

Tutorial 14: An Introduction to Energy in Chemical Reactions

Goals:

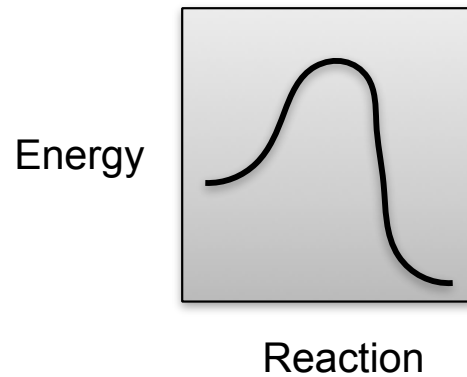
- ✓ Understand the general shapes of energy diagrams, and be able to determine if a reaction is endergonic or exergonic from an energy diagram.
- ✓ Understand activation energy, and how it is represented in an energy diagram.
- ✓ Know the terms endothermic and exothermic.
- ✓ Know how to increase the rate of a chemical reaction.

Collision Theory

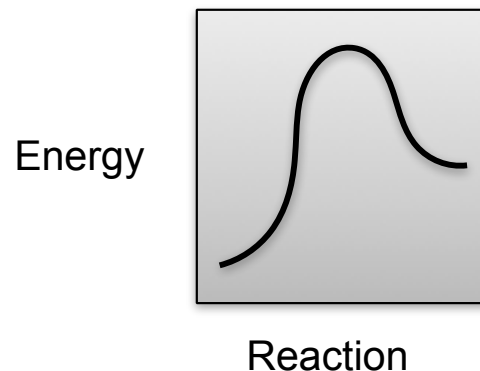
- Molecules must collide in order to react.
- Molecules must collide with the proper orientation such that the correct atoms can form a bond.
- Molecules must possess a minimum amount of energy in order to collide with enough force to cause a reaction. This minimum amount of energy is known as the activation energy (E_a).

Law of Conservation of Energy

- Energy is neither created nor destroyed, but is only transferred from one form to another.
- Exergonic reaction: A reaction in which the products are lower in energy than the reactants. Energy is released in an exergonic reaction.



- Endergonic reaction: A reaction in which the products are higher in energy than the reactants. Energy is absorbed in an endergonic reaction.



Reaction Rate

- **Temperature:** An increase in temperature will increase the rate of a chemical reaction by increasing the motion of the particles, thus resulting in more frequent and more violent collisions.
- **Concentration:** An increase in the concentration will increase the rate of a reaction by increasing the number of collisions occurring between particles.
- **Catalyst:** Addition of a catalyst will increase the rate of a reaction by lowering the activation energy barrier. Note that a biological catalyst is called an enzyme.

