2.4 Chemical Reactions and Enzymes

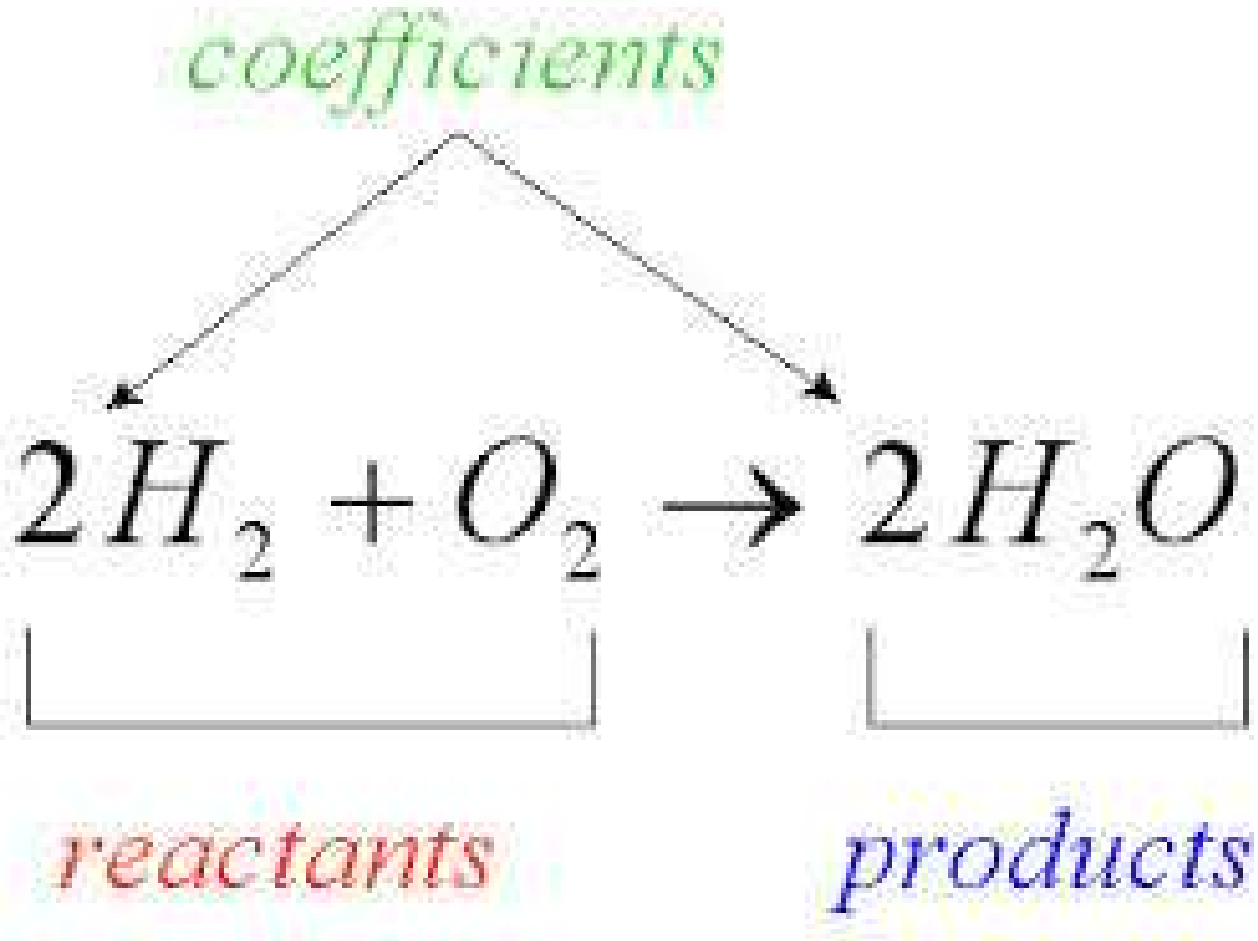
Chemical Reactions

- A **chemical reaction** is a process that changes, or transforms, one set of chemicals into another by changing the chemical bonds that join atoms in compounds.

