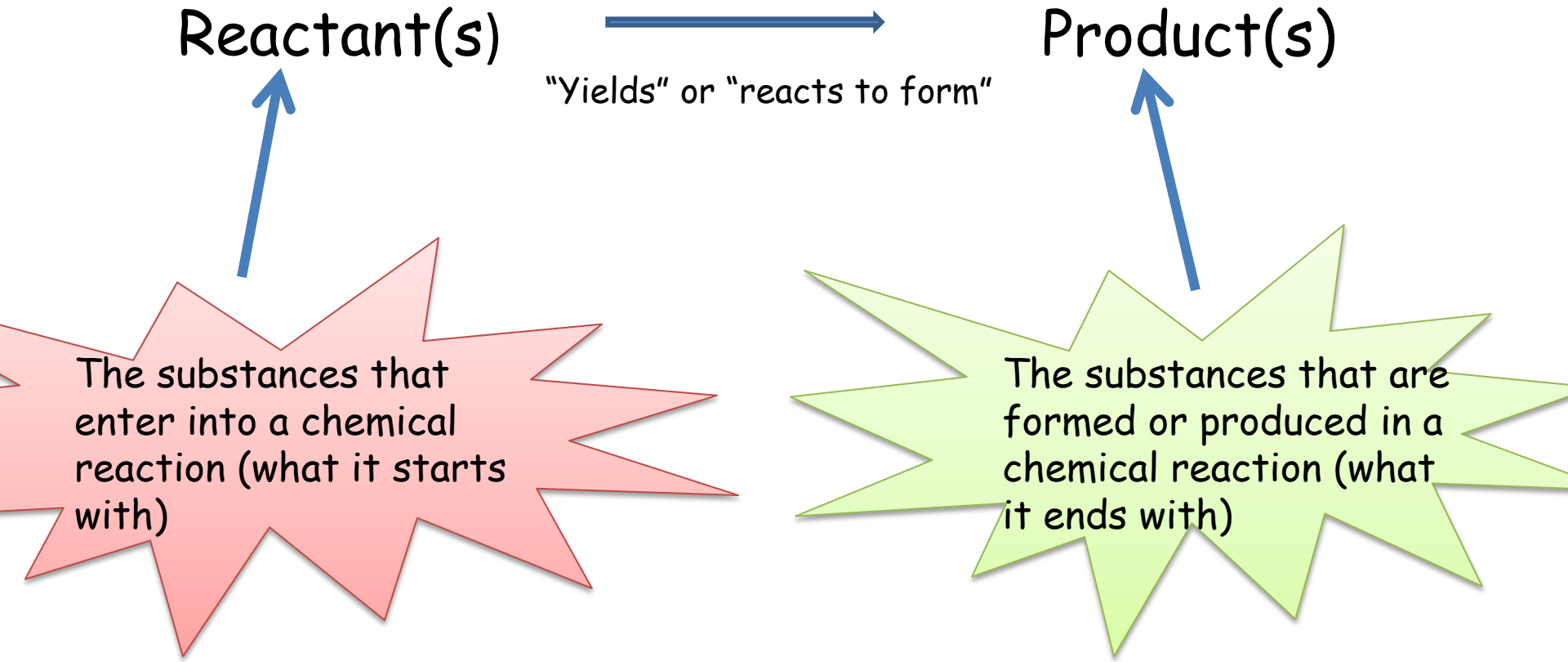
Chemical Reactions

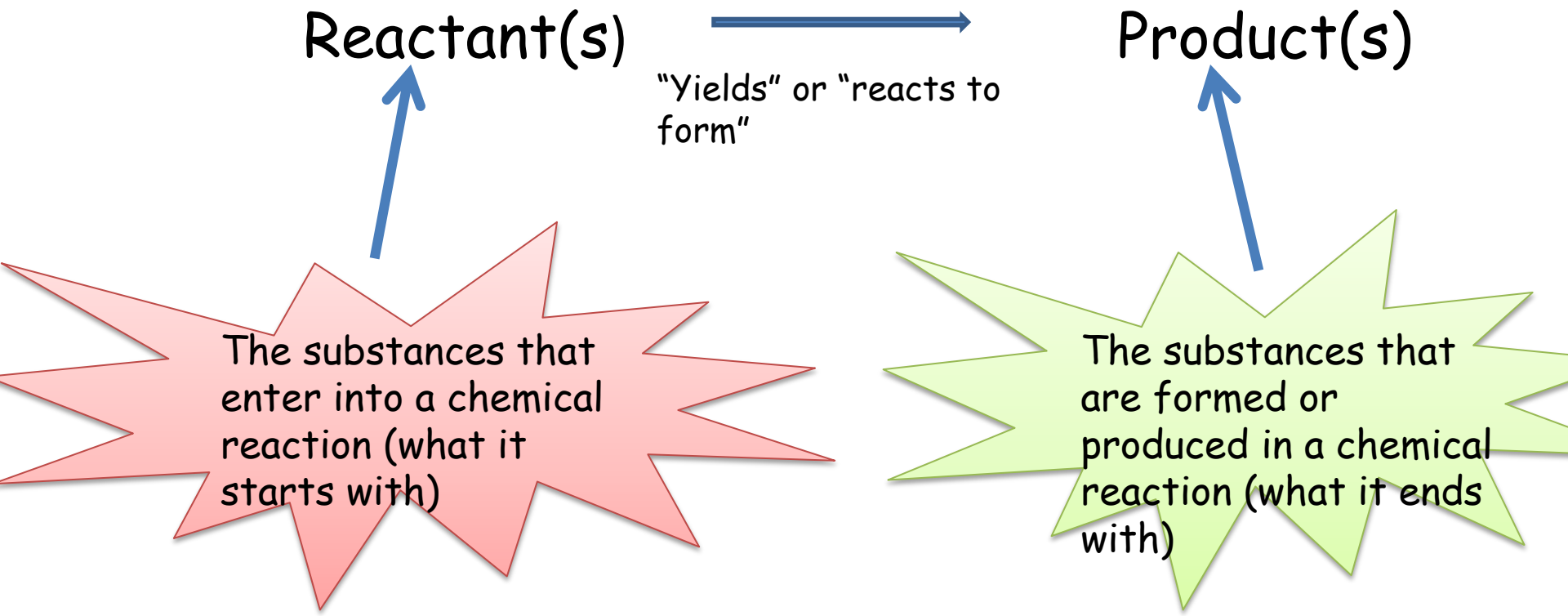
Chemical Reaction: a process that changes one set of chemicals into another.

What is the general format for writing a chemical reaction?



Chemical Reactions

- Chemical reactions always involve **changes in chemical bonds** between atoms.



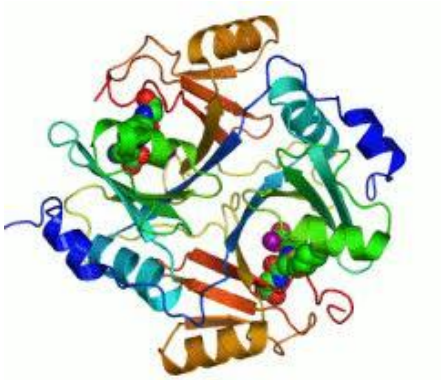
Enzymes Are Biological Catalysts

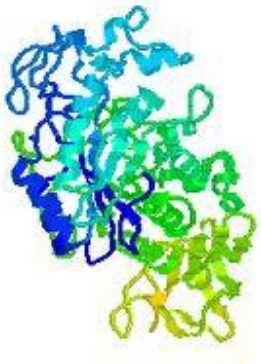
Catalyst – a substance that speeds up chemical reactions.

