



ENZYMES

Types of Chemical Reactions

1. anabolic: synthesis reactions

- smaller molecules join to form larger molecules

ex: making cell parts (growth, repair)

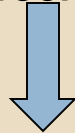
- glucose → **glycogen** (in animals)

 ↓
starch (in plants)

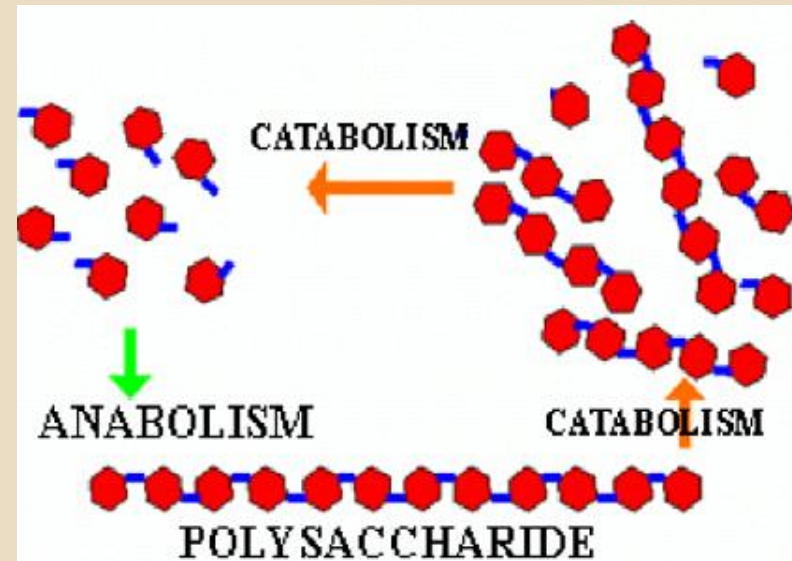
2. catabolic: digestion reactions

- larger molecules broken down into smaller ones

ex: polysaccharides



monosaccharides



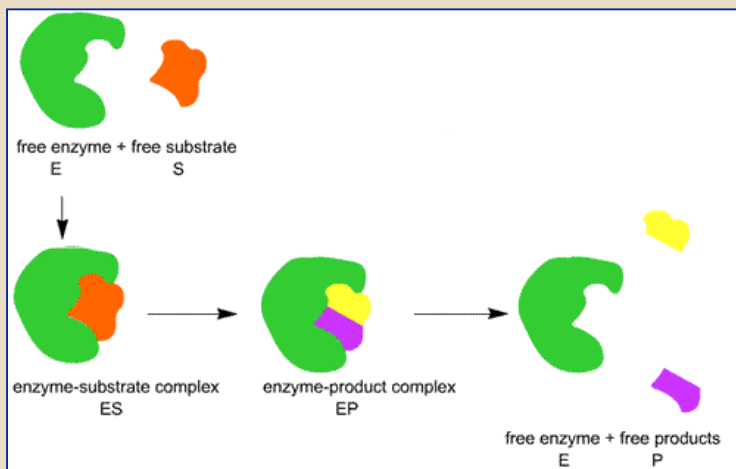
Enzymes

enzymes are **proteins**

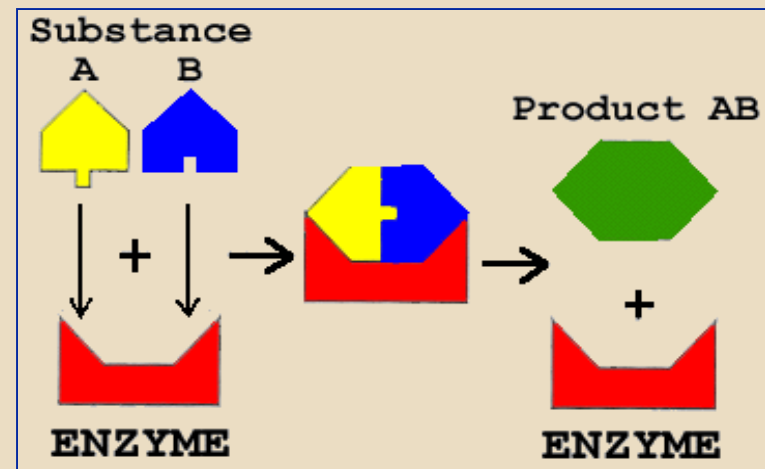
- biological catalysts (speed up chemical reactions)
- reusable

lock & key hypothesis

- each enzyme is uniquely designed to fit with its **substrate** (reactant in a chemical reaction) at the active site
- they fit perfectly like **'a lock & key'**



