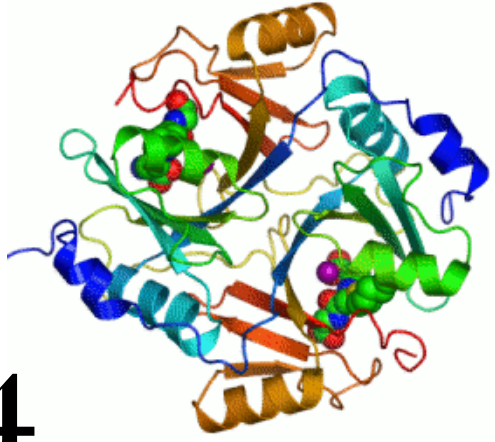
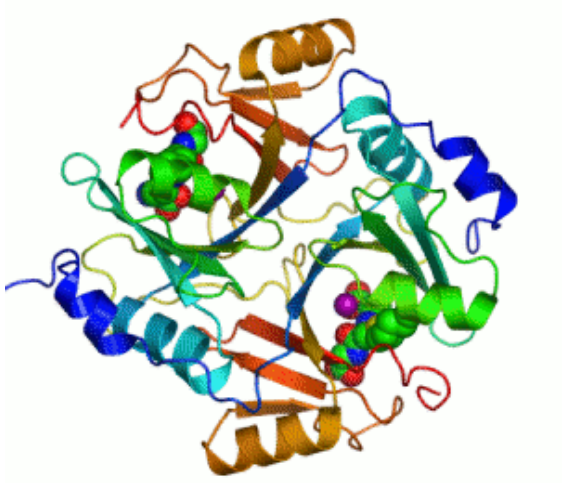
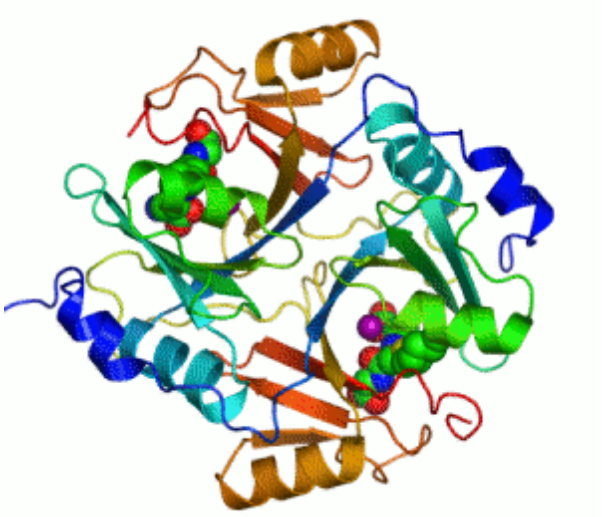