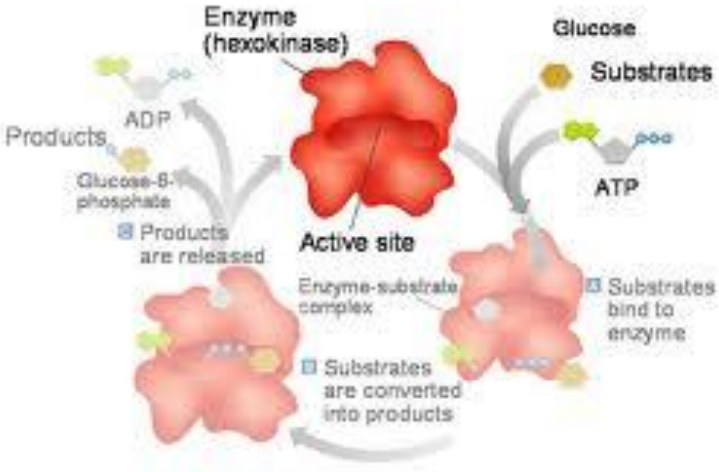
- many reactions in the body happen too slowly on their own and need help to speed up.
  - Ex. our cells are constantly producing CO_2, it gets dissolved into our bloodstream to carry it away from our tissues.
  - CO_2 doesn't dissolve into blood easily, so enzymes help the blood carry the CO_2 and then we exhale it.

Enzymes Are Biological Catalysts

In living things, biological catalysts are known as enzymes – they speed up chemical reactions that take place in cells.



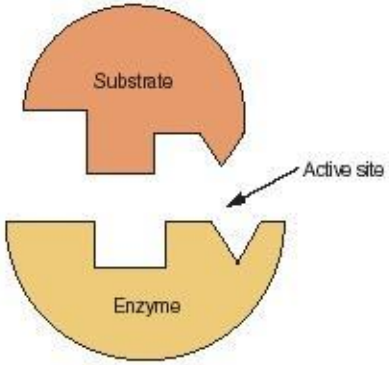




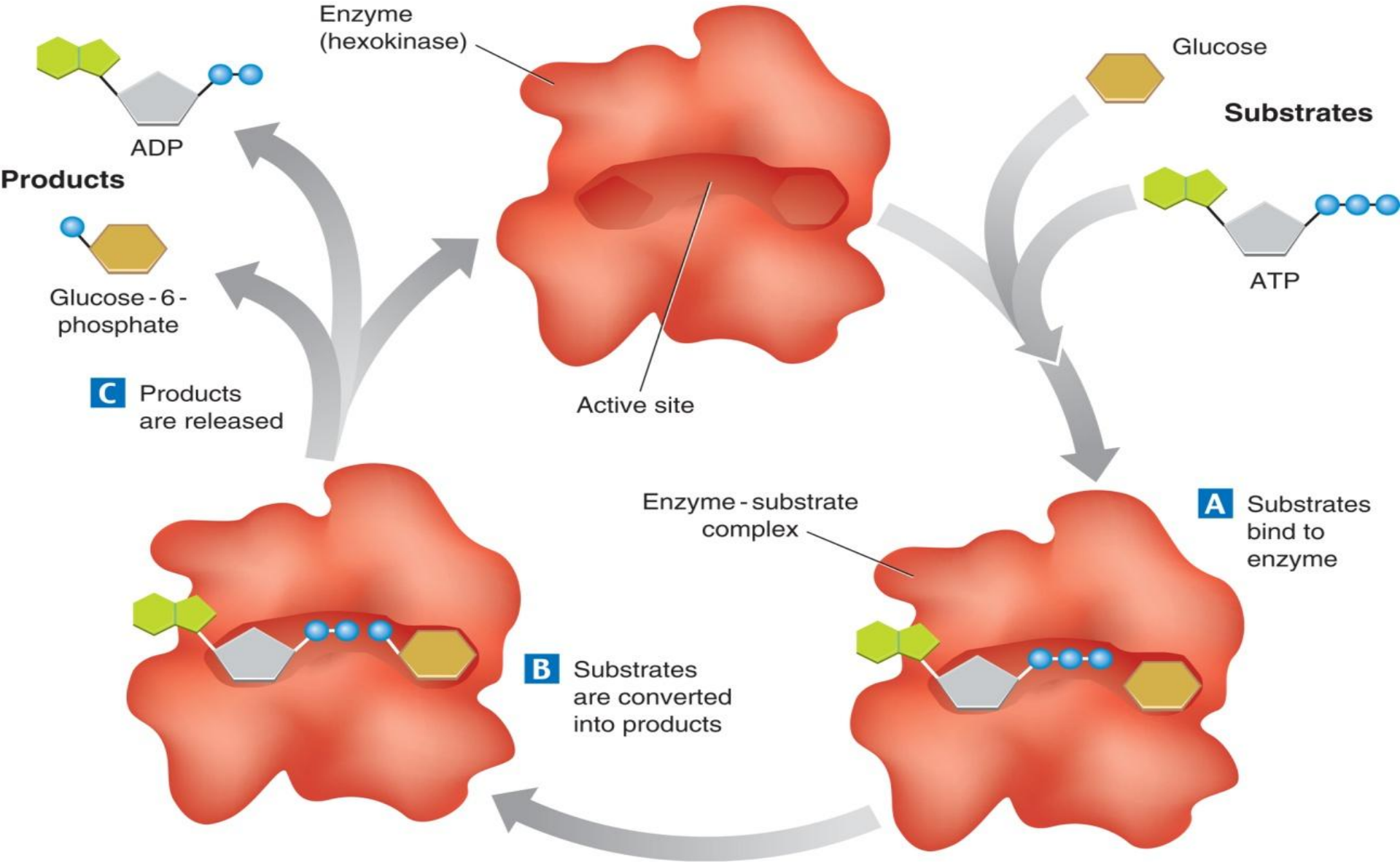
ENZYMES ARE PROTEINS!!!!!!!!!!!!!!!!!!