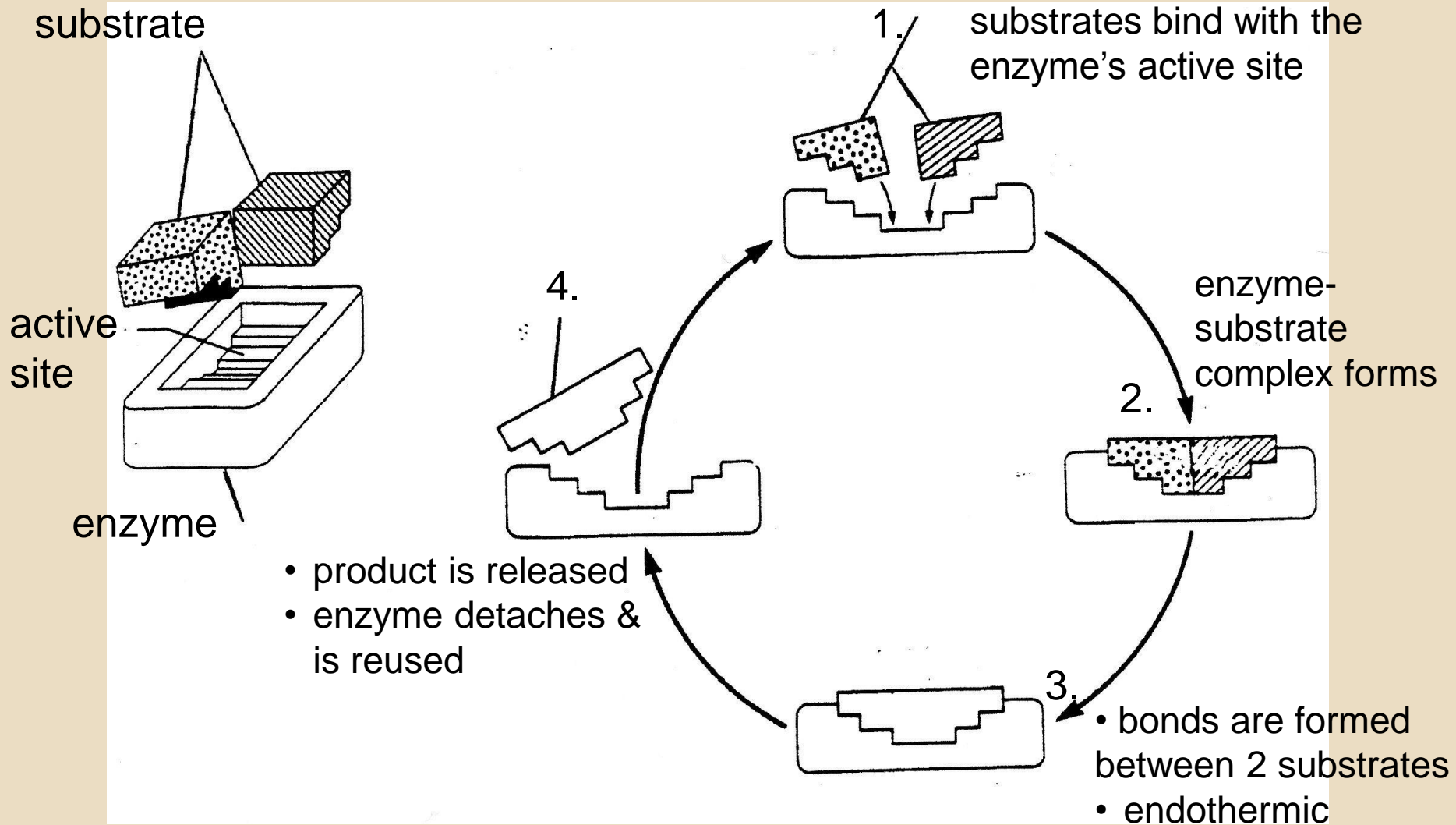
catabolic reaction



anabolic reaction

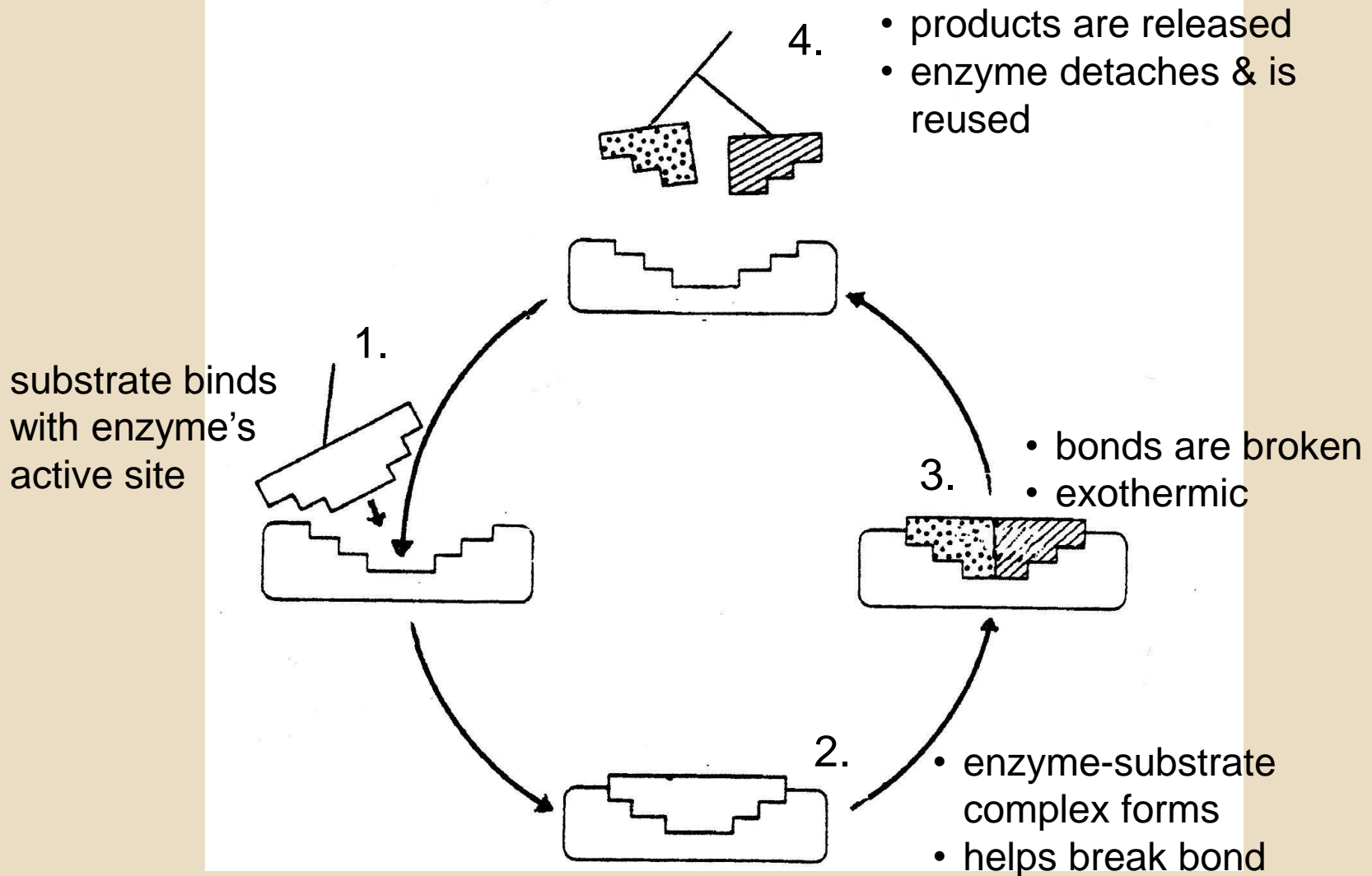
Lock & Key Hypothesis

