PART COMPLETION TEST
## Class 12 - Chemistry

Time Allowed: 1 hour and 30 minutes   **Maximum Marks: 40**

1. Calculate the molarity of each of the following solutions: **[3]**

   a. 30 g of $Co(NO_3)_2 \cdot 6H_2O$ in 4.3 L of solution

   b. 30 mL of 0.5 M H_2SO_4 diluted to 500 mL.

2. Calculate (a) molality (b) molarity and (c) mole fraction of KI **[5]** if the density of 20% (mass/mass) aqueous KI is 1.202 g mL^{-1}.

3. H_2S, a toxic gas with rotten egg like smell, is used for the **[3]** qualitative analysis. If the solubility of H_2S in water at STP is 0.195 m, calculate Henry's law constant.

4. Calculate the osmotic pressure in pascals exerted by a **[2]** solution prepared by dissolving 1.0 g of polymer of molar mass 185,000 in 450 mL of water at 37°C.

5. Given the standard electrode potentials, **[2]**

   K^+/K = -2.93

   Ag^+/Ag = 0.80V

   Hg^{2+}/Hg = 0.79V

   Mg^{2+}/Mg = -2.37V

   Cr^{3+}/Cr = - 0.74V

   Arrange these metals in their increasing order of reducing power.

6. Calculate the standard cell potentials of galvanic cells in **[5]** which the following reactions take place:

   i. $2Cr(s) + 3Cd^{2+}(aq) \rightarrow 2Cr^{3+}(aq) + 3Cd$

ii. $Fe^{2+}(aq) + Ag^+(aq) \rightarrow Fe^{3+}(aq) + Ag(s)$
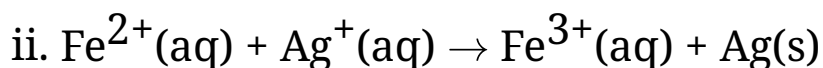
Calculate the $\Delta_r G^\circ$, and equilibrium constant of the reactions.

7. In the button cells widely used in watches and other devices **[2]** the following reaction takes place:
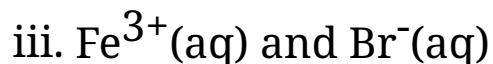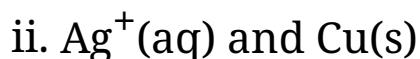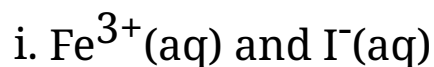
$zn(s) + Ag_2O(s) + H_2O(l) \rightarrow zn^{2+}(aq) + 2Ag(s) + 2OH^-(aq)$
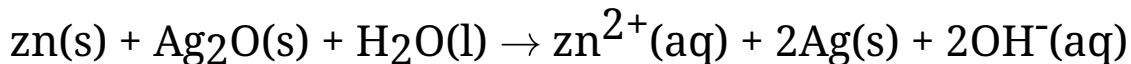
Determine $\Delta_r G^o$ and E^O for the reaction.

8. The conductivity of sodium chloride at 298 K has been **[5]** determined at different concentrations and the results are given below:

Concentration/M	0.001	0.010	0.020	0.050	0.100
$10^2 \times k/S \ m^{-1}$	1.237	11.85	23.15	55.53	106.74

Calculate Λ_m for all concentrations and draw a plot between Λ_m and $c^{1/2}$. Find the value of Λ_m^0.

9. Using the standard electrode potentials given in table 3.1, **[5]** predict if the reaction between the following is feasible or not:

i. $Fe^{3+}(aq)$ and $I^-(aq)$

ii. $Ag^+(aq)$ and $Cu(s)$

iii. $Fe^{3+}(aq)$ and $Br^-(aq)$

iv. $Ag(s)$ and $Fe^{3+}(aq)$

v. $Br_2(aq)$ and $Fe^{2+}(aq)$

Note: Standard Electrode Potentials of Fe^{3+}(+0.77 V), I^-(-0.54 V), Ag^+(+0.80 V), Cu(-0.34 V), Br^-(-1.09 V), Br_2(+1.09 V), Ag(-0.80 V), Fe^{2+}(-0.77 V)

10. Mention the factors that affect the rate of a chemical **[2]** reaction.

11. In a pseudo-first-order reaction in water, the following results were obtained: **[1]**

$\frac{t}{s}$	0	30	60	90
$\frac{[A]}{mol^{-1}}$	0.55	0.31	0.17	0.085

Calculate the average rate of reaction between the time interval 30 to 60 seconds.

12. In a reaction between A and B, the initial rate of reaction (r_0) was measured for different initial concentrations of A and B as given below: **[5]**

A/molL^{-1}	0.20	0.20	0.40
B/molL^{-1}	0.30	0.10	0.05
r$_0$/molL^{-1}s^{-1}	5.07×10^{-5}	5.07×10^{-5}	1.43×10^{-4}

What is the order of the reaction with respect to A and B?