How Enzymes Work

- Enzymes are very specific – they speed up only certain reactions.
- **Substrates**: the reactants in a reaction
- **Active Site**: where the substrates bind to the enzyme.
- The shapes of the substrates and the active site are complementary - they fit together very well (lock and key).



Enzyme Action

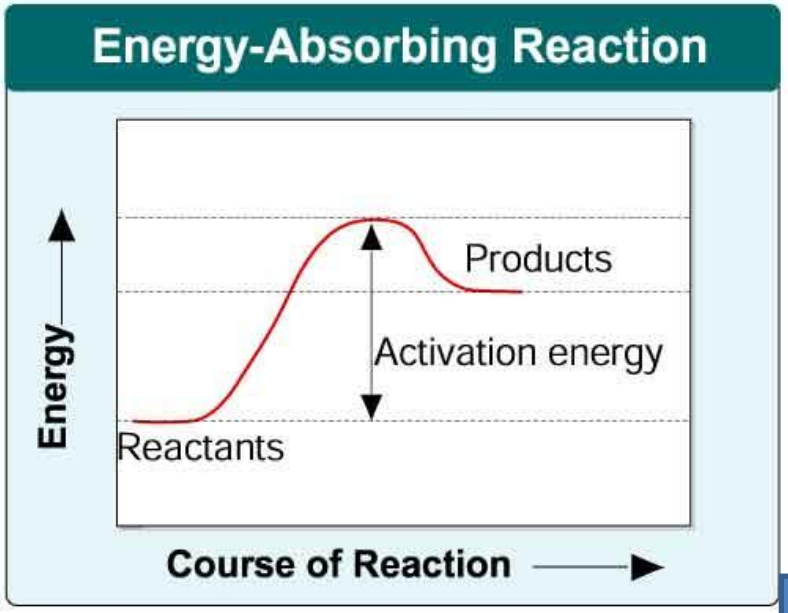


How Enzymes Work

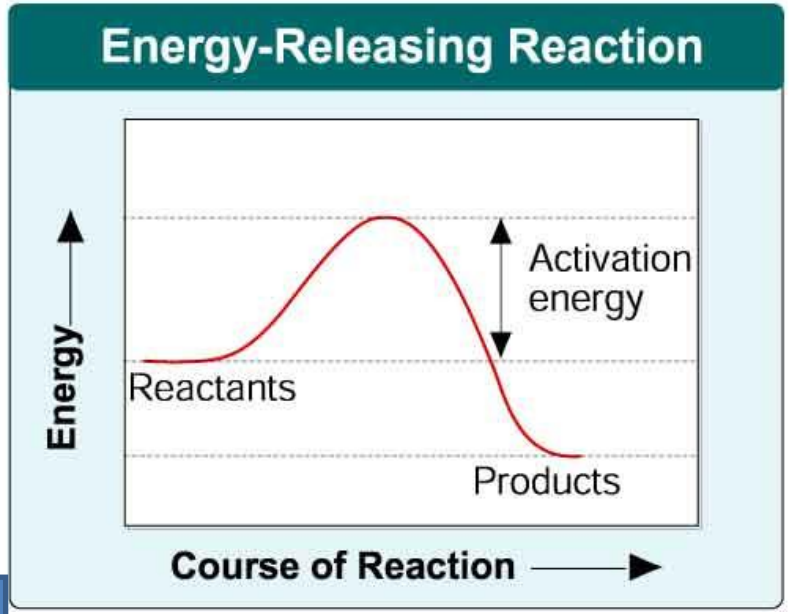
