

Enzymes

...

Amazing biological catalysts!

Chemical reactions either:

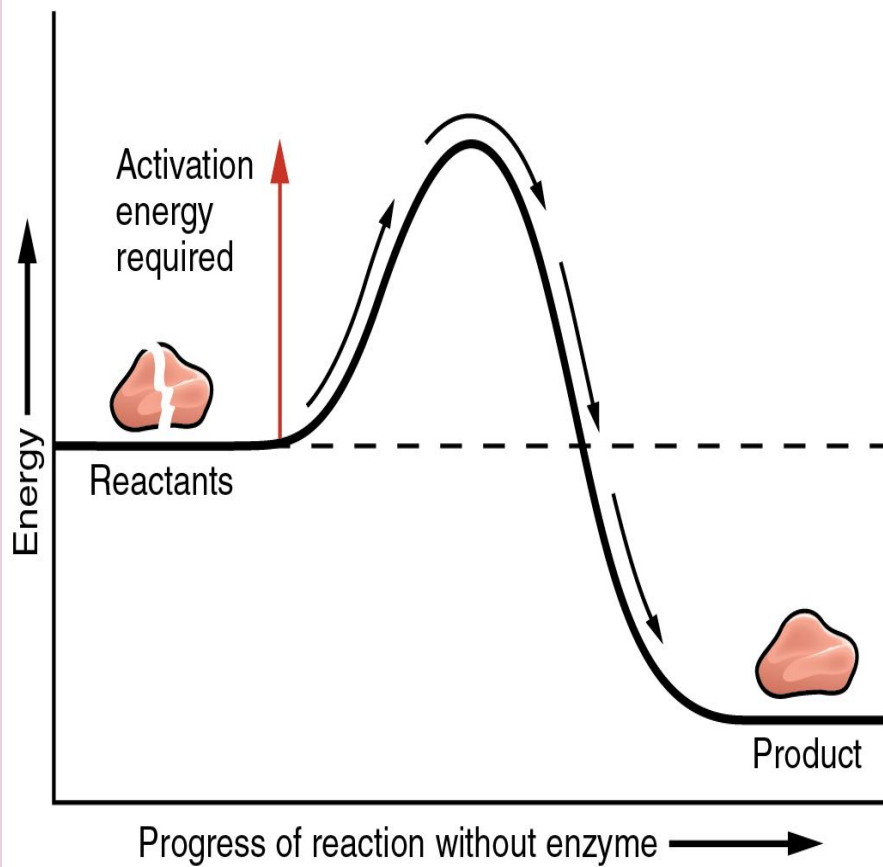
A. Require energy as they go (ENDOTHERMIC)

or

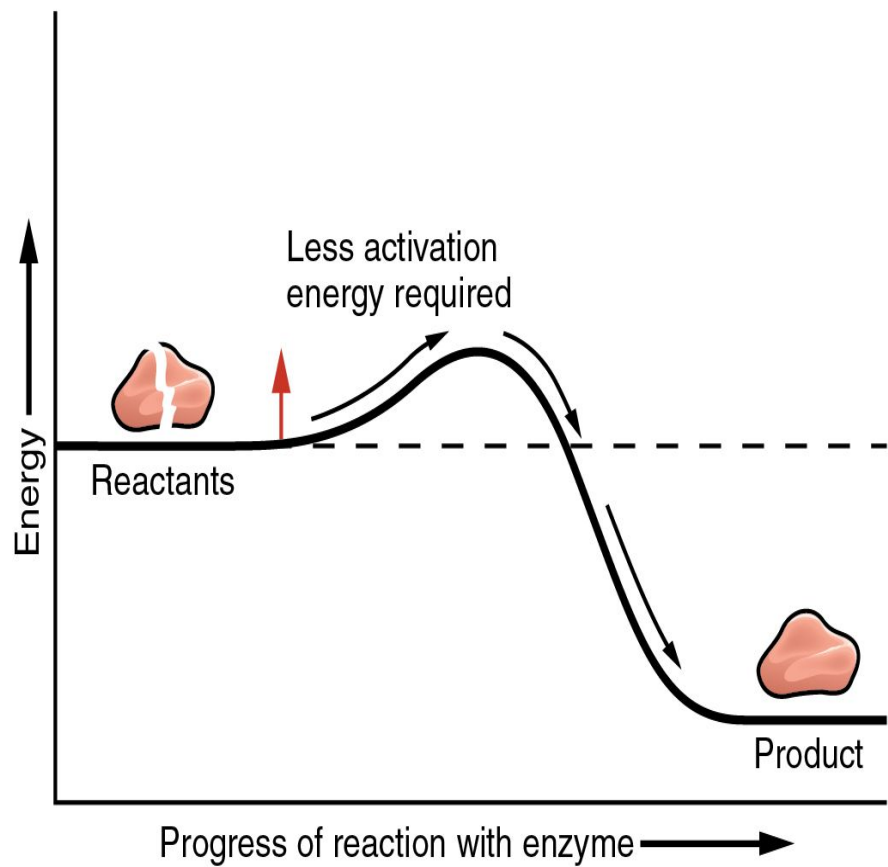
B. Release energy as they go (EXOTHERMIC)

