Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Physical 1

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

Q1.

Iodine reacts slowly with propanone in the presence of an acid catalyst according to the equation

$$CH_3COCH_3 + I_2 \longrightarrow CH_3COCH_2I + HI$$

The rate of this reaction can be followed by preparing mixtures in which only the initial concentration of propanone is varied. At suitable time intervals, a small sample of the mixture is removed and titrated with sodium thiosulfate solution. This allows determination of the concentration of iodine remaining at that time.The rate of this reaction can be followed by preparing mixtures in which only the initial concentration of propanone is varied. At suitable time intervals, a small sample of the mixture is removed and titrated with sodium thiosulfate solution. This allows determination of the concentration of iodine remaining at that time.

Five mixtures, **A**, **B**, **C**, **D** and **E**, are prepared as shown in **Table 1**.

Table 1

Mixture	**A**	**B**	**C**	**D**	**E**
Volume of 0.0200 mol dm^{-3} $I_2(aq)/cm^3$	40.0	40.0	40.0	40.0	40.0
Volume of 0.100 mol dm^{-3} $H_2SO_4(aq)/cm^3$	25.0	25.0	25.0	25.0	25.0
Volume of 1.00 mol dm^{-3} $CH_3COCH_3(aq)/cm^3$	25.0	20.0	15.0	10.0	6.5
Volume of distilled water/cm^3	0.0	5.0	10.0	15.0	18.5

(a) Calculate the initial concentration, in mol dm^{-3}, of the propanone in mixture **A**.

Concentration = _____ mol dm^{-3}

(2)

(b) State and explain why different volumes of water are added to mixtures **B**, **C**, **D** and **E**.

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(2)

(c) Calculate the volume of 0.0100 mol dm^{-3} sodium thiosulfate solution required to react with all of the iodine in a 10.0 cm^3 sample of mixture **E**, before the iodine reacts with propanone.

The equation for the reaction in the titration is

$$2Na_2S_2O_3(aq) + I_2(aq) \longrightarrow Na_2S_4O_6(aq) + 2NaI(aq)$$

Volume = _____ cm^3

(4)

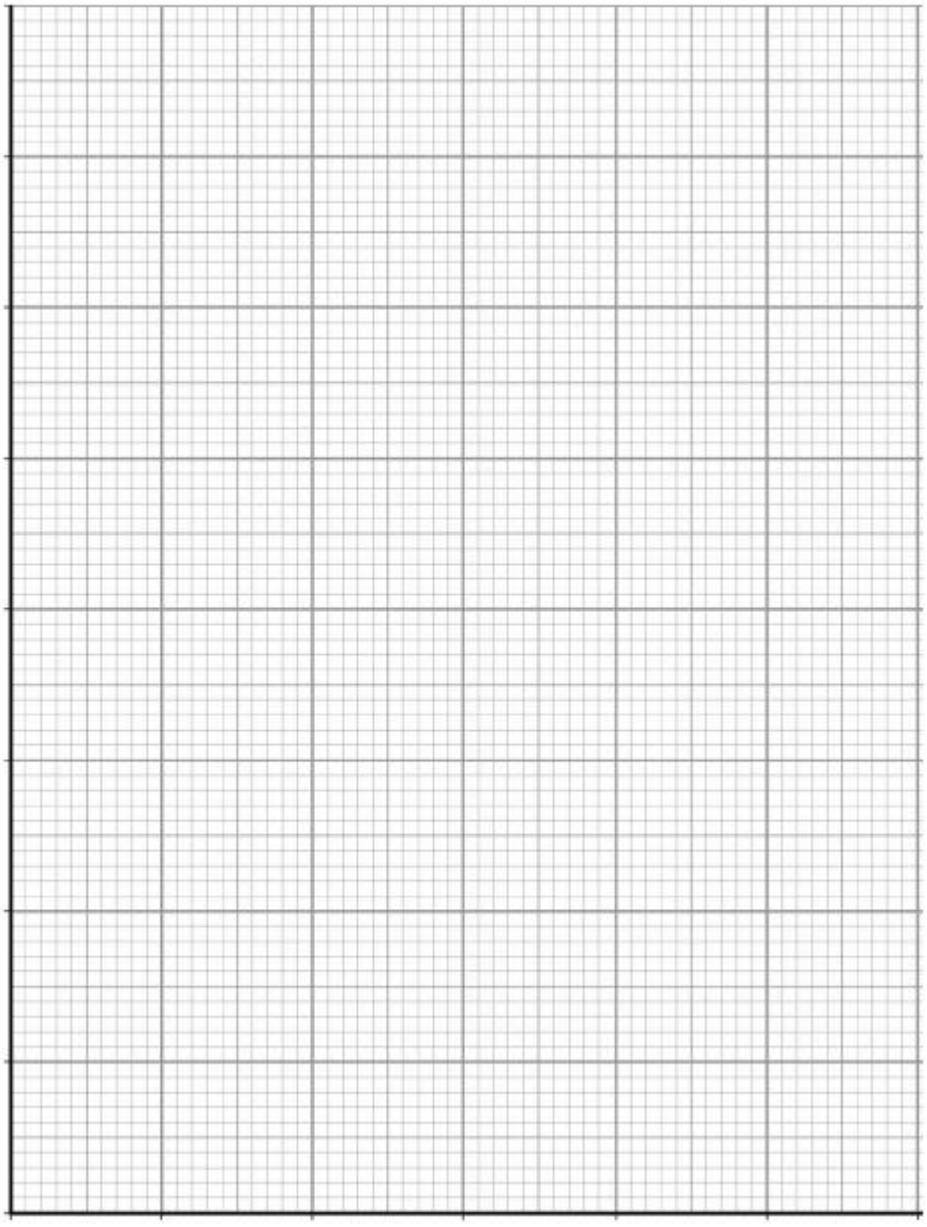
(d) The results for mixture **E** are shown in **Table 2**.
V is the volume of 0.0100 mol dm^{-3} sodium thiosulfate solution needed, at different times, **t**, to react with the iodine in a 10.0 cm^3 sample of **E**.

Table 2

t/min	5	10	20	30
V/cm^3	17.5	17.2	16.6	16.0

Use these data and your answer to part **(c)** to plot a graph of **V** (*y*-axis) against **t** (*x*-axis) for mixture **E**.
Draw a best-fit straight line through your points and calculate the gradient of this line.

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gradient = _____ $cm^3\ min^{-1}$

(5)

(e) The gradients for similar graphs produced by mixtures **A**, **B**, **C** and **D** are shown in **Table 3**.
Each gradient is a measure of the rate of the reaction between iodine and propanone.

Table 3

Mixture	**A**	**B**	**C**	**D**
Gradient / $cm^3\ min^{-1}$	−0.24	−0.20	−0.15	−0.10

Use information from **Table 1** and **Table 3** to deduce the order with respect to propanone.
Explain your answer.

_____

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(2)

(f) Each sample taken from the reaction mixtures is immediately added to an excess of sodium hydrogencarbonate solution before being titrated with sodium thiosulfate solution.

Suggest the purpose of this addition.
Explain your answer.

_____

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_____

_____

_____

_____

(2)

(Total 17 marks)

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