- @Mass and energy are conserved during chemical transformations.@

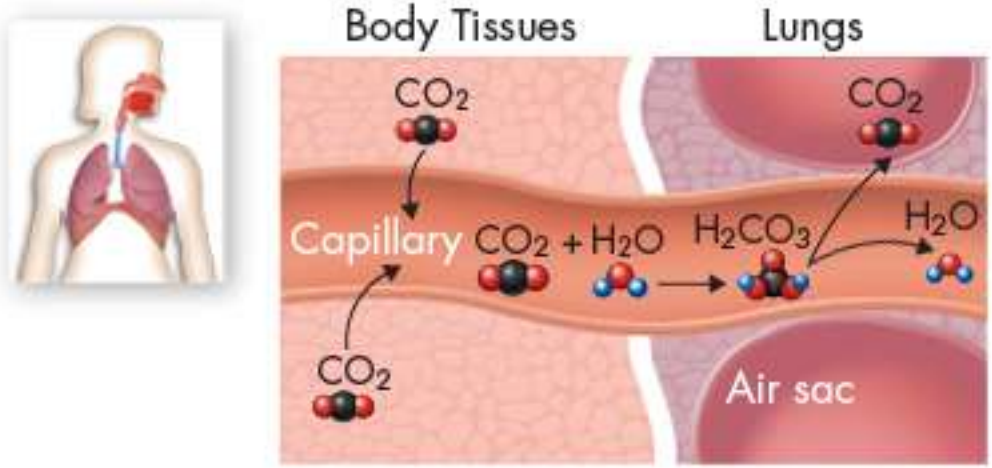
- The elements or compounds that enter into a chemical reaction are known as **reactants.**

- The elements or compounds produced by a chemical reaction are known as **products.**


coefficients
$2H_2 + O_2 \rightarrow 2H_2O$
reactants
products

Chemical Reactions

- As it enters the blood, carbon dioxide (CO_2) reacts with water to produce carbonic acid (H_2CO_3), which is highly soluble.
- This chemical reaction enables the blood to carry carbon dioxide to the lungs.
- In the lungs, the reaction is reversed and produces carbon dioxide gas, which you exhale.

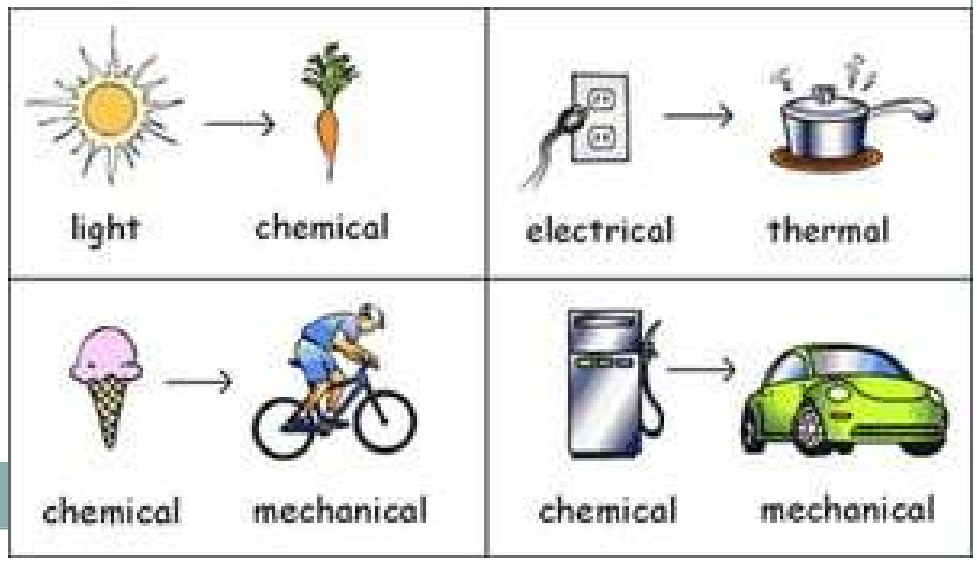


What is released or absorbed whenever chemical bonds form or are broken?