http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter2/animation__how_enzymes_work.html

Chemical Reactions and Energy

- Some chemical reactions <u>absorb energy</u> (photosynthesis)
- Some chemical reactions <u>release energy</u> (digestion reactions).



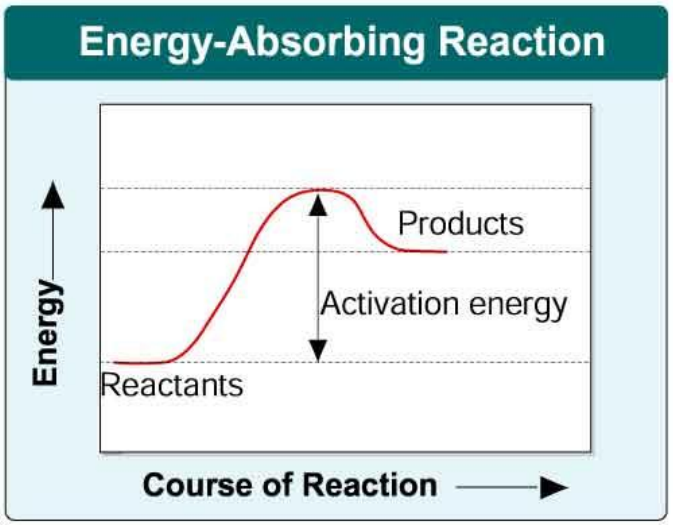
The energy of the products is _____ than that of the reactants.

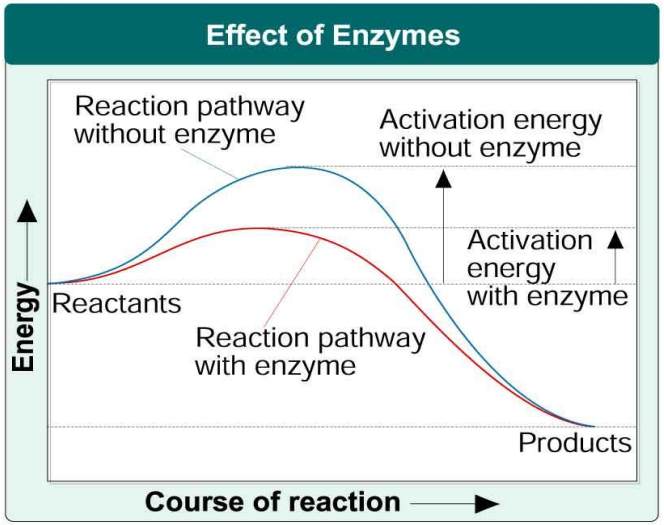


The energy of the products is _____ than that of the reactants.