SECTION 2-4
CHEMICAL REACTIONS & ENZYMES

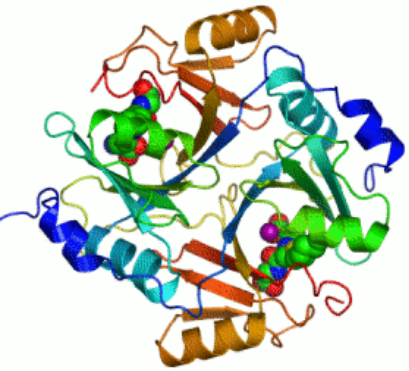




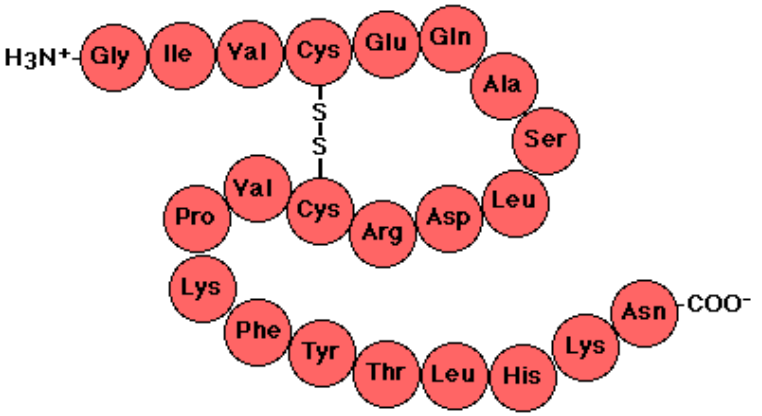
~ Quick Review ~

- **What is a chemical reaction?**
  - a process that changes, or transforms, 1 set of chemicals into another.
- **What are reactants**?
  - chemicals that enter enter into a chemical rxn.
- **What are products?**
  - **chemicals produced by a chemical reaction.**
- In a reaction equation what is on the *left side* of the eqn? On the *right side*?

Reactant + Reactant → Product



Enzymes



- Help carry out chemical reactions (catalyst)
- Build things & break things down
- Each enzyme works with a specific substrate

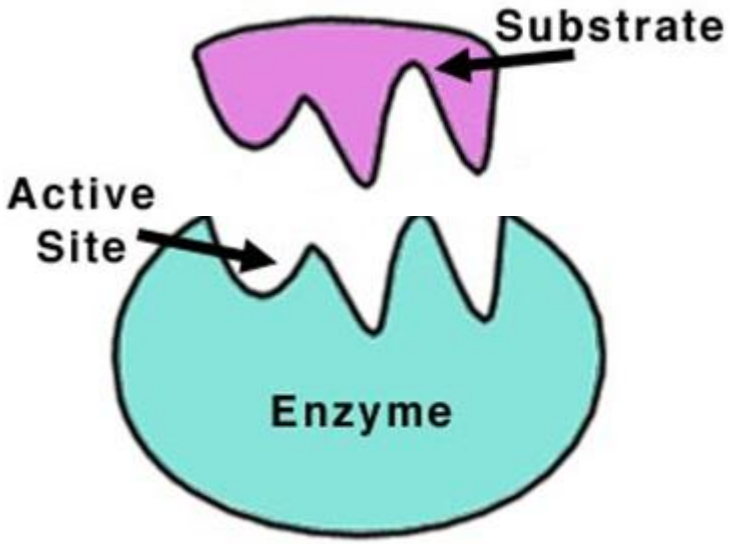
  → Lipids are broken down by ***lipase***

  → ***Pepsin*** helps break down proteins
- Enzyme names end in **–ase** or **–in**

~ Enzyme Vocabulary ~

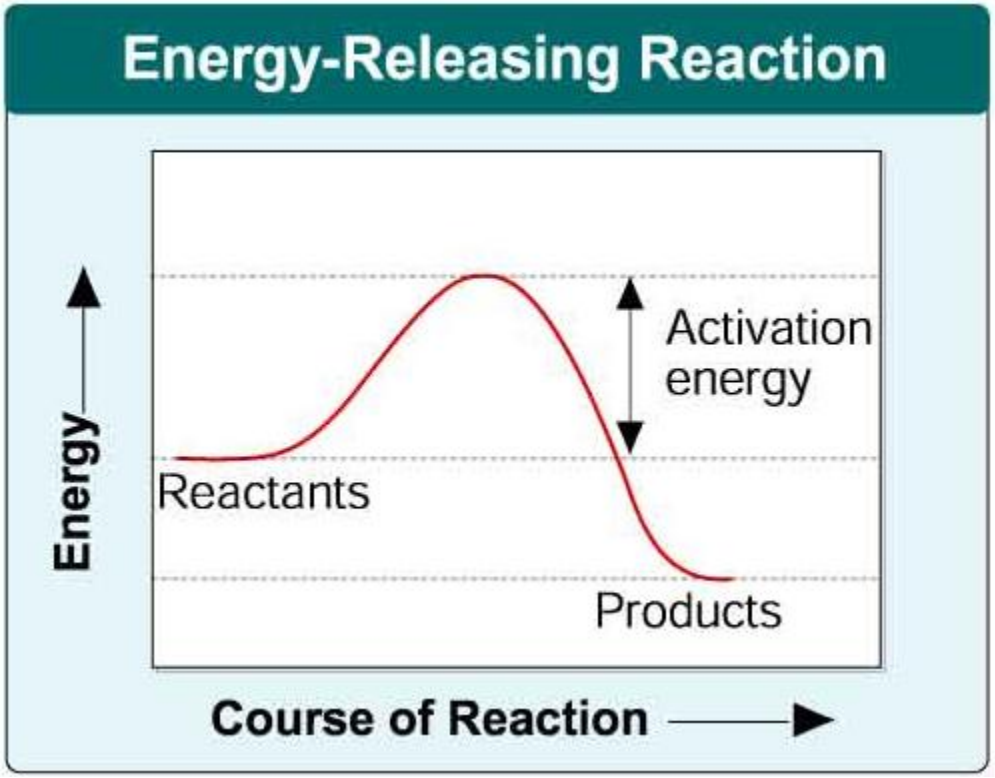
- **Active site:** where reactants touch the enzyme
- **Substrates:** The reactants being changed by the enzyme; the things that bind to an enzyme to be put together or broken apart.

