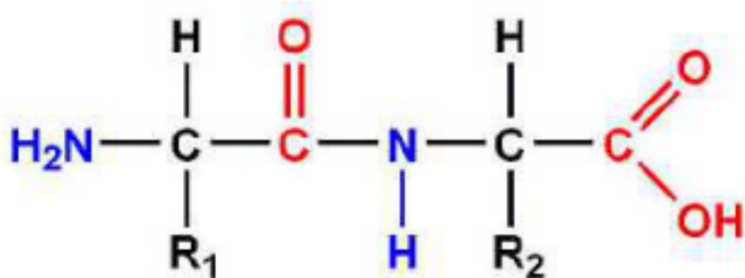


Kickoff:

A student in lab reacted an unknown sample with an unknown reagent. After the instructor explained to them a second time regarding safe laboratory techniques and doing things with purpose, they discovered the solution was dark blueish. What two compounds and their reagents does this narrow it down to order to find out what was mixed?

What if the compound looked like this:



2.4 Chemical Reactions

KEY CONCEPT

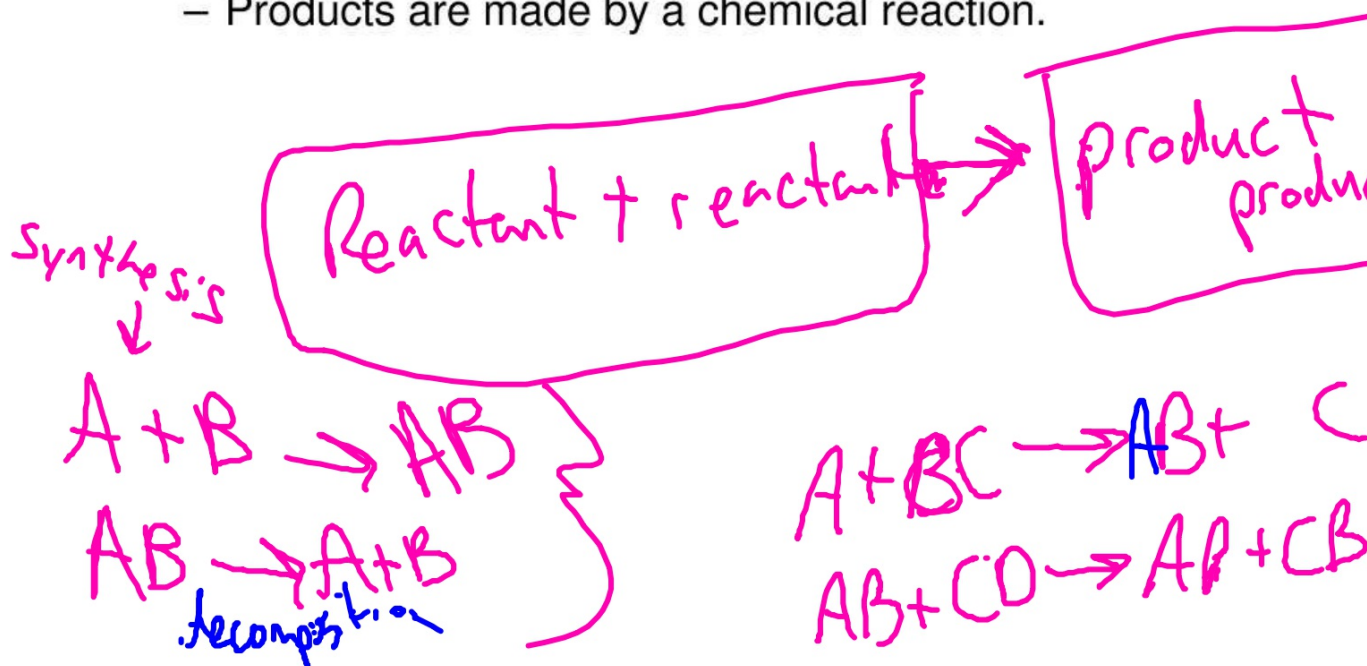
Life depends on chemical reactions.



