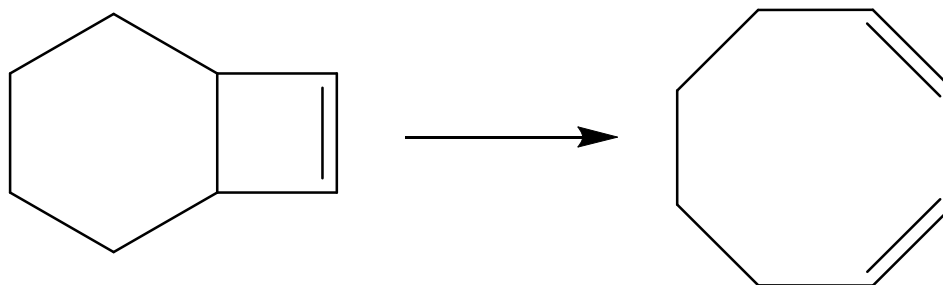


Activation energy

Given the following rate data for the isomerization of cyclooctadiene (shown below), calculate the activation energy for the reaction:



T (K)	236	248	259	267
Rate (x 10 ⁴)	0.376	1.08	2.44	4.61

Hint: You should be able to pick any pair of values in this table to calculate the activation energy.

Activation energy

Solution: Use the Arrhenius rate law written in the form:

$$E_a = \frac{-R \ln \frac{k_2}{k_1}}{\left(\frac{1}{T_2} - \frac{1}{T_1}\right)}$$

T (K)	236	248	259	267
Rate (x 10 ⁴)	0.376	1.08	2.44	4.61

$$E_a = \frac{-(8.31) \ln \frac{1.08}{0.376}}{\left(\frac{1}{248} - \frac{1}{236}\right)} = 39.3 \text{ kJ/mol}$$