Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Inorganic 2

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Name of the Student:_____
Max. Marks : 15 Marks **Time : 15 Minutes**

Q1.

Cisplatin, $[Pt(NH_3)_2Cl_2]$, is used as an anti-cancer drug.

(a) Cisplatin works by causing the death of rapidly dividing cells.

Name the process that is prevented by cisplatin during cell division.

_____

(1)

After cisplatin enters a cell, one of the chloride ligands is replaced by a water molecule to form a complex ion, **B**.

(b) Give the equation for this reaction.

_____

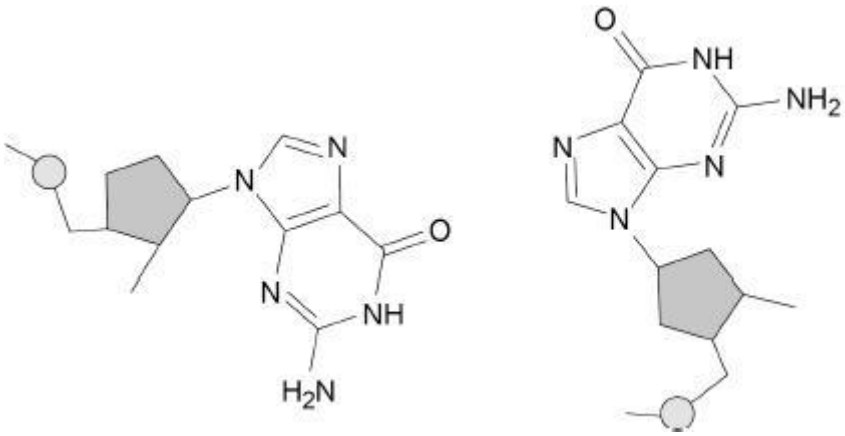
(2)

(c) When the complex ion **B** reacts with DNA, the water molecule is replaced as a bond forms between platinum and a nitrogen atom in a guanine nucleotide.
The remaining chloride ligand is also replaced as a bond forms between platinum and a nitrogen atom in another guanine nucleotide.

Figure 1 represents two adjacent guanine nucleotides in DNA.

Complete **figure 1** to show how the platinum complex forms a cross-link between the guanine nucleotides.

Figure 1



(2)

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An experiment is done to investigate the rate of reaction in part (b).

(d) During the experiment the concentration of cisplatin is measured at one-minute intervals.

Explain how graphical methods can be used to process the measured results, to confirm that the reaction is first order.

(3)

In another experiment, the effect of temperature on the rate of the reaction in part (b) is investigated.

The table shows the results.

Temperature T / K	$\frac{1}{T}$ / K^{-1}	**Rate constant k / s^{-1}**	**ln k**
293	0.00341	1.97×10^{-8}	−17.7
303	0.00330	8.61×10^{-8}	−16.3
313	0.00319	3.43×10^{-7}	−14.9
318		6.63×10^{-7}	
323	0.00310	1.26×10^{-6}	−13.6

(e) Complete the table above.

(2)

(f) The Arrhenius equation can be written in the form

$$\ln k = \frac{-E_a}{RT} + \ln A$$

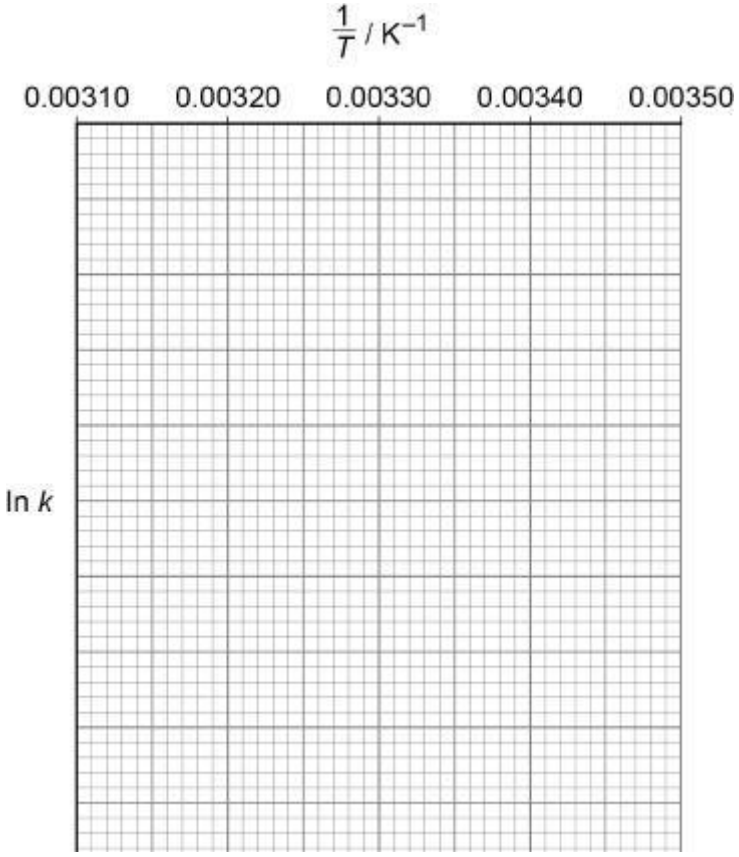
Use the data in the table above to plot a graph of ln k against $\frac{1}{T}$ on the grid in **Figure 2**.

Calculate the activation energy, E_a, in kJ mol^{-1}

The gas constant, R = 8.31 J K^{-1} mol^{-1}

Figure 2

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E_a _____ kJ mol^{-1}

(5)

(Total 15 marks)

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