2.4 Chemical Reactions

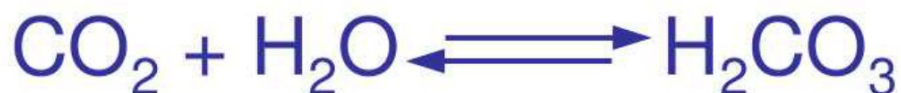
► Bonds break and form during chemical reactions.

- Chemical reactions change substances into different ones by breaking and forming chemical bonds.
 - Reactants are changed during a chemical reaction.
 - Products are made by a chemical reaction.



2.4 Chemical Reactions

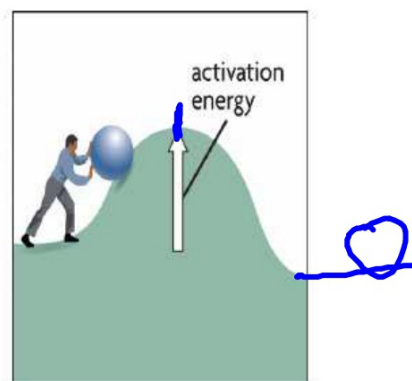
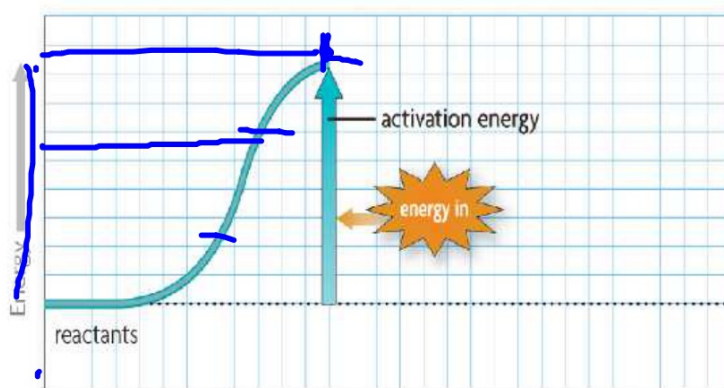
- Bond energy is the amount of energy that breaks a bond.
 - Energy is added to break bonds.
 - Energy is released when bonds form.
- A reaction is at equilibrium when reactants and products form at the same rate.



2.4 Chemical Reactions

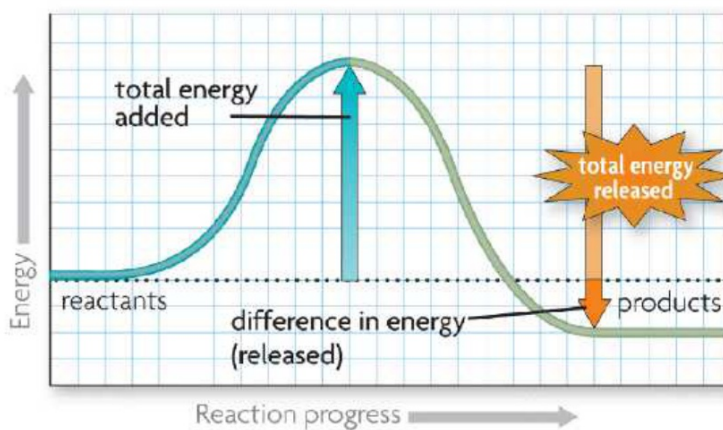
► **Chemical reactions release or absorb energy.**

- Activation energy is the amount of energy that needs to be absorbed to start a chemical reaction.



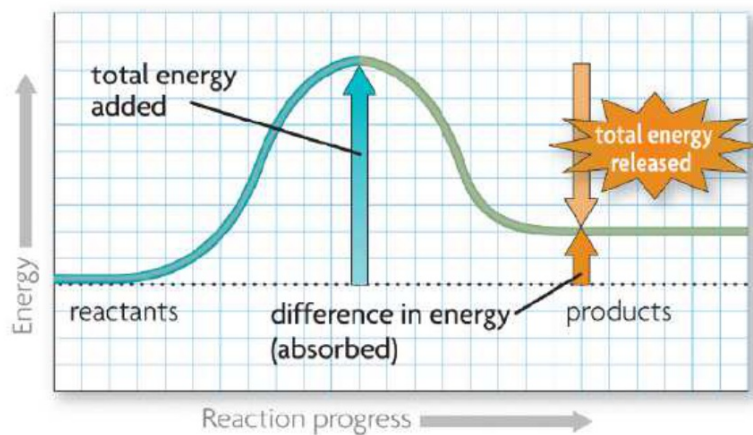
2.4 Chemical Reactions

- Exothermic reactions release more energy than they absorb.
 - Reactants have higher bond energies than products.
 - Excess energy is released by the reaction.



