**Name: Period: Seat#:**

**S-23**

🞏 **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 x 104 | 0.0 |
| 4.00 x 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 *Ea*, 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 = –*k*t

🞏 **Catalysts**

A proposed mecha­nism for the depletion of O3 in the upper atmo­sphere is shown below.

Step I O3 + Cl → O2 + ClO

Step II ClO + O → Cl + O2

(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.