➢ **Active site** and **substrate** fit together like a lock and key!



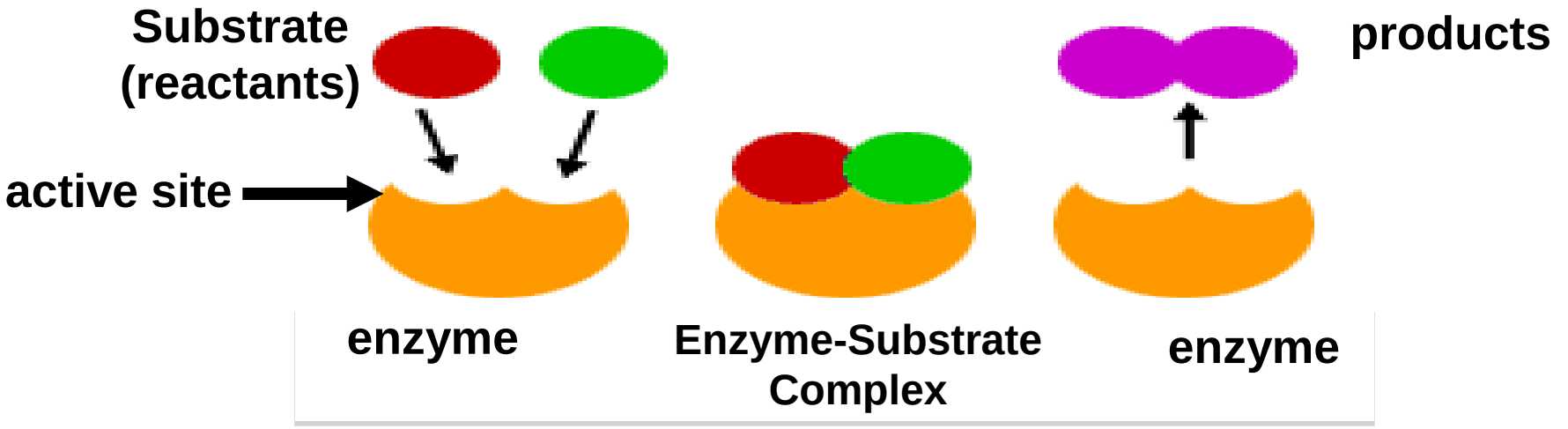
Enzymes Speed Up Chemical Reactions

- **Catalyst:** a substance that speeds up the rate of a chemical reaction.
  - They work by lowering a reaction's activation energy.
- **Activation energy:** the energy required to get a chemical reaction started.

