Biology High School

For Standardized Scholastic Tests

EST2-ACT2 Biology

Coursework

2024-2025

Dr. Mohamed Kabbany

Chapter 1

Cellular and Molecular Biology

Lesson 1.3.1

Enzymes

	1.3- Enzymes
1	Definition and Catalyst
2	Enzyme structure
3	Activation Energy
4	Effect of temperature
5	Effecto of p.H.
6	Enzymes mMix

Chapter 1

Cellular and Molecular Biology

Lesson 1.3.1

Enzymes are biological catalysts made up of proteins

A catalyst speeds up chemical reactions without being consumed.

A catalyst speeds up chemical reactions by lowering the activation energy.

A catalyst lowers the activation energy by finding an alternative root for the reaction to occur.

1.3.2- Enzymes proteins.

Few are RNA molecules.

Enzymes are large proteins.

Enzymes serve to speed up reactions by lowering the energy of activation (E_a), the amount of energy needed to begin a reaction.

The chemical that an enzyme works on is called a substrate.

The site on the enzyme molecule to which the substrate binds is called the **active site.**

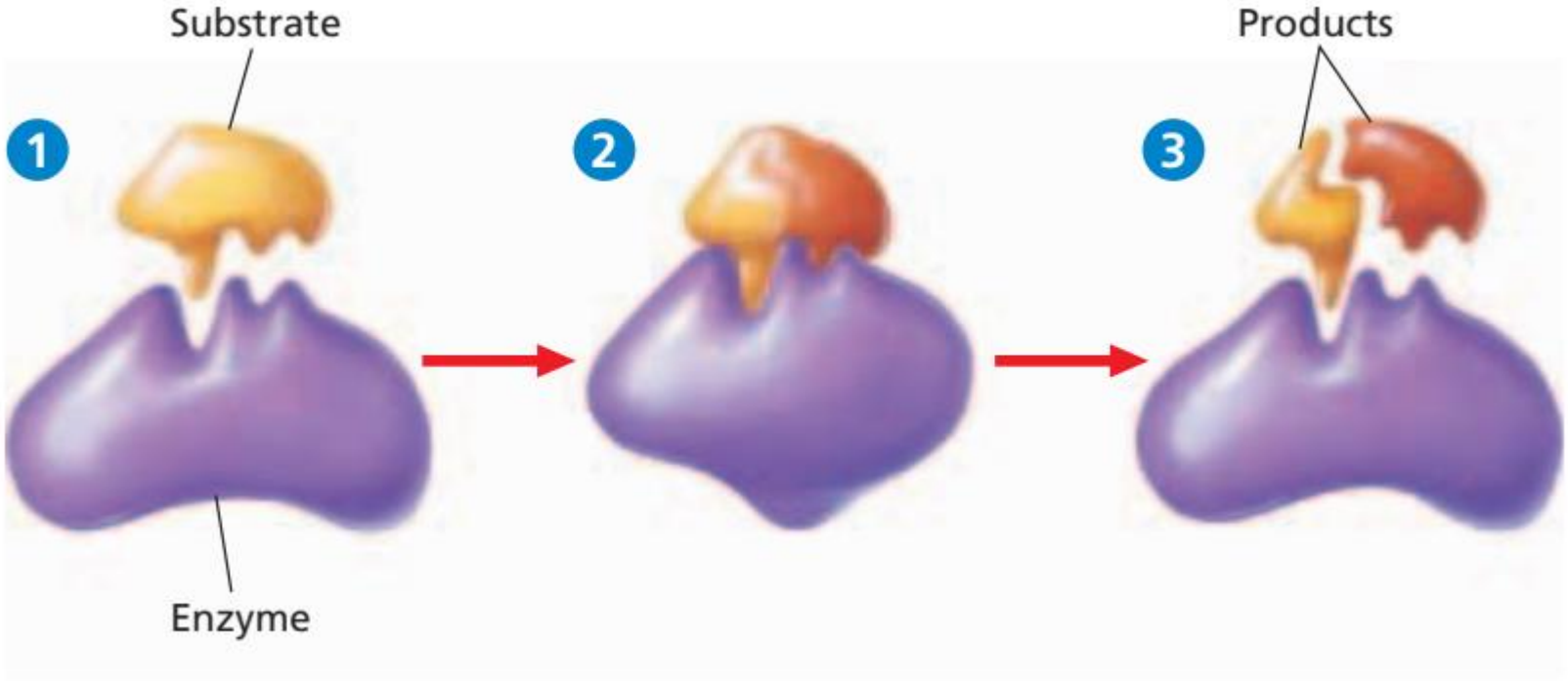
Enzymes are specific. only specific substrate will bind to the enzyme.

