| Elementary Step | Molecularity | Rate Law |
| :---: | :---: | :---: |
| $A \rightarrow$ products | Unimolecular | Rate = k[A] |
| $\begin{aligned} \hline \mathrm{A}+\mathrm{A} \rightarrow & \text { products } \\ & (2 \mathrm{~A} \rightarrow \text { products }) \end{aligned}$ | Bimolecular | Rate $=\mathrm{k}[\mathrm{A}]^{2}$ |
| $A+B \rightarrow$ products |  | Rate $=\mathrm{k}[\mathrm{A}][\mathrm{B}]$ |
| $\begin{gathered} \hline A+A+B \rightarrow \text { products } \\ (2 A+B \rightarrow \text { products }) \\ \hline \end{gathered}$ | Termolecular | Rate $=\mathrm{k}[\mathrm{A}]^{2}[\mathrm{~B}]$ |
| $A+B+C \rightarrow$ products |  | Rate $=\mathrm{k}[\mathrm{A}][\mathrm{B}][\mathrm{C}]$ |

$$
\begin{aligned}
\mathrm{k}=\mathrm{A} e^{\left(\frac{-E_{a}}{R T}\right)} \quad & \ln \left(\frac{k_{2}}{k_{1}}\right)=\frac{E_{a}}{R}\left(\frac{1}{T_{1}}-\frac{1}{T_{2}}\right) \quad \text { or... } \\
& \ln \left(\frac{k_{2}}{k_{1}}\right)=\frac{-E_{a}}{R}\left(\frac{1}{T_{2}}-\frac{1}{T_{1}}\right)
\end{aligned}
$$

$\ln (k)=-\frac{E_{a}}{R}\left(\frac{1}{T}\right)+\ln (A)$

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

| Elementary Step | Molecularity | Rate Law |
| :---: | :---: | :---: |
| $A \rightarrow$ products | Unimolecular | Rate = $\mathrm{k}[\mathrm{A}]$ |
| $\begin{aligned} & \hline \mathrm{A}+\mathrm{A} \rightarrow \text { products } \\ &(2 \mathrm{~A} \rightarrow \text { products }) \\ & \hline \end{aligned}$ | Bimolecular | Rate $=\mathrm{k}[\mathrm{A}]^{2}$ |
| A $+\mathrm{B} \rightarrow$ products |  | Rate $=\mathrm{k}[\mathrm{A}][\mathrm{B}]$ |
| $\begin{gathered} \hline A+A+B \rightarrow \text { products } \\ (2 A+B \rightarrow \text { products }) \\ \hline \end{gathered}$ | Termolecular | Rate $=\mathrm{k}[\mathrm{A}]^{2}[\mathrm{~B}]$ |
| $A+B+C \rightarrow$ products |  | Rate $=\mathrm{k}[\mathrm{A}][\mathrm{B}][\mathrm{C}]$ |

$$
\begin{aligned}
& \mathrm{k}=\mathrm{A} e^{\left(\frac{-E_{a}}{R T}\right)} \quad \ln \left(\frac{k_{2}}{k_{1}}\right)=\frac{E_{a}}{R}\left(\frac{1}{T_{1}}-\frac{1}{T_{2}}\right) \quad \text { or... } \\
& \ln \left(\frac{k_{2}}{k_{1}}\right)=\frac{-E_{a}}{R}\left(\frac{1}{T_{2}}-\frac{1}{T_{1}}\right)
\end{aligned}
$$

$\ln (k)=-\frac{E_{a}}{R}\left(\frac{1}{T}\right)+\ln (A)$

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

| Elementary Step | Molecularity | Rate Law |
| :---: | :---: | :---: |
| $A \rightarrow$ products | Unimolecular | Rate $=\mathrm{k}[\mathrm{A}]$ |
| $\begin{aligned} & \hline \mathrm{A}+\mathrm{A} \rightarrow \text { products } \\ &(2 \mathrm{~A} \rightarrow \text { products }) \\ & \hline \end{aligned}$ | Bimolecular | Rate $=\mathrm{k}[\mathrm{A}]^{2}$ |
| $A+B \rightarrow$ products |  | Rate $=\mathrm{k}[\mathrm{A}][\mathrm{B}]$ |
| $\begin{gathered} \hline A+A+B \rightarrow \text { products } \\ \quad(2 A+B \rightarrow \text { products }) \\ \hline \end{gathered}$ | Termolecular | Rate $=k[A]^{2}[B]$ |
| $A+B+C \rightarrow$ products |  | Rate $=\mathrm{k}[\mathrm{A}][\mathrm{B}][\mathrm{C}]$ |

$$
\begin{aligned}
& \mathrm{k}=\mathrm{A} e^{\left(\frac{-E_{a}}{R T}\right)} \quad \ln \left(\frac{k_{2}}{k_{1}}\right)=\frac{E_{a}}{R}\left(\frac{1}{T_{1}}-\frac{1}{T_{2}}\right) \quad \text { or... } \\
& \ln \left(\frac{k_{2}}{k_{1}}\right)=\frac{-E_{a}}{R}\left(\frac{1}{T_{2}}-\frac{1}{T_{1}}\right)
\end{aligned}
$$