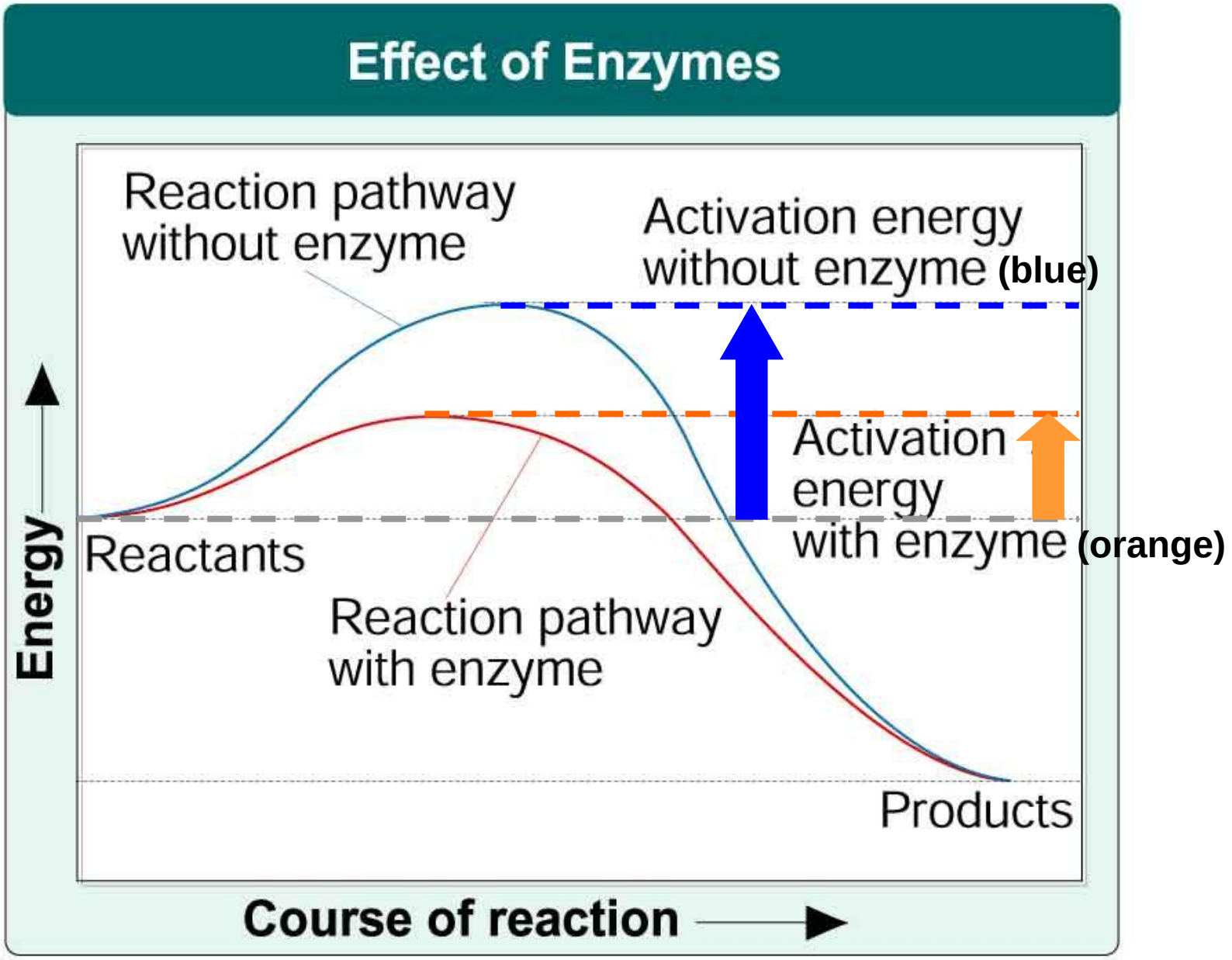


How enzymes work

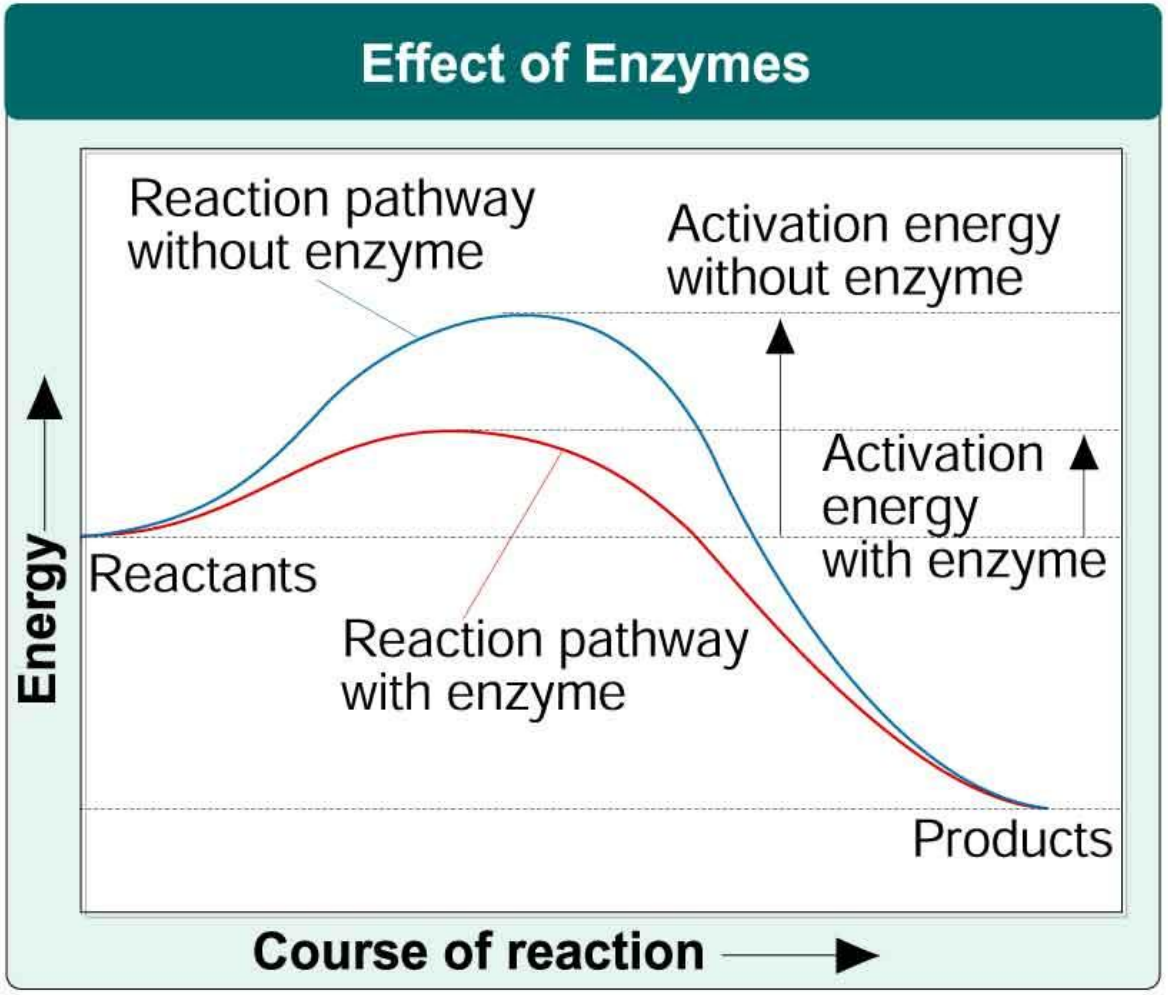
1. The **substrates (reactants)** bind to the **active site** on the enzyme.
2. The enzyme weakens bonds, which lowers the **activation energy** for the chemical reaction.
3. The products of the reaction are released from the enzyme
4. The enzyme remains unchanged and is ready for more substrate to combine.