Anabolic Chemical Reaction

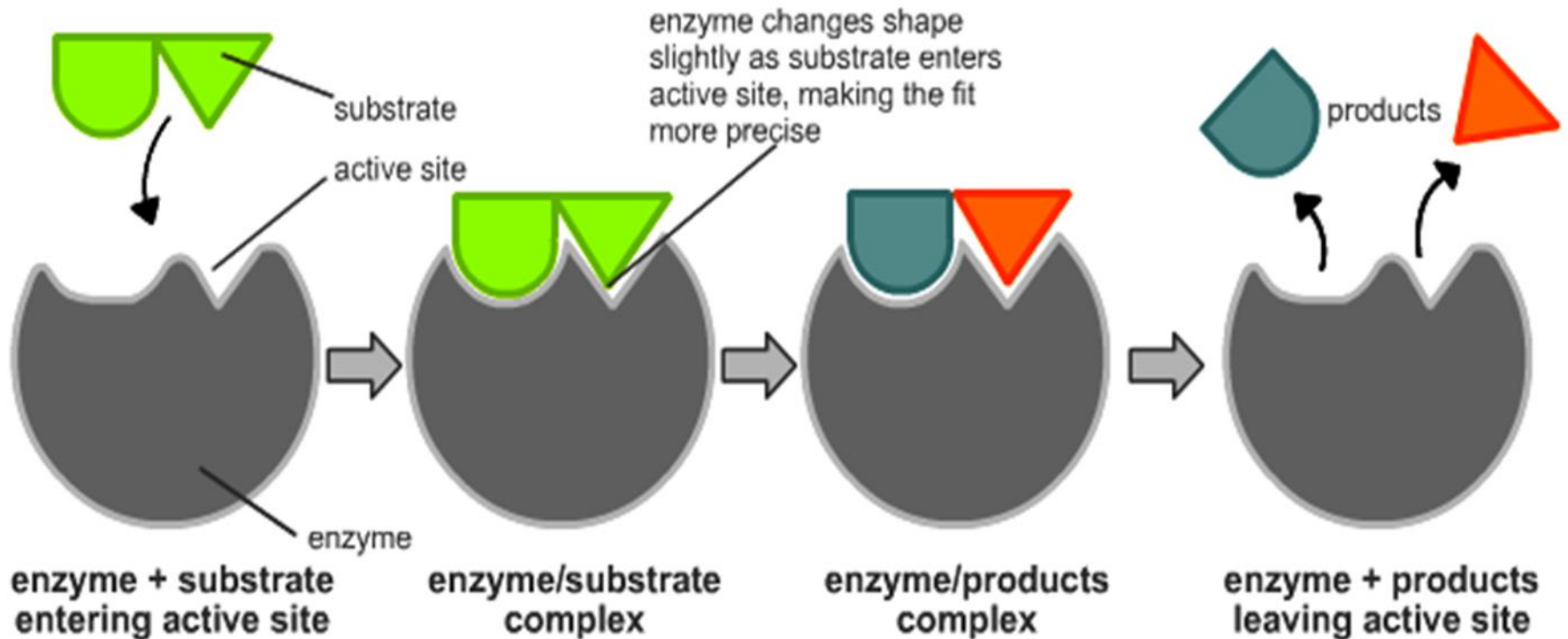


Lock & Key Hypothesis

Catabolic Chemical Reaction



Lock & Key Hypothesis