Previously described as lock and key model.

Now, The induced-fit model describes how enzymes work.

As the substrate enters the active site, it induces the enzyme to alter its shape slightly so the substrate fits better.

(The old “lock and key” model was abandoned because it implied that the enzyme never changes.)



In the induced fit model of enzyme action, the enzyme can attach only to a substrate (reactant) with a specific shape. The enzyme then changes and reduces the activation energy of the reaction so reactants can become products. The enzyme is unchanged and is available to be used again.

Back

Enzymes are not consumed during a reaction and are reused.

Enzymes are named after their substrate, and the name ends in the suffix “ase.”

For example, sucrase is the name of the enzyme that hydrolyzes sucrose, and lactase is the name of the enzyme that hydrolyzes lactose.

Enzymes function with the assistance from cofactors (minerals) or coenzymes (vitamins).

The efficiency of the enzyme is affected by temperature and pH.

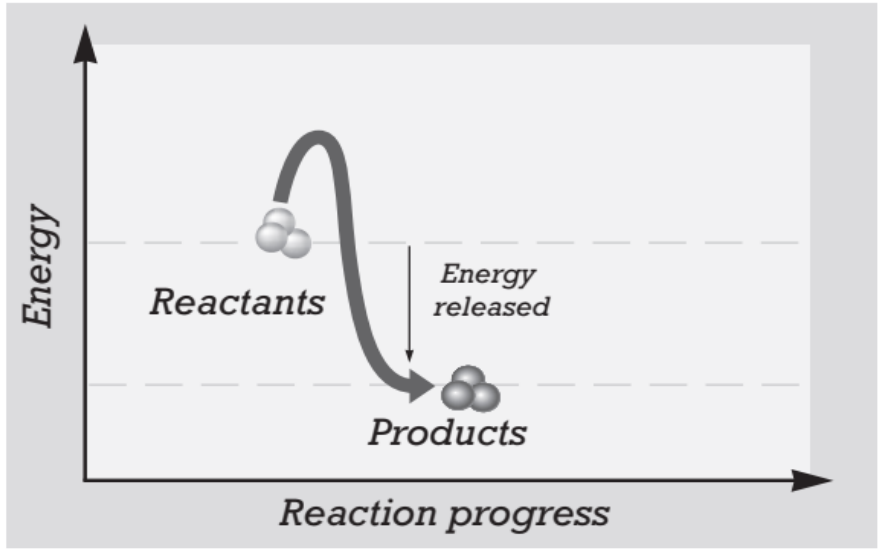
Average human body temperature is 37°C, near optimal for human enzymes.