Effects of Enzymes on Activation Energy

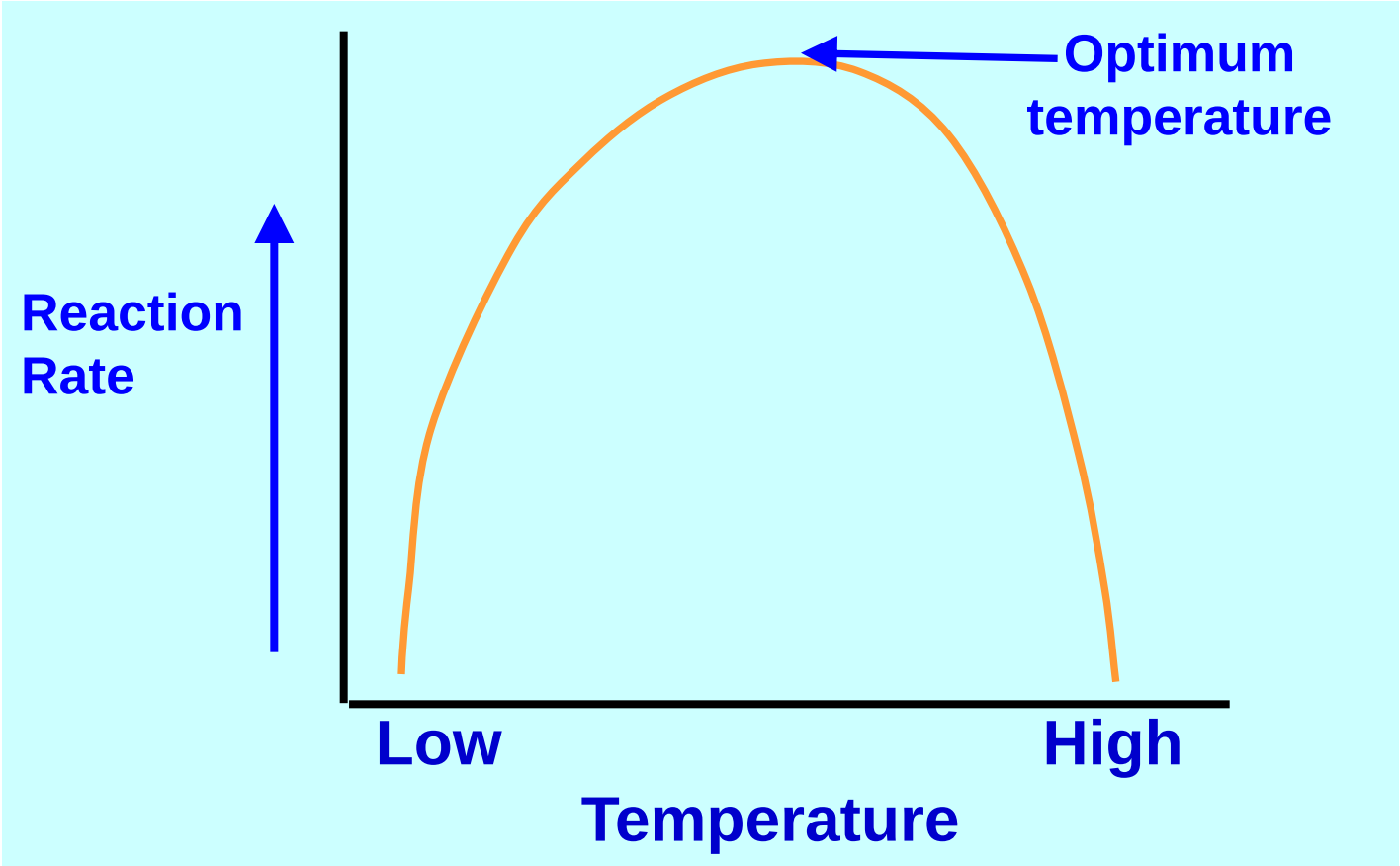


Which reaction needs less energy?
The one *with the enzyme*?
Or *without the enzyme*?



