Name: **Period:** **Seat#:**

☐ FRQ Practice

The first-order decomposition of X is monitored. The data from the experiment are given in the table below.

[X] (M)	Time (min)
1.28×10^{-4}	0.0
4.00×10^{-5}	35.0

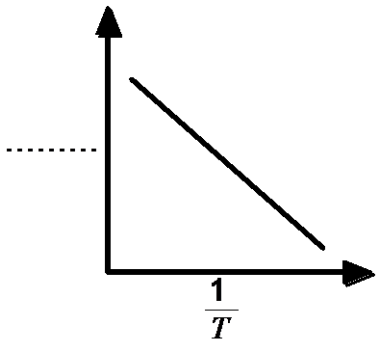
(a) Calculate the rate constant for the first order reaction using the values given for concentration and time. Include units with your answers.

(b) Calculate the half-life of the reaction. Include units with your answer.

(c) Experiments were performed to determine the value of the rate constant for this reaction at various temperatures. Data from these experiments were used to produce the graph below, where T is temperature. This graph can be used to determine E_a, the activation energy.

(i) Label the vertical axis of the graph

(ii) Explain how to calculate the activation energy from this graph.



Useful information: $\ln[X]_t - \ln[X]_0 = -kt$

☐ Catalysts

A proposed mechanism for the depletion of O_3 in the upper atmosphere is shown below.

Step I $O_3 + Cl \rightarrow O_2 + ClO$

Step II $ClO + O \rightarrow Cl + O_2$

(a) Write a balanced equation for the overall reaction represented by Step I and Step II above.

(b) Clearly identify the catalyst in the mechanism above. Justify your answer.

(c) Clearly identify the intermediate in the mechanism above. Justify your answer.