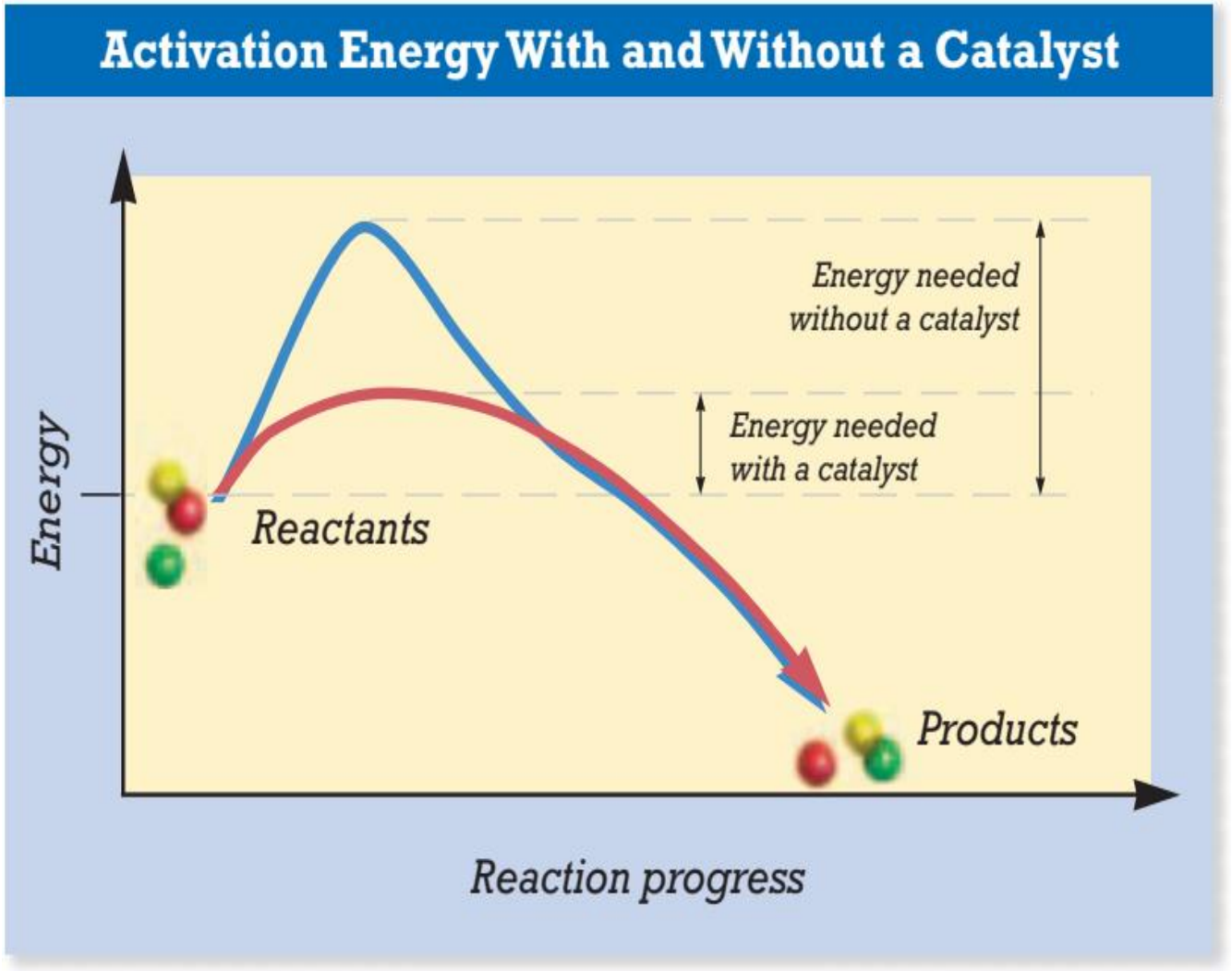
If body temperature rises above 40°C, the enzymes will stop functioning, as it is denatured.

As enzymes denature, they lose their unique shape and their ability to function.
The active site changes its shape and no more suits the substrate binding.

Gastric enzymes become active at low pH, when mixed with stomach acid.
In contrast, intestinal amylase works best in an alkaline environment;

1.3.3- Enzymes lower activation energy of reaction.