ENERGY

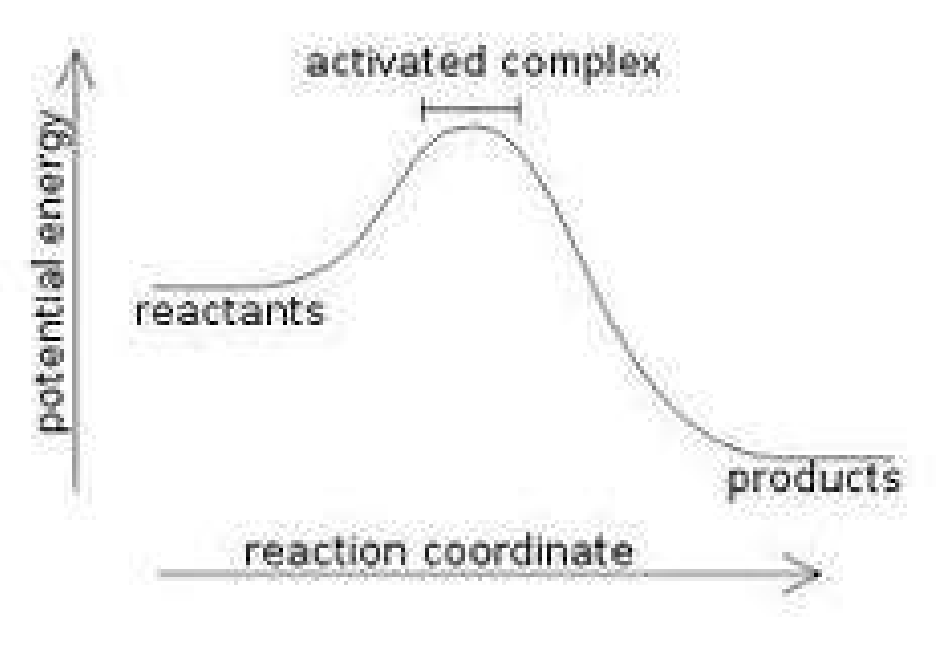
Energy Changes

- @Energy is released or absorbed whenever chemical bonds are formed or broken during chemical reactions.@
- Chemical reactions that release energy often occur on their own, or spontaneously.
- Chemical reactions that absorb energy will not occur without a source of energy.



