$$
1(2)+30 \rightleftharpoons+\infty
$$

## Elementary Reactions

$\mathrm{A}+\mathrm{B} \longrightarrow$ Products
Chemistry Essentials - 038


- Energy
- Orientation



## $\mathrm{CO}+\mathrm{NO}_{2} \rightarrow \mathrm{CO}_{2}+\mathrm{NO}$

## Stoichiometry

Predictable


## $\mathrm{CO}+\mathrm{NO}_{2} \rightarrow \mathrm{CO}_{2}+\mathrm{NO}$

Elementary Reaction
Predictable
$2 \mathrm{NO}_{2} \rightarrow \mathrm{NO}_{3}+\mathrm{NO}$
$\mathrm{NO}_{3}+\mathrm{CO} \rightarrow \mathrm{NO}_{2}+\mathrm{CO}_{2}$
Reaction Mechanism

## Unimolecular Elementary Reaction

 $\mathrm{A} \rightarrow$ Products

## Bimolecular Elementary Reaction

$\mathrm{A}+\mathrm{A} \rightarrow$ Products $\mathrm{A}+\mathrm{B} \rightarrow$ Products


Rate $=\mathrm{k}[\mathrm{A}]^{2}$
Rate $=k[A][B]$

## Termolecular Elementary Reaction

## $\mathrm{A}+\mathrm{B}+\mathrm{C} \rightarrow$ Products



Did you learn?
A + B $\rightarrow$ Products

$$
\text { Rate }=k[A][B]
$$

To connect the rate law for an elementary reaction to the frequency and success of molecular collisions.

## Acknowledgements

chabacano. English: Explosion Symbol, June 14, 2007. Own work. http://commons.wikimedia.org/wiki/File:Explosion.svg.
domain, unknown-public. English: Stopwatch Icon for Time Trial Stages, May 18, 2011. http://cliparts101.com. http://commons.wikimedia.org/wiki/File:Time_Trial.svg.
"File:Calvin-cycle4.svg," October 27, 2013. http://en.wikipedia.org/wiki/File:Calvin-cycle4.svg.
"File:Leaf 1 Web.jpg," October 26, 2013. http://en.wikipedia.org/w/index.php?title=File:Leaf_1_web.jpg\&oldid=573724699.
"File:Melvin Calvin.jpg," October 27, 2013. http://en.wikipedia.org/wiki/File:Melvin_Calvin.jpg.
LinuxCLP. English: Reaction Mechanism of the Baylis-Hillman Reaction, May 16, 2011. Own work using: ChemBioOffice 11. http://commons.wikimedia.org/wiki/File:Baylis-Hillman_reaction_mechanism.svg.
 commons.wikimedia.org/wiki/File:Emblem-scales.svg.
"Radioactive Dating Game." PhET, October 21, 2013. http://phet.colorado.edu/en/simulation/radioactive-dating-game.
"Reactions \& Rates." PhET, October 20, 2013. http://phet.colorado.edu/en/simulation/reactions-and-rates.
"Reversible Reactions." PhET, October 27, 2013. http://phet.colorado.edu/en/simulation/reversible-reactions.

www.bozemanscience.com