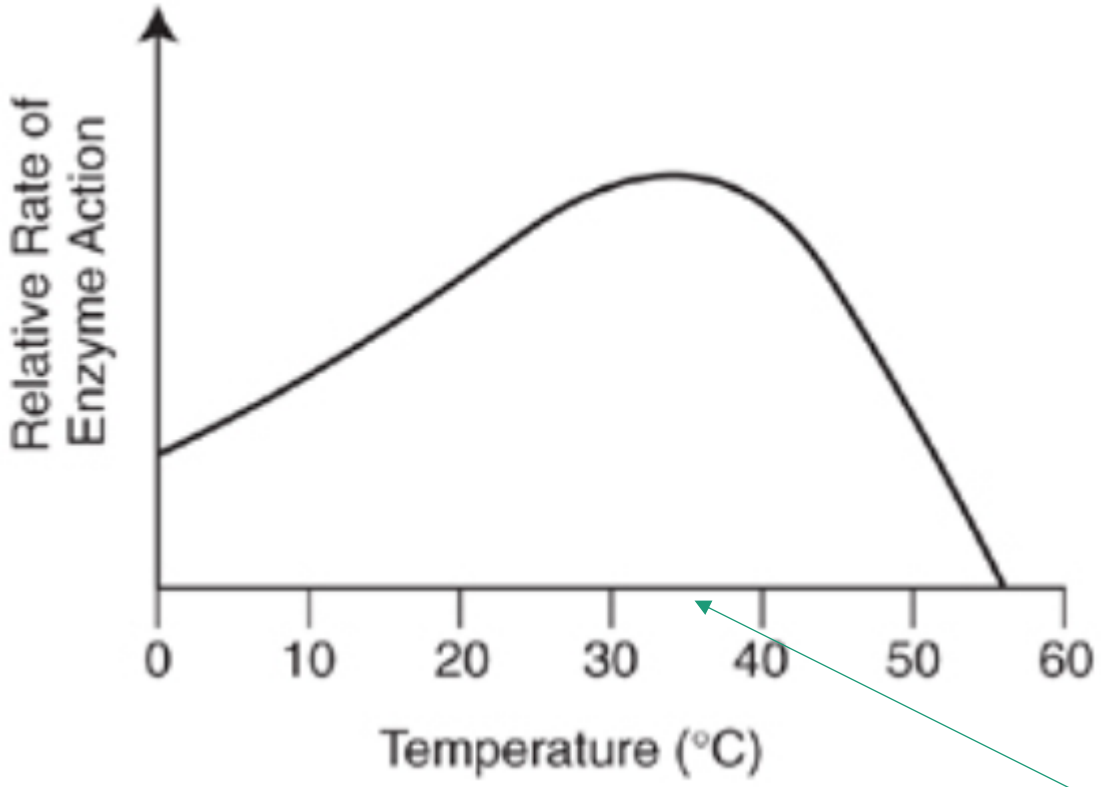




The blue curve shows the activation energy that must be supplied before this reaction can begin. The activation energy can be reduced, as shown by the red curve, by adding a catalyst

Back

1.3.4- Optimum temperature is the temperature at which the enzyme works best.



Optimum temperature for most body enzymes is 37 except in the liver (40) and in the testes (35)

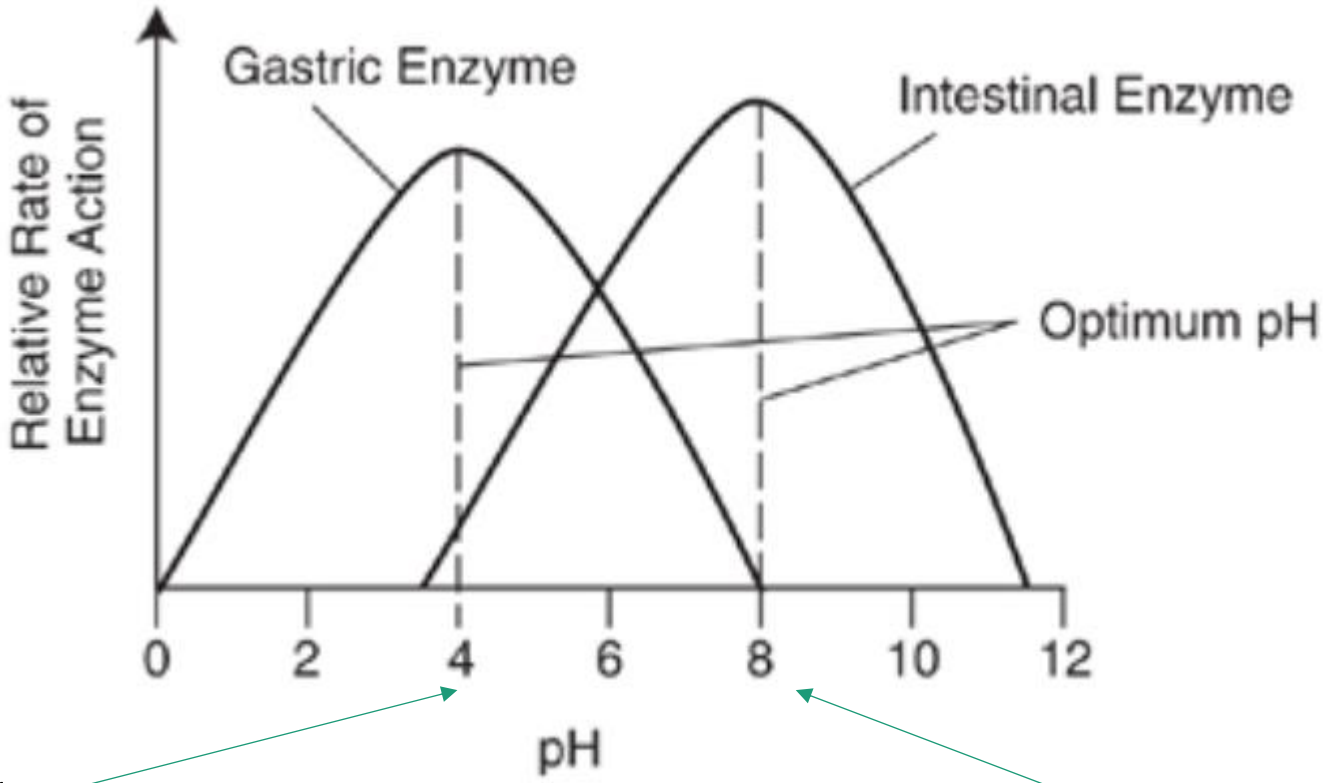
Optimum temperature for an enzyme:

is the temperature at which the enzyme works best.

1.3.5- Optimum pH. is the pH. at which the enzyme works best.

Link

Link



Optimum pH for an enzyme:

is the pH at which the enzyme works best.

Thank you