Chemical Reactions and Energy

- Activation energy – energy needed to get a reaction started.
- Enzymes lower the activation energy – speeds up the reaction.

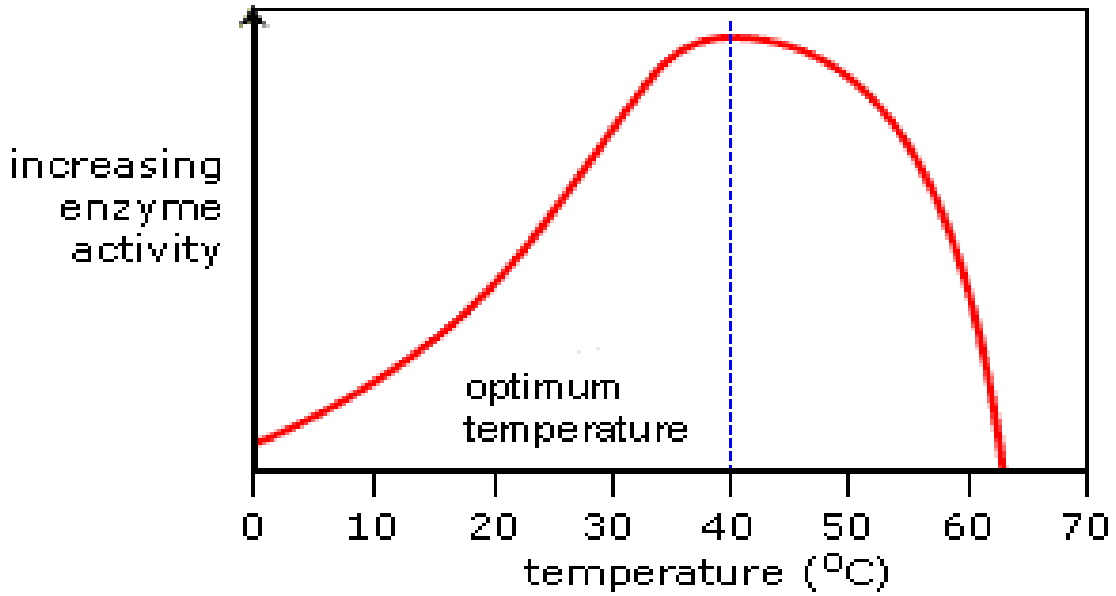




Conditions That Effect Enzyme Activity

Temperature:

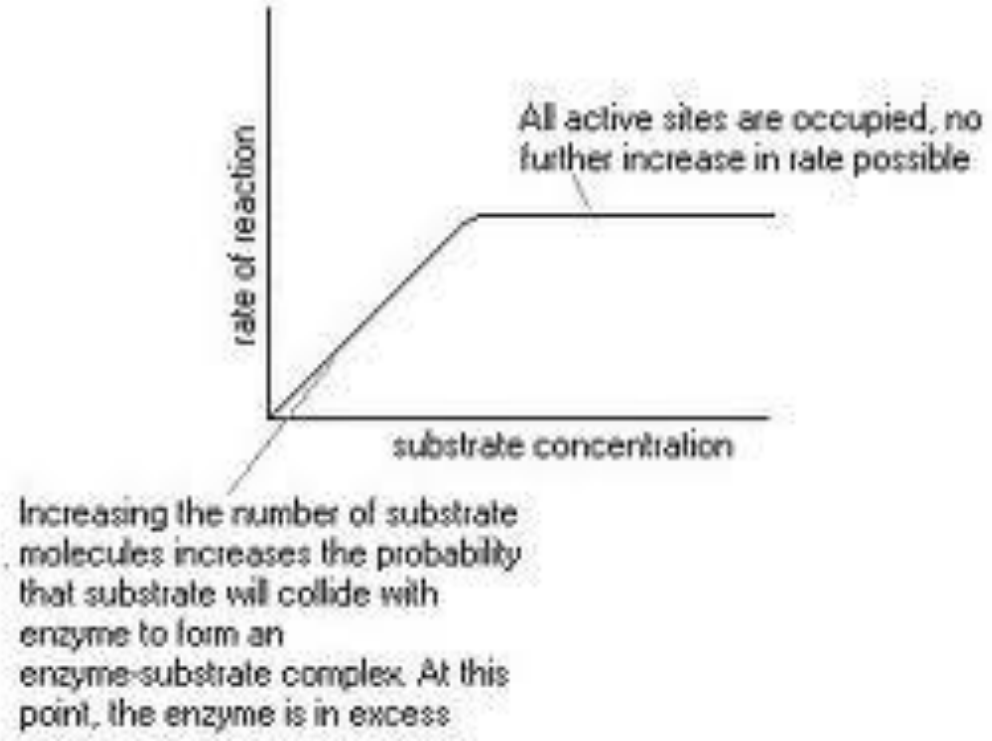
- **Lower** temp = **slower** enzyme activity.
- **Higher** temp = **faster** enzyme activity.
- BUT - if the temperature gets too high, the enzyme **denatures** **or changes shape** so that it works ineffectively, or not at all!



