Electrochemistry

1. What is specific conductance of a solution? What is the unit of specific conductance? How does it vary with temperature and concentration (Strong and weak electrolytes)
2. a) Explain the variation of equivalent conductances of strong and weak electrolytes with concentration
   b) State and explain kohlrausch's law of independent migration of ions

   c) What is the effect of temperature on molar conductivity?

3. a) State Hittorf's rule
   b) Explain the nature of conductometric titration curve when a strong monobasic acid is titrated by a strong base
   c) what is specific conductance

   d) what is equivalent conductance and molar conductance, correlate them.

4. The equivalence of 0.01 (N) solution of acetic acid was found to be 16.30 ohm^{-1} cm^2 at 25 °C. The ion conductance of hydrogen and acetate ions at infinite dilution is 349.8 ohm^{-1} cm^2 and 40.9 ohm^{-1} cm^2, respectively at the same temperature. What percentage of acetic acid is dissociated at this concentration?
5. Explain the nature of conductometric titration curve when
   (i) Strong monobasic acid is titrated by strong base
   (ii) Strong monobasic acid by weak base
   (iii) Weak acid by strong base
   (iv) Weak acid by weak base
   (v) Nacl by $AgNO_3$
   (vi) $MgSO_4$ is titrated by $Ba(OH)_2$
6. The equivalent conductance of 0.01 (N) solution of acetic acid was found to be 16.30 ohm^{-1} cm^2 at 25 °C.The ion conductance of hydrogen and acetate ions at infinite dilution are 349.8 ohm^{-1} cm^2 and 40.9 ohm^{-1} cm^2, respectively at the same temperature. What percentage of acetic acid is dissociated at this concentration?
7. Difference between electro chemical and electrolytic cell.
8. What is salt bridge? What are its functions?
9. What is Nernst's equation?
10. What is redox potential?
11. What is primary and secondary std. electrode? What is their potential?
12. What is fuel cell? What is storage cell? Explain briefly.
13. How you find out equivalent conductance of acetic acid with the help of Kohlrausch's law of independent migration of ions.
14. The equivalent conductance of a 0.01 (N) $CaCl_2$ is 130.36 ohm^{-1} cm^2 $g.equiv^{-1}$. What will be the molar conductance?
15. Describe the conductometric titration curve for CH_3COOH and NH_4OH?Derive the expression for potential of hydrogen half-cell. How pH of a solution is determined through hydrogen electrode
16. Differentiate between electrolytic cells and galvanic cells.
17. Calculate the EMF of the following cell
    Ni | Ni^{2+} (1M) || Pb^{2+} (1M) | Pb at 25°C ; Given: Standard electrode potentials of Ni and Pb are –0.24 V and –0.13 V respectively at 25 °C.

18. Define 'Reference Electrode.'
19. For the following cell write down the cell reaction and calculate the emf at
    Ag | Ag^+ (a = 0.1) || Zn^{2+} (a = 0.1) | Zn

    $E°_{Ag+/Ag}$ = 0.799 V and $E°_{Zn2+/Zn}$ = –0.763 V

20. Write down the individual electrode reaction and also the total cell reaction of the following cell

    $Pb \mid PbSO_4 (S), SO_4^{2-} \mid\mid Cu^{2+} \mid Cu$

    $Zn \mid Zn^{2+} \mid\mid H^{+} \mid H_2 (Pt)$

21. For the following cell write down the cell reaction and calculate the emf at 25 °C
    $Pt \mid Fe^{+++}$ (a = 0.5), Fe^{++} (a = 0.2) Cl^{-} (a = 0.001) $\mid\mid AgCl \mid Ag$

    $E°_{Fe+++/Fe++} = 0.771$ V and $E°_{AgCl/Ag} = 0.222$

22. For the cell Cu/Cu^{2+} and Tl^{3+}/Tl^{+} (Pt), the cell reaction is $Cu+Tl^{3+} \rightarrow Cu^{2+}+Tl^{+}$. If the standard cell potential $E^0 = 0.913$V, then what will be the amount of standard free energy change?