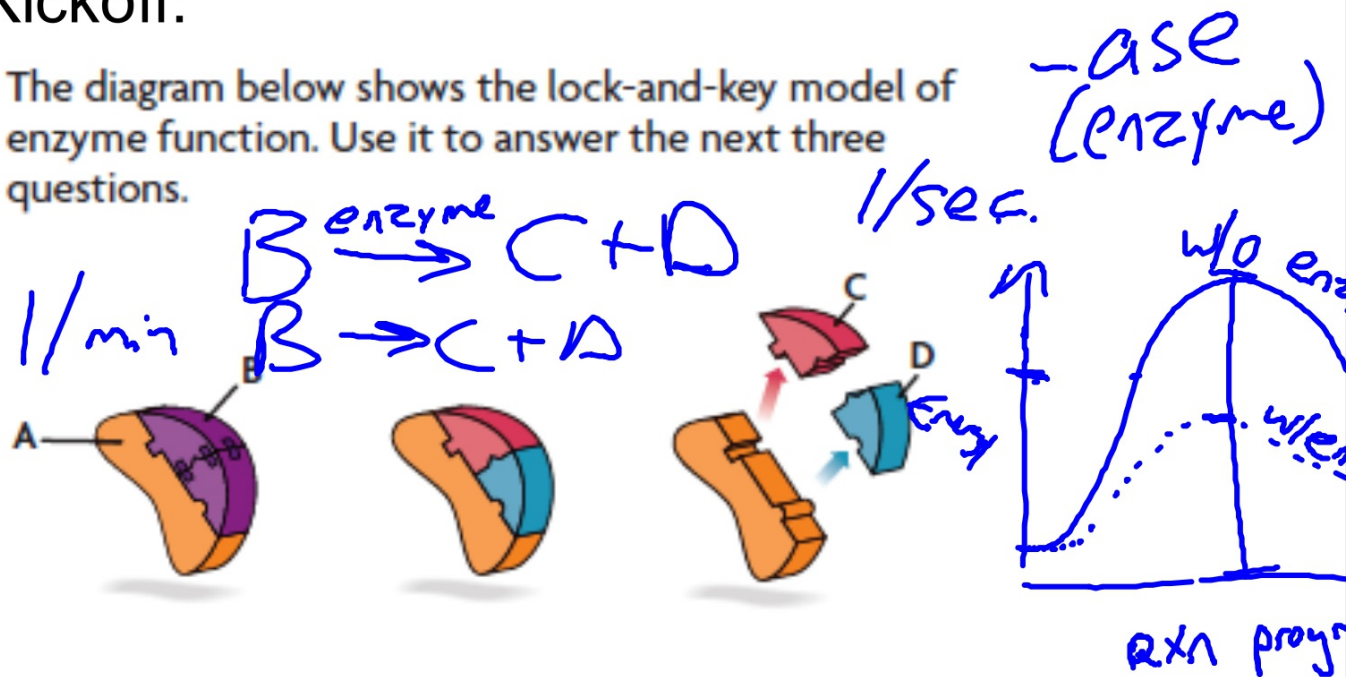
2.4 Chemical Reactions

- Endothermic reactions absorb more energy than they release.
 - Reactants have lower bond energies than products.
 - Energy is absorbed by the reaction to make up the difference.



Kickoff:

The diagram below shows the lock-and-key model of enzyme function. Use it to answer the next three questions.



30. **Summarize** Briefly explain what is happening at each step of the process. Be sure to identify each of the substances (A–D) shown in each step of the process.
31. **Apply** How does Substance A affect the amount of activation energy needed by the process? Explain.

