Universal gas constant $R = 8.314 \, J \, K^{-1} \, mol^{-1}$

Avogadro constant $N_A = 6.022 \times 10^{23} \, mol^{-1}$

Plank's constant $h = 6.626 \times 10^{-34} \, J \, s$

Velocity of light $c = 3 \times 10^8 \, m \, s^{-1}$

Introduction to paper Class- 06 -2023 A/L

❖ **Answer all the Questions.**

1. ## 2006 AL

(b) (i) A solution **B** contains SO_3^{2-} and $C_2O_4^{2-}$ ions. 25.0 cm³ of solution **B** required 40.0 cm³ of 0.05 mol dm⁻³ $KMnO_4$ solution for complete reaction under acidic conditions. The resulting solution was treated with excess of $BaCl_2$ in the presence of dil. HNO_3. The mass of the white precipitate so obtained after drying was 0.466 g.

Calculate the concentrations of SO_3^{2-} and $C_2O_4^{2-}$ ions in solution **B**.

(Ba = 137.0 ; S = 32.0 ; O = 16.0)

Hint : Consider that, $KMnO_4$ converts $SO_3^{2-} \longrightarrow SO_4^{2-}$ and $C_2O_4^{2-} \longrightarrow CO_2$.

2. ## 2008 AL

(b) A solution **B** contains $C_2O_4^{2-}$ and CO_3^{2-} ions. A 25.00 cm³ portion of this solution was treated with excess $Ca(NO_3)_2$ solution to completely precipitate $C_2O_4^{2-}$ and CO_3^{2-} ions. The precipitate so obtained after drying had a mass of 0.820 g. This precipitate was then dissolved in dil. H_2SO_4 and titrated with 0.05 mol dm³ $KMnO_4$ solution. The titration required 20.00 cm³ of the $KMnO_4$ solution.

Calculate the concentrations of $C_2O_4^{2-}$ and CO_3^{2-} ions in the solution **B**.

(Ca = 40.0, C = 12.0, O = 16.)

(6.0 marks)

3. (c) A 25.00 cm^3 portion of a 0.1 mol dm^{-3} solution containing A^{n+} needs 15.00 cm^3 of 0.1 mol dm^{-3} solution of acidic MnO$_4^-$ for complete reaction, In the above reaction A^{n+} ions are converted to AO$_3^-$

i) Write the balanced oxidation half reaction

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ii) Write the balanced reduction half reaction

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iii) Find the value of n.

4. c) A solution of H$_2$O$_2$ has been diluted by twenty times. When 25.00 cm^3 of above diluted solution was acidified with dill. H$_2$SO$_4$ acid and titrated with 0.0150 mol dm^{-3} of KMnO$_4$ solution, a volume of 20.00 cm^3 was required.

Before diluting another 10.00 cm^3 sample was acidified with dill. HNO$_3$ and reacted with excess Ag$_2$O to form Ag metal and Oxygen gas. (Ag = 108)

i) Write the balanced chemical equation for reaction of H$_2$O$_2$ with KMnO$_4$ in acidic medium

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ii) Find out the concentration of initial H$_2$O$_2$ solution.

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iii) Write balanced equation for reaction of H$_2$O$_2$ with Ag$_2$O in acidic medium.

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iv) What is the mass of Ag metal that formed?

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