Conditions That Effect Enzyme Activity

Concentration of Substrate:

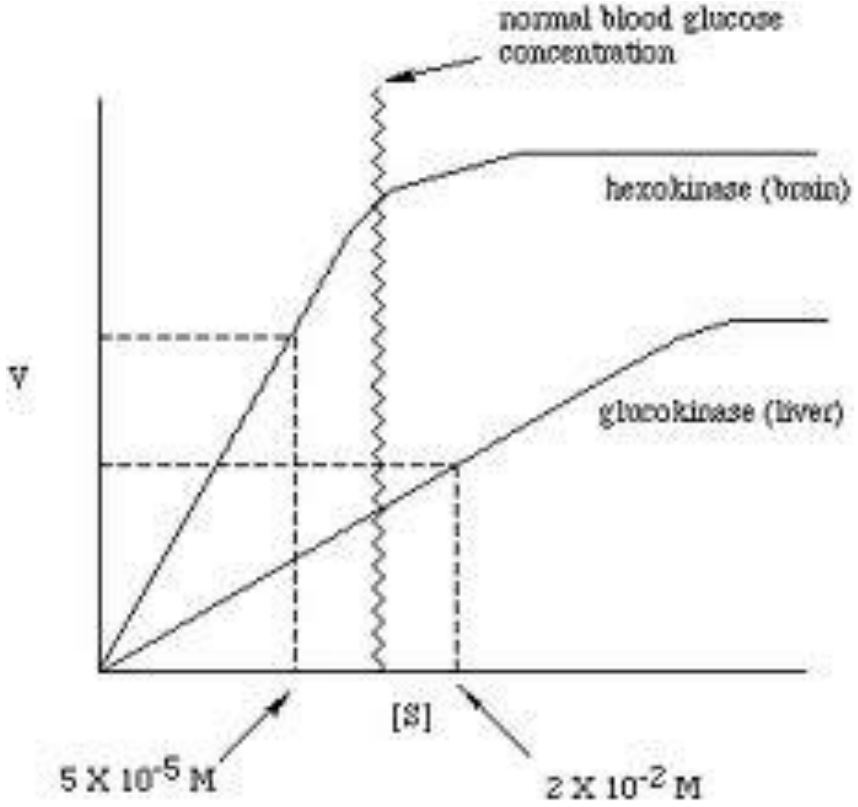
- **Lower** concentration = **slower** enzyme activity.
- **Higher** concentration = **faster** enzyme activity.



Conditions That Effect Ezyme Activity

Concentration of Enzyme:

- **Lower** concentration = **slower** enzyme activity.
- **Higher** concentration = **faster** enzyme activity.



Conditions That Effect Enzyme Activity

- **<u>Inhibitors</u>** – inhibitors stop the substrates from binding to the enzyme's active site.
  - The reaction involving the substrates cannot be sped-up!
  - The rate of reaction <u>decreases</u>!