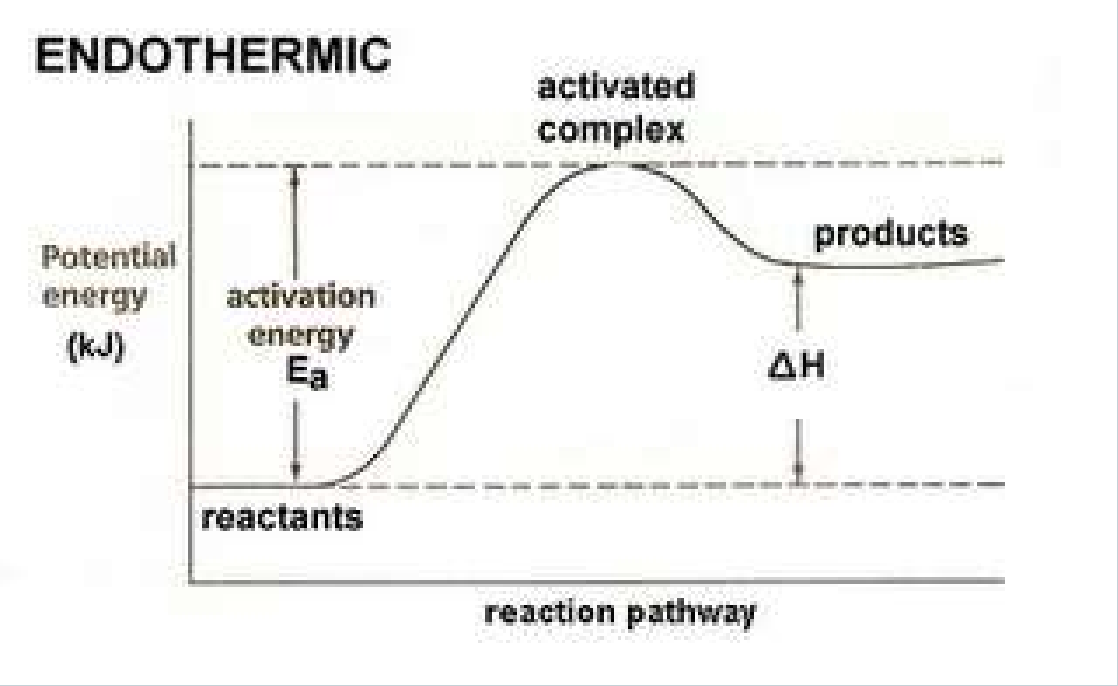
Exothermic Reactions

- @Reaction in which heat is given off is exothermic@(Ex. combustion of fuels)



Endothermic Reactions

- @Reaction in which heat is absorbed is endothermic@ (Ex. water is evaporated)

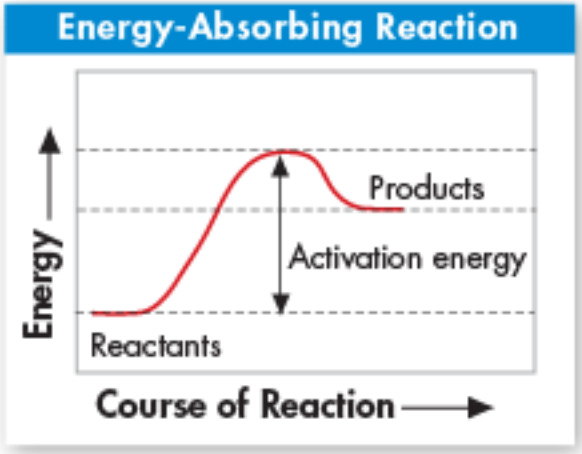


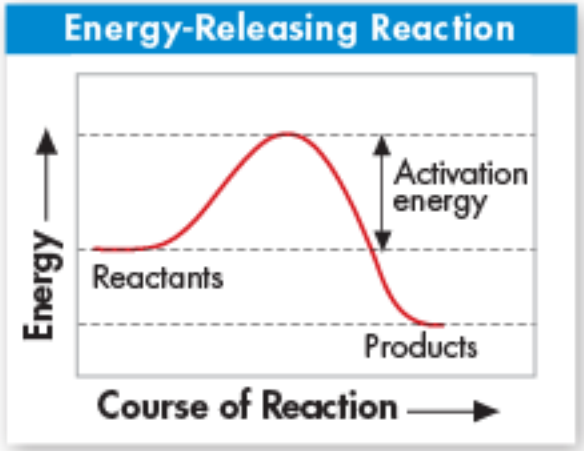
Chemists call the energy needed to get a reaction started the .

activation energy

Activation Energy

- Energy needed to get a reaction going is the activation energy.