In living things, enzymes:

1. Speed up chemical reactions by reducing the amount of energy needed (the ACTIVATION energy) for a reaction to start.



(a)



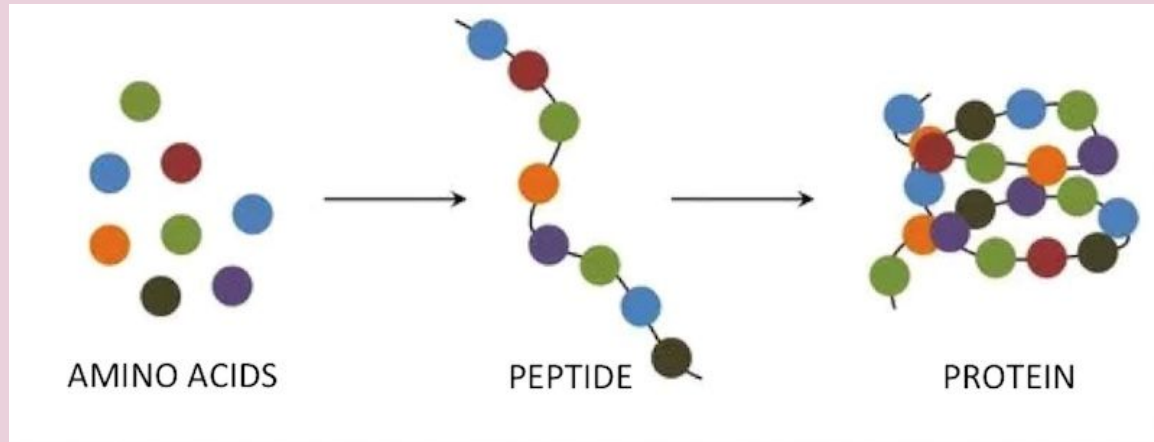
(b)

2. ...are made of protein

-Proteins are made of amino acids

-Enzymes have a folded, 3D shape

-This shape determines an enzyme's function



3. ...are re-usable. They don't get used up or permanently changed in reactions. (They may wear out, though)



4. ...work for only one type of reaction. They are SPECIFIC. There are many different enzymes.

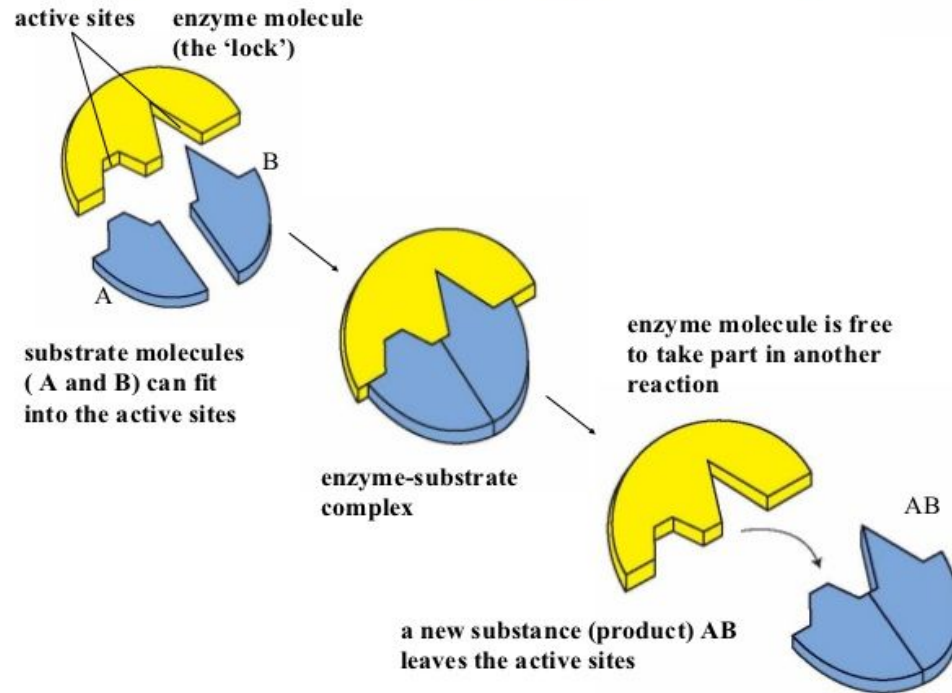
Shape is everything with an enzyme. They must fit with their substrate like a puzzle piece.