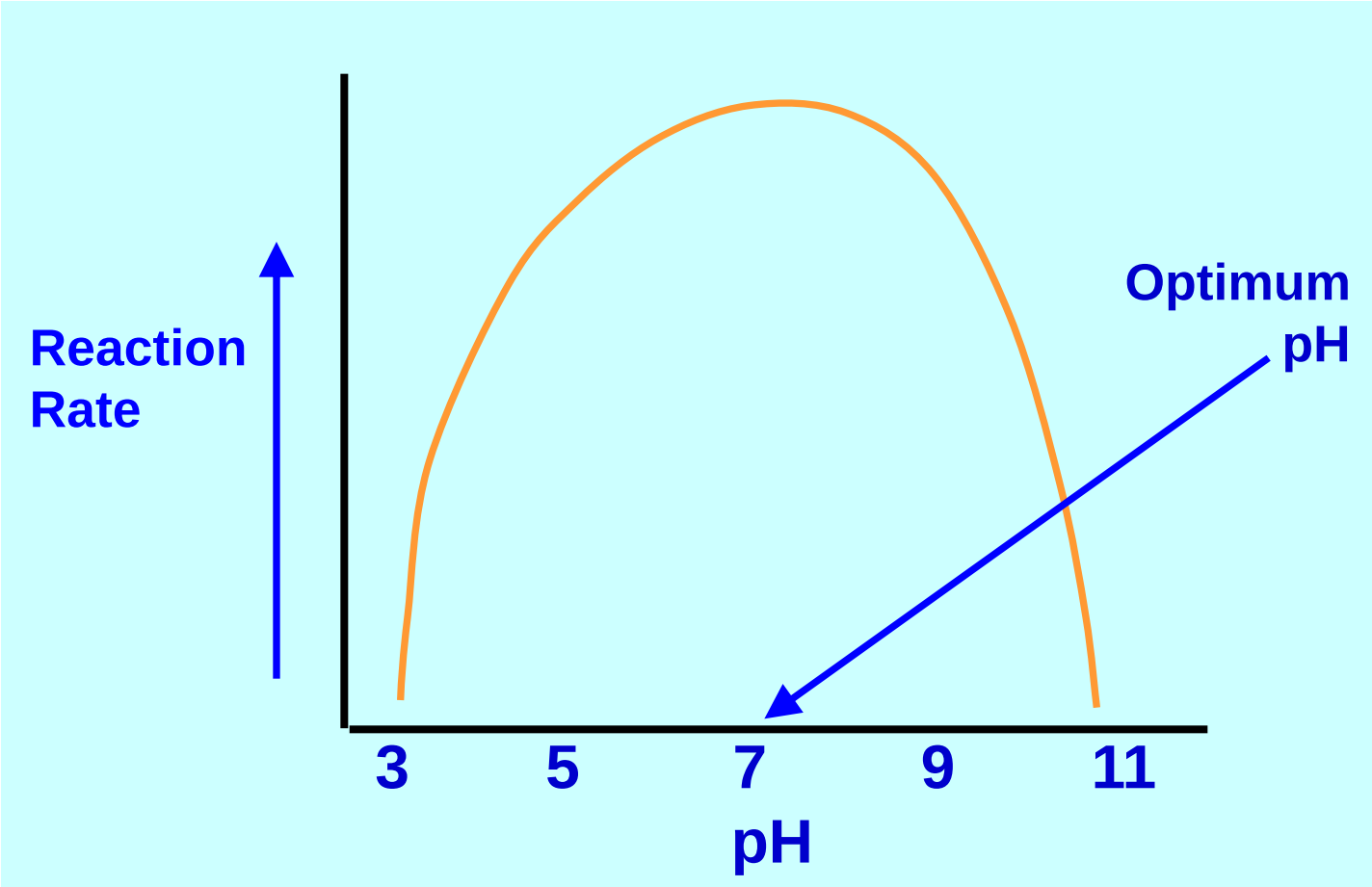
Factors that Affect Enzyme Activity: Temperature

