. of the cell

Q6. Iron and nickel are used to make an electro chemical cell by using a salt bridge to join a half-cell containing 1.0 M solution of $Fe^{+2}{}_{(aq)}$ in a strip of iron has been immersed to a second half-cell which contains 1.0 M $Ni^{+2}{}_{(aq)}$ solution in which a ship of nickel has been immersed. A voltmeter is connected between the two metal strips.

a) In which cell does reduction occur?
b) Write the half-cell reactions involved.
c) Which metal the anode?
d) In which direction are the electrons passing through the voltmeter?
e) What would be effect on the voltmeter reading if Fe^{+2} concentrations were increased?
f) What will be the voltmeter reading when the cell reaches equilibrium?

Q7. If the molar conductivities at infinite dilution at 293 K for aqueous hydrochloric acid, sodium acetate and sodium chloride solution are 383.5, 78.4 and 102 $\Omega^{-1}cm^2$ respectively, calculate the molar conductivity of acetic acid at this temperature and dilution. If the molar conductivity of acetic acid at some other dilution Is 100.0 S cm^2 at 293K, calculate the degree of ionization of acetic acid at the dilution.

Q8. The half-cell reactions with their potentials are $Pb_{(s)} - 2e^- \rightarrow Pb^{+2}$ E° = +0.13 V; $Ag_{(s)} - e^- \rightarrow Ag^+$ E° = +0.80 V Write the cell reaction and calculate its e.m.f.

Q9. In a particular cell, 0.01 M solution of potassium chloride gave a resistance of 150 ohms at 298 K. While 0.01 M solution of hydrochloric acid gave a resistance of 51.40 ohms at the same temperature. At 298 K the specific conductivity of 0.01 M potassium chloride solution is 0.0014088 ohm^{-1} cm^{-1} Calculate equivalent conductivity of the given hydrochloric acid solution.

Q10. Two half cells are $Al^{+3}{}_{(aq)}$/Al and $Mg^{+2}{}_{(aq)}$ /Mg The reduction potentials of these half cells are -1.66 V and -2.36 V respectively. Calculate the cell potential also write the cell reaction?

Q11. Calculate the equilibrium constant for the reaction $Cu_{(s)} + 2Ag^+ \leftrightarrows Cu^{+2} + 2Ag_{(s)}$

Q12. The molar conductivity of NH_4Cl at infinite dilution is 149.7 S cm^2 and the ionic conductivities of OH^{-1} and Cl^{-1} ions are 198 and 76.3 S cm^2 respectively. Calculate the molar conductivity of NH_4OH at this dilution.

Q13. The conductivity of 0.001 M acetic acid is 4.95 x 10^{-5} S/cm Calculate its dissociation constant. Given for acetic acid, Λ^{α} is 390 Scm^2 mol^{-1}

Q14. Calculate the equilibrium constant for the reaction at 298 K. $4\ Br^{-1} + O_2 + 4\ H^+ \leftrightarrows 2Br_2 + 2H_2O$

Q15. For the cell $Zn_{(s)}|\ ZnSO_4\ ||\ CuSO_4|\ Cu_{(s)}$ calculate standard cell potential

Refer to the standard electrode potential data page for electrode potentials

Q16. The resistance of a deci normal solution of an electrolyte in a conductivity cell was found to be 245 ohms. Calculate the equivalent conductivity of the solution if the electrodes in the cell were 2cm apart and each has an area of 3 sq. cm?

Q17. Calculate the EMF of the following cell at 298K: Cd| Cd^{+2} (0.1M)|| Ag^{+}(0.1 M)| Ag

Q18. Predict whether zinc and silver react with 1M sulphuric acid to give out hydrogen gas or not.

Q19. The molar conductance of NaOH, NaCl and $BaCl_2$ at infinite dilution are 2.481 x 10^{-2}, 1.265 x 10^{-2} and 2.800 x 10^{-2} $\Omega^{-1}cm^2$ mol^{-1} respectively. Calculate Λ^{α} for $Ba(OH)_2$ [Ans. 5.232 x 10^{-2} $\Omega^{-1}cm^2$ mol^{-1}]

Q20. How much electricity In terms of Faraday is required to produce
   a) 20.0 g of Ca from molten $CaCl_2$
   b) 40.0 g Al from molten Al_2O_3

Q21. If E° for copper electrode is + 0.34 V, how will you calculate its emf value when the solution in contact with it is 0.1 M in copper ions (Cu^{+2})? How does the emf for copper electrode change when concentration of Cu^{+2} ions in the solution is decreased?