2.5 Enzymes

KEY CONCEPT

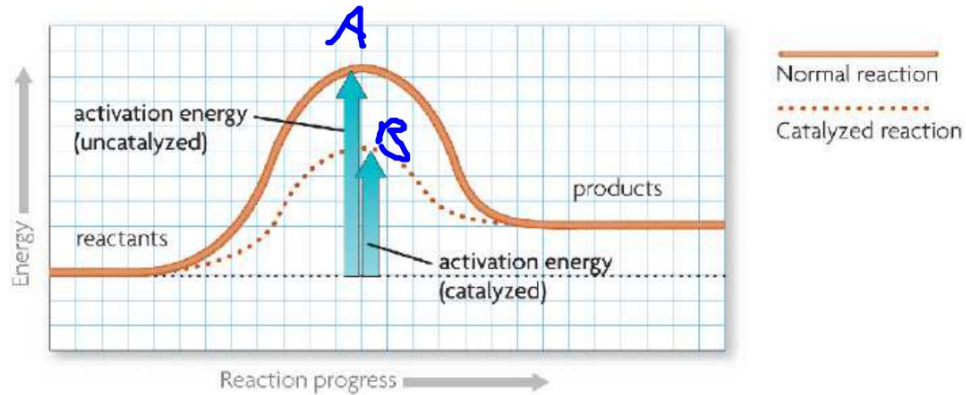
Enzymes are catalysts for chemical reactions in living things.



2.5 Enzymes

► A catalyst lowers activation energy.

- Catalysts are substances that speed up chemical reactions.
 - decrease activation energy *less energy required*
 - increase reaction rate *faster rxn*



2.5 Enzymes

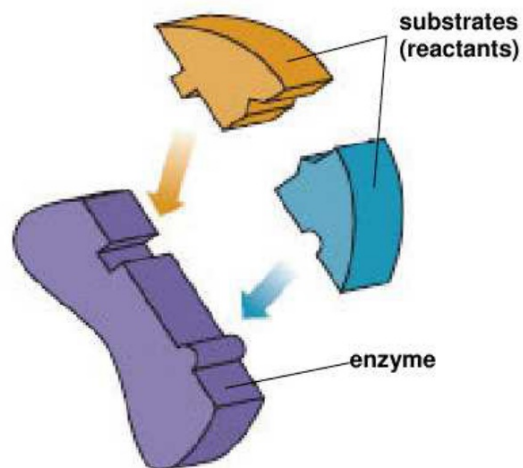
- ▶ **Enzymes allow chemical reactions to occur under tightly controlled conditions.**
 - Enzymes are catalysts in living things.
 - Enzymes are needed for almost all processes.
 - Most enzymes are proteins.

2.5 Enzymes

- Disruptions in homeostasis can prevent enzymes from functioning.
 - Enzymes function best in a small range of conditions.
 - Changes in temperature and pH can break hydrogen bonds.
 - An enzyme's function depends on its structure.

2.5 Enzymes

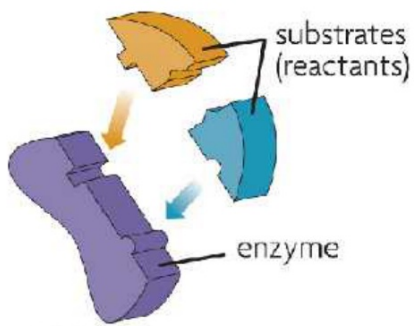
- An enzyme's structure allows only certain reactants to bind to the enzyme.
 - substrates
 - active site



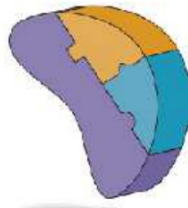
Substrates bind to an enzyme at certain places called active sites.

2.5 Enzymes

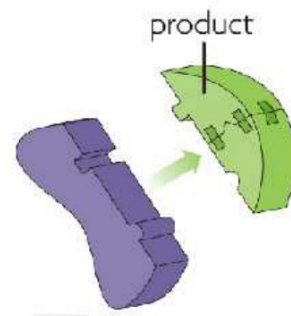
- The lock-and-key model helps illustrate how enzymes function.
 - substrates brought together
 - bonds in substrates weakened



Substrates bind to an enzyme at certain places called active sites.



The enzyme brings substrates together and weakens their bonds.



The catalyzed reaction forms a product that is released from the enzyme.

<http://www.lpscience.fatcow.com/jwanamaker/animations/Enzyme%20activity.html>

All about *ENZYMES*:

Enzymes are very important molecules in biology. Enzymes are *proteins* that help to speed up chemical reactions in the body.