- Too cold? Very little enzyme activity
- Too hot? Enzyme begins to ***denature***, meaning they will come apart.
- In humans, enzymes work best at 37° C



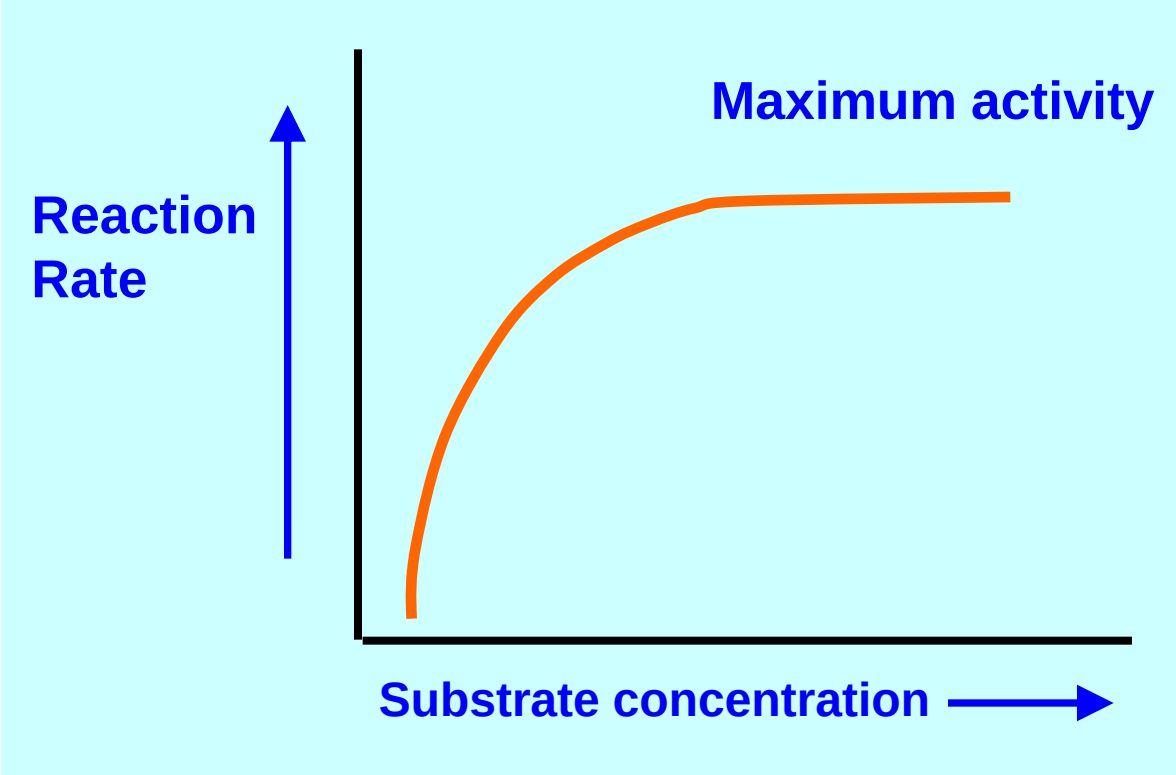
Factors that Affect Enzyme Activity: pH

- How acidic/basic is the enzyme's environment?
- Most enzymes are not active at high or low pH



Factors that Affect Enzyme Activity: Substrate Concentration

- Increasing substrate concentration increases the rate of the reaction
  - Enzyme concentration stays constant
- Max. activity reached when all of the enzyme combines with all of the substrate available.



Sucrase (enzyme for sucrose) has an optimum temperature of 37° C and an optimum pH of 6.2.

Determine the effect (no change, increase, or decrease) of the following on its rate of reaction.

(A) Increasing the concentration of sucrose.

(B) Changing the pH to 4

(C) Running the reaction at 70° C