Q22. For the Cell Mg(s) | Mg^{+2} || Ag^{+}| Ag (aq) Ag calculate the equilibrium constant of the cell reaction at 25°C and maximum work that can be obtained by operating the cell

Q23. Calculate the EMF of the cell
   a) Containing Ni and Cu electrodes.
   b) Containing Chromium and Cadmium electrodes.
   c) Containing Zinc and Nickel electrodes

Q24. Can a solution of l M $ZnSO_4$ made by stirring the solution with copper rod?

Q25. Two electrolytic cells containing silver nitrate solution and copper sulphate solution are connected in series. A steady current of 2 ampere was passed through them till 1.078 g of Ag were deposited. How long did the current flow? What weight of copper will be deposited? (At. Mass of Ag = 107.8, Cu = 63.5) [Ans.= 6 min 26 sec, 0.3175 gm]

Q26. Why blue colour of copper sulphate solution gets discharged when zinc rod is dipped in it?

Q27. Predict reaction of 1N sulphuric acid with the following metals (i) Copper (ii) lead (iii) iron. Justify your answer

Q28. For the equilibrium $2H_2 + O_2 \leftrightarrows 2H_2O$ at 25° C ΔG^o for the reaction is -474.78 kJ/ mol Calculate K for it

Q29. Silver is electro-deposited on a metallic vessel of surface area 800 cm^2 by passing a current 0.2 ampere for 3 hours. Calculate the thickness of silver deposited. Given the density of silver as 10.78 gm/cc (Atomic mass of Ag = 107 amu)

Q30. Calculate the maximum possible electrical work that can be obtained from the cell under the standard conditions at 25°C $Zn_{(s)}$ | Zn^{+2} || Ni^{+2} | $Ni_{(s)}$

Q31. Calculate the cell potential ($E°_{cell}$) for the cell containing 0.100 M Ag^{+} and 4.00M Cu^{+2} ions in aqueous solution at25°C.

Q32. Can a nickel spoon be used to stir a solution of silver nitrate? Support your answer with reason?

Q33. Write the Nernst equation and e.m.f. of the following cells at 298 K
   a) $Mg_{(s)}$ | Mg^{+2}(0.001 M) || Cu^{+2} (0.0001 M) |$Cu_{(s)}$
   b) $Fe_{(s)}$ | Fe^{+2}(0.001 M) || H^{+} (0.1 M) |$H_{2\,(g)}$ (1 bar)| $Pt_{(s)}$
   c) $Sn_{(s)}$ | Sn^{+2} (0.005 M) || H^{+} (0.02 M) |$H_{2\,(g)}$ (1 bar)| $Pt_{(s)}$
   d) P(s)| $Br2_{(l)}$ | Br^{-1} (0.001 M) || H^{+} (0.03 M) |$H_{2\,(g)}$ (0.5 bar)| $Pt_{(s)}$

Q34. Write the Nernst equation and calculate the value of ΔG° for the Galvanic cell:
$Cu_{(s)} |Cu^{+2} (0.130\ M) || Ag^{+} (1 \times 10^{-4}\ M) | Ag_{(s)}$

Q35. Calculate the potential of the following cell reaction at 298 $Sn^{+4}(1.50\ M) + Zn\ (s) \rightarrow Zn^{+2}$ $(2.00\ M) + Sn^{+2}\ (0.50\ M)$ The standard potential (E°_{cell}) of the cell is 0.89 V. Whether the potential of the cell will increase or decrease, if the concentration of Sn^{+4} is increased in the cell?

Q36. How much charge is required for the following reduction of
a) 1 mole of Al^{+3} to Al
b) 1 mole of Cu^{+2} to Cu
c) 1 mole of MnO_4^{-1} to Mn^{+2}

Q37. Three electrolytic cells A, B, C containing solution of $ZnSO_4$, $AgNO_3$ and $CuSO_4$ respectively are connected in series. A steady current of 1.5 amperes was passed through them until 1.45 g of silver deposited at the

Refer to the standard electrode potential data page for electrode potentials