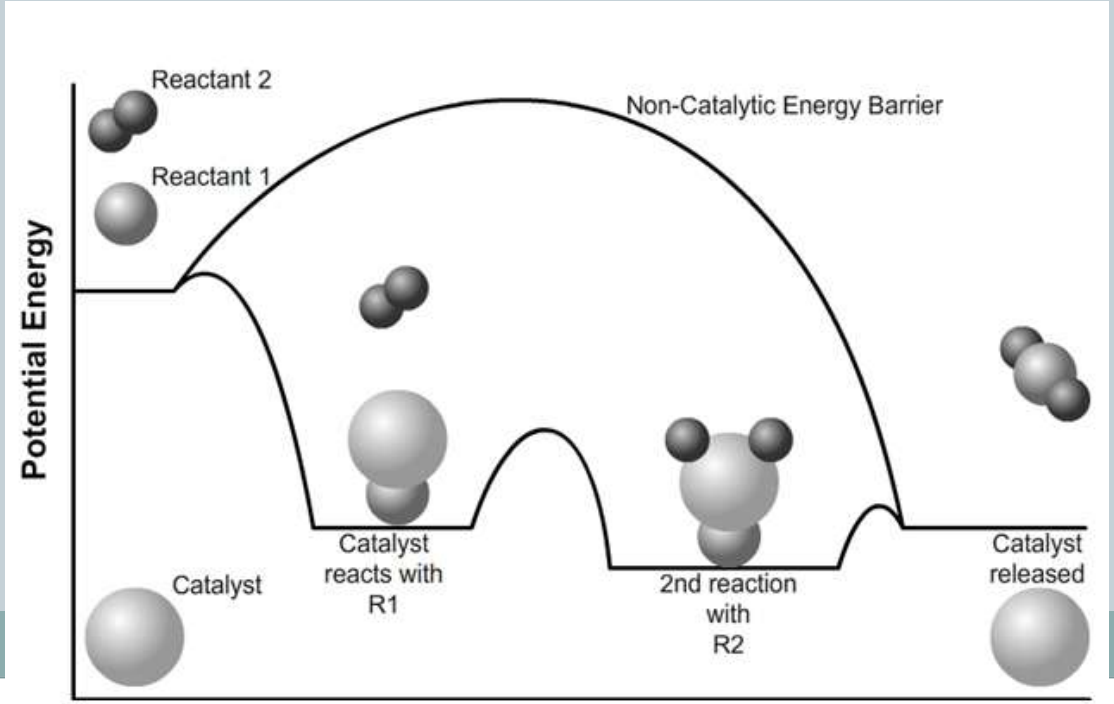




What is a catalyst?

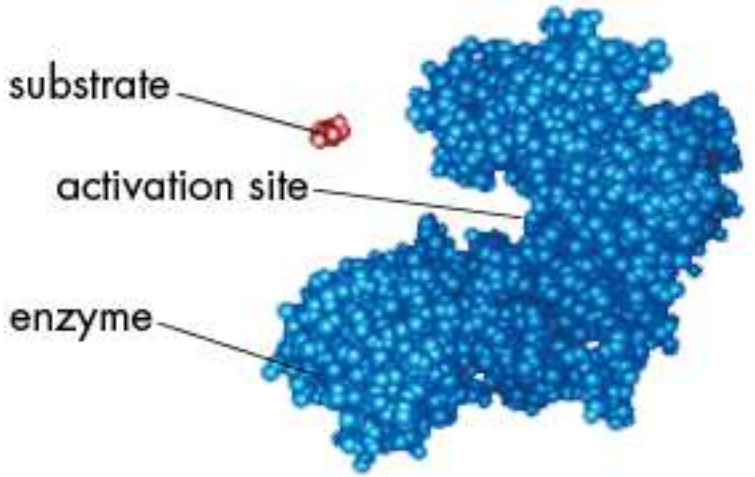
- **A catalyst** is a substance that speeds up the rate of a chemical reaction.

- @Catalysts work by lowering a reaction's activation energy.@



The Enzyme-Substrate Complex

- The substrates bind to a site on the enzyme called the active site.
- The active site and the substrates have complementary shapes.
- The fit is so precise that the active site and substrates are often compared to a lock and key.



Regulation of Enzyme Activity

- Temperature, pH, and regulatory molecules are all factors that can affect the activity of enzymes
- "on" or "off" as needed.