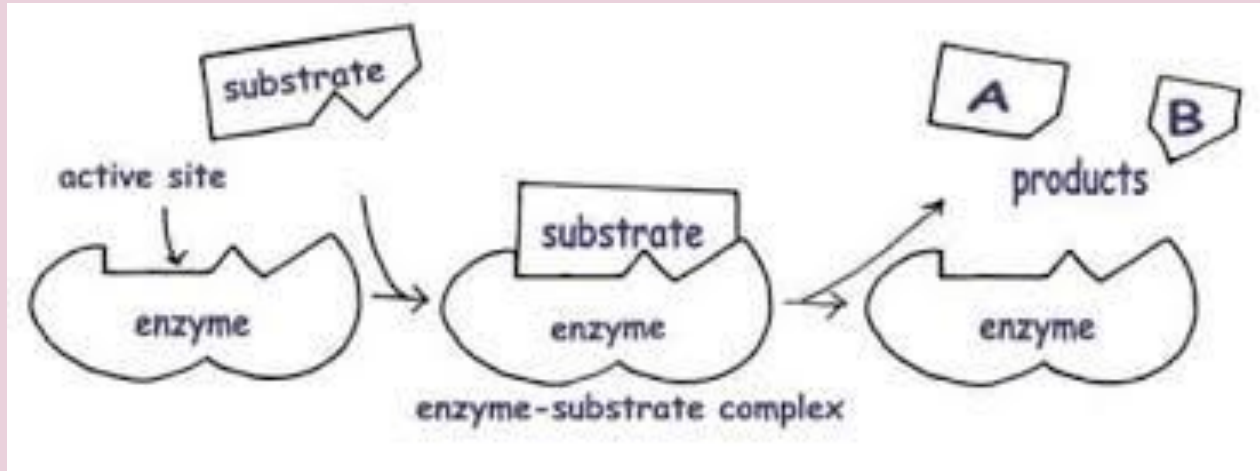
5. ...can act as matchmakers.



