School of Chemistry and Biochemistry, TIET, Patiala
Applied Chemistry (UCB008)
Tutorial Sheet (Electrochemistry-II)

1. Define electrode potential and standard electrode potential.

2. What are the conditions for a cell to be reversible? What are reversible electrodes?

3. What do you mean by reference electrode? What are secondary reference electrodes?

4. Draw the diagram for the standard hydrogen electrode and calomel electrode. Give their electrode notations and electrode reactions.

5. Why do electrochemical cells stop working after some time?

6. What do you mean by metal indicator electrodes of first and second kind? Explain with the help of suitable examples giving reactions.

7. The hydrogen electrode is dipped in the solution of *p*H = 3 at 25°C. Calculate the potential of the cell. The value of (2.303 RT/F) is 0.0591V.

8. Calculate the EMF of the following electrochemical cell at 25 °C. Also write down the overall reaction.
Cu, Cu^{2+}(c = 0.1 M)|H^+ (c = 0.01 M), H_2(1 atm); Pt
Given that E° (Cu^{2+}, Cu) = + 0.34 V and E° (H^+, H_2) = + 0.00 V

9. Set up the electrochemical cell for the reaction: $2Fe^{3+}(aq) + Sn^{2+}(aq) \rightleftharpoons 2Fe^{2+}(aq) + Sn^{4+}(aq)$
Calculate the equilibrium constant for the reaction.
Given that E° (Fe^{3+}, Fe^{2+}) = + 0.77 V and E°(Sn^{4+}, Sn^{2+}) = 0.15 V

10. Why a nickel spatula cannot be used to stir $CuSO_4$ solution?
Given that E° (Ni^{2+}, Ni) = - 0.25 V and E° (Cu^{2+}, Cu) = + 0.34 V

11. How concentration cells are different from chemical cells?

12. What is an electrolyte concentration cell? What is the driving force in a concentration cell?

13. What is liquid junction potential? What is its' origin? What is the basis on which an electrolyte is selected for making salt bridge? What is the function of salt bridge?

14. Find the concentration of Cd^{2+} ions in the given electrochemical cell:
$Zn(s)|Zn^{2+}$ (0.1M)$||Cd^{2+}(M_1)|Cd(s)$
Given: E^o (Zn^{2+}, Zn) = −0.76V; $E^o(Cd^{2+}$, Cd) = −0.40V; E_{cell} = 0.33 V

15. Calculate the EMF of the cell: $Pb(s)|Pb^{2+}$(1 M)$||Cu^{2+}$(1 M)|Cu(*s*)

Given that $Pb(s)|Pb^{2+}$ (1 M)$||Zn^{2+}$(1 M)|Zn(*s*) E^o = −0.63 V

$Cu(s)|Cu^{2+}$ (1 M)$||Zn^{2+}$(1 M)|Zn(*s*) E^o = −1.010 V