N11 – Collision Theory and More

Elementary Step	Molecularity	Rate Law
$A \rightarrow products$	Unimolecular	Rate = k[A]
A + A \rightarrow products (2A \rightarrow products)	Bimolecular	Rate = k[A] ²
$A + B \rightarrow products$		Rate = k[A][B]
$A + A + B \rightarrow products$ (2A + B \rightarrow products)	Termolecular	Rate = k[A] ² [B]
$A + B + C \rightarrow products$	7	Rate = k[A][B][C]

$$k = Ae^{\left(\frac{-E_a}{RT}\right)} \quad ln\left(\frac{k_2}{k_1}\right) = \frac{E_a}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right) \quad \text{or...}$$
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$$\ln(k) = -\frac{E_a}{R} \left(\frac{1}{T}\right) + \ln(A)$$

- $-E_a/R$ is the slope when graphing ln(k) vs. (1/T)
- In(A) is the y-intercept
- $E_a = -R(slope)$
- Graphing ln(k) vs (1/T) and taking line of best fit can quickly yield a slope

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