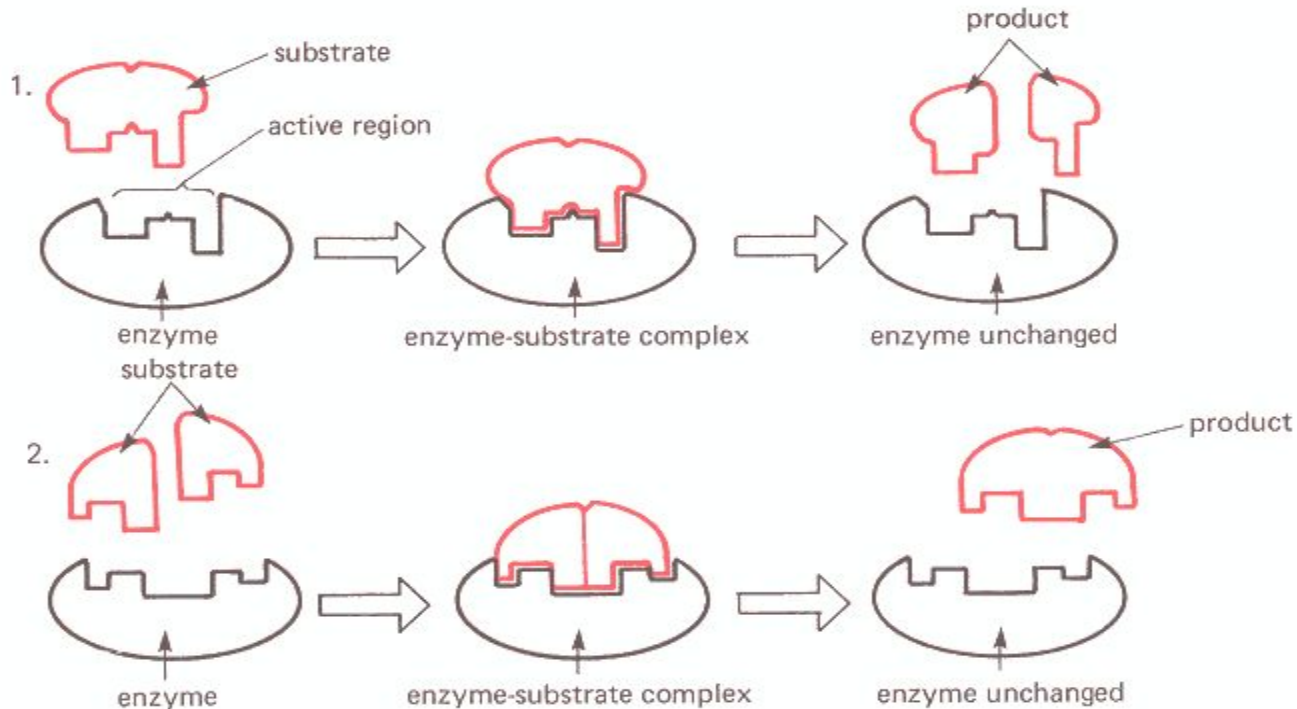
Lock and Key Hypothesis



6. ...can act as gossipers

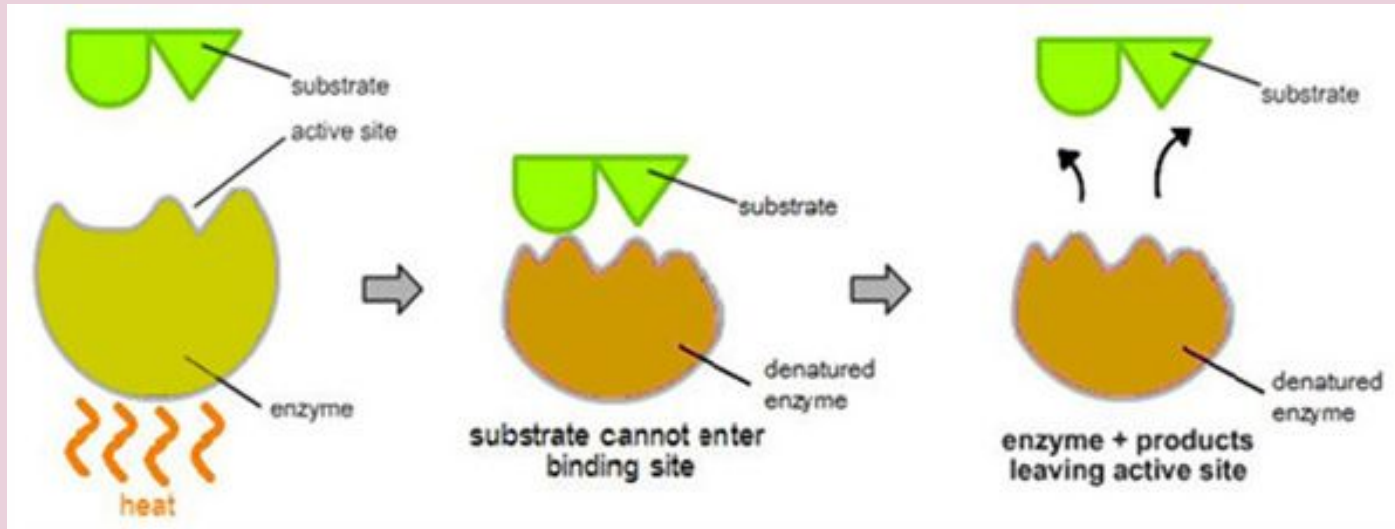


Gossiper vs. Matchmaker



1. a catabolic enzyme controlled reaction
2. an anabolic enzyme controlled reaction

7. ...can be changed by extreme changes in pH and temperature. This is called "denatured". An enzyme that has been completely denatured will not work anymore.



8. ...can be inhibited by blocking the active site. This can slow down a reaction that doesn't need to happen quickly.

It can also prevent an enzyme from ever working at all.

Clinically useful Competitive Inhibition

Drugs	Target Enzyme	Therapeutic Use
STATINS - Atorvastatin , simvastatin	HMG CoA reductase	Decrease plasma Cholesterol level - Antihyperlipidemic agents
Allopurinol	Xanthine oxidase	Gout
Methotrexate	Dihydrofolate reductase	Cancer
Captopril & Enalapril	Angiotensin converting enzyme	High blood pressure
Dicoumarol	Vit.K-epoxide-reductase	Anti-coagulant

WHAT IS GOUT?

Medical Observer | Source: WebMD



Gout is a kind of arthritis caused by a buildup of uric acid crystals in the joints.

Uric acid is a breakdown product of purines that are part of many foods we eat.

An abnormality in handling uric acid and crystallization of these compounds in joints can cause attacks of painful arthritis, kidney stones, and blockage of the kidney filtering tubules with uric acid crystals, leading to kidney failure.

SYMPTOMS OF GOUT

Acute gout attacks are characterized by a rapid onset of pain in the affected joint followed by warmth, swelling, reddish discoloration, and marked tenderness.

The small joint at the base of the big toe is the most common site for an attack. Other joints that can be affected include the ankles, knees, wrists, fingers, and elbows.



What gout looks like

Maintaining adequate fluid intake helps prevent acute gout attacks and decreases the risk of kidney stone formation in people with gout. Also avoid drinking alcohol.