$\ln (k)=-\frac{E_{a}}{R}\left(\frac{1}{T}\right)+\ln (A)$

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

| Elementary Step | Molecularity | Rate Law |
| :---: | :---: | :---: |
| $A \rightarrow$ products | Unimolecular | Rate = k[A] |
| $\begin{aligned} & \hline A+A \rightarrow \text { products } \\ &(2 \mathrm{~A} \rightarrow \text { products }) \\ & \hline \end{aligned}$ | Bimolecular | Rate $=\mathrm{k}[\mathrm{A}]^{2}$ |
| $A+B \rightarrow$ products |  | Rate $=\mathrm{k}[\mathrm{A}][\mathrm{B}]$ |
| $\begin{gathered} \hline A+A+B \rightarrow \text { products } \\ (2 A+B \rightarrow \text { products }) \\ \hline \end{gathered}$ | Termolecular | Rate $=\mathrm{k}[\mathrm{A}]^{2}[\mathrm{~B}]$ |
| $A+B+C \rightarrow$ products |  | Rate $=\mathrm{k}[\mathrm{A}][\mathrm{B}][\mathrm{C}]$ |

$$
\begin{aligned}
& \mathrm{k}=\mathrm{A} e^{\left(\frac{-E_{a}}{R T}\right)} \quad \ln \left(\frac{k_{2}}{k_{1}}\right)=\frac{E_{a}}{R}\left(\frac{1}{T_{1}}-\frac{1}{T_{2}}\right) \quad \text { or... } \\
& \ln \left(\frac{k_{2}}{k_{1}}\right)=\frac{-E_{a}}{R}\left(\frac{1}{T_{2}}-\frac{1}{T_{1}}\right)
\end{aligned}
$$

$\ln (k)=-\frac{E_{a}}{R}\left(\frac{1}{T}\right)+\ln (A)$

- $\quad-E_{a} / R$ is the slope when graphing $\ln (k)$ vs. $(1 / T)$
- $\ln (A)$ is the $y$-intercept
- $E_{a}=-R$ (slope)
- $\quad G r a p h i n g ~ \ln (k)$ vs $(1 / \mathrm{T})$ and taking line of best fit can quickly yield a slope

| Elementary Step | Molecularity | Rate Law |
| :--- | :--- | :--- |
| $\mathrm{A} \rightarrow$ products | Unimolecular | Rate $=\mathrm{k}[\mathrm{A}]$ |
| $\mathrm{A}+\mathrm{A} \rightarrow$ products <br> $(2 \mathrm{~A} \rightarrow$ products $)$ | Bimolecular | Rate $=\mathrm{k}[\mathrm{A}]^{2}$ |
| $\mathrm{~A}+\mathrm{B} \rightarrow$ products |  | Rate $=\mathrm{k}[\mathrm{A}][\mathrm{B}]$ |
| $\mathrm{A}+\mathrm{A}+\mathrm{B} \rightarrow$ products <br> $(2 \mathrm{~A}+\mathrm{B} \rightarrow$ products $)$ |  | Rate $=\mathrm{k}[\mathrm{A}]^{2}[\mathrm{~B}]$ |
| $\mathrm{A}+\mathrm{B}+\mathrm{C} \rightarrow$ products |  | Rate $=\mathrm{k}[\mathrm{A}][\mathrm{B}][\mathrm{C}]$ |

$$
\begin{aligned}
\mathrm{k}=\mathrm{A} e^{\left(\frac{-E_{a}}{R T}\right)} \quad \ln \left(\frac{k_{2}}{k_{1}}\right)=\frac{E_{a}}{R}\left(\frac{1}{T_{1}}-\frac{1}{T_{2}}\right) \quad \text { or } \ldots \\
\ln \left(\frac{k_{2}}{k_{1}}\right)=\frac{-E_{a}}{R}\left(\frac{1}{T_{2}}-\frac{1}{T_{1}}\right)
\end{aligned}
$$

$\ln (k)=-\frac{E_{a}}{R}\left(\frac{1}{T}\right)+\ln (A)$

- $-E_{a} / R$ is the slope when graphing $\ln (k)$ vs. $(1 / T)$
- $\ln (A)$ is the $y$-intercept
- $E_{a}=-R$ (slope)
- $\quad G r a p h i n g ~ \ln (k)$ vs $(1 / T)$ and taking line of best fit can quickly yield a slope

| Elementary Step | Molecularity | Rate Law |
| :--- | :--- | :--- |
| $\mathrm{A} \rightarrow$ products | Unimolecular | Rate $=\mathrm{k}[\mathrm{A}]$ |
| $\mathrm{A}+\mathrm{A} \rightarrow$ products <br> $(2 \mathrm{~A} \rightarrow$ products $)$ | Bimolecular | Rate $=\mathrm{k}[\mathrm{A}]^{2}$ |
| $\mathrm{~A}+\mathrm{B} \rightarrow$ products |  | Rate $=\mathrm{k}[\mathrm{A}][\mathrm{B}]$ |
| $\mathrm{A}+\mathrm{A}+\mathrm{B} \rightarrow$ products <br> $(2 \mathrm{~A}+\mathrm{B} \rightarrow$ products $)$ |  | Rate $=\mathrm{k}[\mathrm{A}]^{2}[\mathrm{~B}]$ |
| $\mathrm{A}+\mathrm{B}+\mathrm{C} \rightarrow$ products |  | Rate $=\mathrm{k}[\mathrm{A}][\mathrm{B}][\mathrm{C}]$ |

$$
\begin{aligned}
\mathrm{k}=\mathrm{A} e^{\left(\frac{-E_{a}}{R T}\right)} & \ln \left(\frac{k_{2}}{k_{1}}\right)=\frac{E_{a}}{R}\left(\frac{1}{T_{1}}-\frac{1}{T_{2}}\right) \quad \text { or } \ldots \\
& \ln \left(\frac{k_{2}}{k_{1}}\right)=\frac{-E_{a}}{R}\left(\frac{1}{T_{2}}-\frac{1}{T_{1}}\right)
\end{aligned}
$$

$\ln (k)=-\frac{E_{a}}{R}\left(\frac{1}{T}\right)+\ln (A)$

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

