CBSE -XII
CHEMISTRY WORKSHEET (Electro Chemistry)

1. For the cell shown: Zn(s) | $ZnSo_4$ (aq) || $CuSo_4$ (aq) | C(s). Calculate standard cell potential if standard state reduction electrode potentials for Cu^{2+}/Cu and Zn^{2+}/ Zn are +0.34 V and -0.76 V respectively. ***(Ans. 1.10V)***

2. Following cell is set up between copper and silver electrodes: Cu/ Cu^{2+}(aq) || Ag^{+}(aq)| Ag. If its two half cells work under standard conditions, calculate the e.m.f of the cell [Given E^o Cu^{2+}/cu (E^o red) = + 0.34 volt , E^o Ag^{+}/ Ag (E^ored) = + 0.34 volt] ***(Ans: 0.46volt)***

3. The standard EMF of the cell Ni | Ni^{2+} || Cu^{2+} | cu is 0.59 volt. The standard electrode potential (reduction potential) of copper electrode is 0.34 volt. Calculate the standard electrode potentials of nickel electrode. ***(Ans: E^o Ni^{2+} , Ni = -0.25 volt)***

4. Calculate the EMF of the cell containing chromium and cadmium electrodes. (Given E^o cr^{3+} /cr = -0.74 V, E^o Cu^{2+}/ cd = -0.40 V) ***(Ans: 0.34V)***

5. Formulate the galvanic cell in which the following reaction takes place: Zn(s) + $2Ag^{+}$ (aq)→ Zn^{2+}(aq) + 2Ag(s) state *(i)* which one of the electrodes is negatively charged ? *(ii)* The reaction taking place at each of its electrode. *(iii)* The carriers of current within this cell.

6. If E^o_1, E^o_2 and E^o_3 are the standard electrode potentials for Fe/Fe^{2+}, Fe^{2+}/ Fe^{3+} and Fe/Fe^{3+} electrodes respectively, derive a relation between E^o_1, E^o_2 and E^o_3.

7. Calculate the standard electrode potentials of Cu^{2+}/cu half cell. Given that the standard reduction potential of Cu^{2+}/cu and Cu^{2+}/cu^{+} are 0.337 V and 0.153 V respectively.

8. Calculate the equilibrium constant for the reaction, $2Fe^{3+} + 3I^{-} \rightleftarrows 2Fe^{2+} + 13^{-}$. The standard reduction potentials in acidic conditions are 0.77 and 0.54 V respectively for Fe^{3+}/Fe^{2+} and $I3^{-}/I^{-}$ couples.

9. Calculate the standard free energy for the following reaction at 25^o C. Au(s) + ca^{2+} (aq, 1M) → Au^{3+} (aq, 1M) + ca (s) E^o Au^{3+}/Au = +1.50 V E^o Ca^{2+}/Ca = -2.87 V. Predict whether the reaction will be spontaneous oe not at 25^o C which of the above two half cells will act as an oxidizing agent and which one will be a reducing agent ?

10. A current of one ampere is flowing through a wire .Calculate the numbers of electrons flowing through the cross-section of the wire per second. ***(Ans: 6024 x 10^{18})***

11. Calculate the standard free energy change taking place in fuel cell in which the following reactions occur :
(i) $O_2 + 4M^{+} + 4e^{-} \rightarrow 2H_2O$, E^o = 1.229 V (ii) $2H_2 \rightarrow 4H^{+}4e^{-}$, E^o = 0.000V ***(Ans : -474.4kJ)***

12. Resistance of a condivity cell fixed with 0.1 mol L^{-1} KCI solution is 100Ω. If the resistance of the same cell when filled with 0.02 mol L^{-1} KCI solution is 520Ω, Calculate the Conductivity and molar conductivity of 0.02 M KCI solution. The Conductivity of 0.1 M KCI solution is 1.29 s/m.

13. The measured resistance of a conductance cell containing 7.5 x 10^{-3} M solution of KCI at 25^o C was 1005 ohms. Calculate (a) Specific conductance (b) Molar conductance of the solution. Cell constant = 1.25 cm^{-1}. ***(Ans : a. 0.001244 ohm^{-1} cm^{-1} (b) 165.85 ohm^{-1} cm^2 mol^{-1})***

14. The conductivity of 0.2 M solution of KCI at 298 K is 0.248 5cm^{-1}. Calculate its molar conductivity. ***(Ans: 124Ω ^{1} cm^2 mol^{-1})***

15. If the molar conductivities at infinite dillution of NaCI, HCI and CH_3COONa (Na Ac) are 126.4, 425.9 and 91.0 5 cm^2 mol^{-1} respectively, what will be that of acetic acid (HAc) ?