

Answer on Question #73246 - Chemistry - General Chemistry

Question:

A student performing this exercise to determine the activation energy and frequency factor ran the reaction at 40C, 26oC, 74oC and a fourth temperature that was between 26oC and 74oC having forgotten to record the water bath temperature. Would the student be able to determine the temperature of the fourth reaction mixture from the absorbance-time data collected from all four determinations?

Solution:

Knowing the time of absorption (with all four definitions) one can find the reaction rate, as well as the constant of the reaction rate. Knowing the reaction constant and the temperature for the two systems, one can determine the activation energy using the formula:

$$E_a = \frac{R \cdot T_1 \cdot T_2}{T_1 - T_2} \cdot \ln \frac{k_1}{k_2}$$

Knowing the value of the activation energy and the value at a temperature of one temperature, we can find the value of the second temperature based on the formula given above.

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