Practice Question Set For A-Level
**Subject : Chemistry**
**Paper-2 Topic: Physical**

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**Name of the Student**:_____
**Max. Marks : 17 Marks** **Time : 17 Minutes**

Q1.

Hydrogen peroxide is used as an oxidising agent in the preparation of transition metal complexes.

(a) Consider the following reaction scheme. All the complexes are in aqueous solution.

$[Co(H_2O)_6]^{2+}$ —Reaction **1**→ cobalt(II) complex —Reaction **2**, $H_2O_2$→ $[Co(NH_3)_6]^{3+}$

(i) Identify a reagent for Reaction **1** and describe the colour change that occurs.

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**(3)**

(ii) State the colour of the final solution formed in Reaction **2**.

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**(1)**

(b) Consider the following reaction scheme. All the complexes are in aqueous solution.

$[Cr(H_2O)_6]^{3+}$ —Reaction **3**, Excess NaOH(aq)→ chromium(III) complex —Reaction **4**, $H_2O_2$→ $CrO_4^{2-}$

(i) For Reaction **3**, state the colour of the initial and of the final solution and write an equation for the reaction.

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**(4)**

(ii) Write a half-equation for the reduction of hydrogen peroxide to hydroxide ions.

Deduce an overall equation for Reaction **4** and state the colour of the final solution.

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**(4)**

(c) The concentration of a hydrogen peroxide solution can be determined by titration with acidified potassium manganate(VII) solution. In this reaction the hydrogen peroxide is oxidised to oxygen gas.

A 5.00 $cm^3$ sample of the hydrogen peroxide solution was added to a volumetric flask and made up to 250 $cm^3$ of aqueous solution. A 25.0 $cm^3$ sample of this diluted solution was acidified and reacted completely with 24.35 $cm^3$ of 0.0187 mol $dm^{-3}$ potassium manganate(VII) solution.

Write an equation for the reaction between acidified potassium manganate(VII) solution and hydrogen peroxide.
Use this equation and the results given to calculate a value for the concentration, in mol $dm^{-3}$, of the original hydrogen peroxide solution.
(If you have been unable to write an equation for this reaction you may assume that 3 mol of $KMnO_4$ react with 7mol of $H_2O_2$. This is **not** the correct reacting ratio.)

**(5)**

**(Total 17 marks)**

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