Denaturation of Proteins



↓ + heat



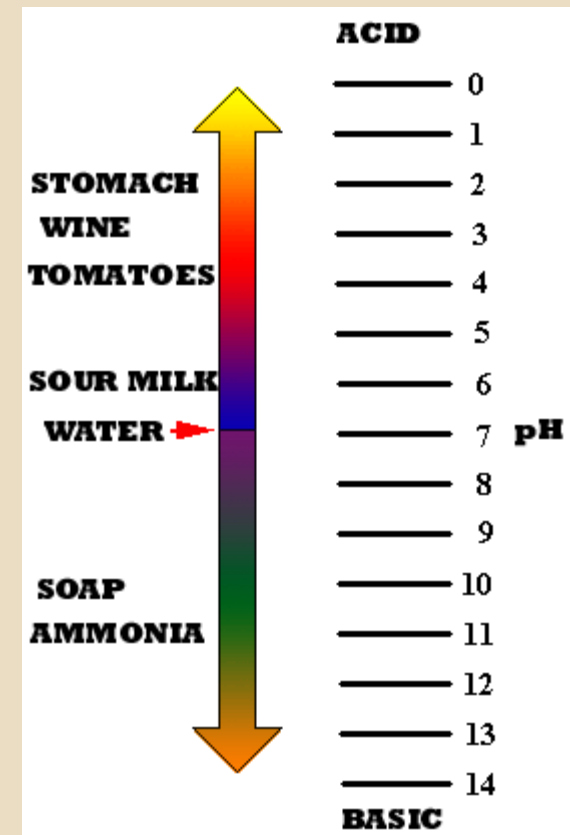
denature:

- when proteins lose their specific 3D shape
 - ex.
 - washing a pure wool (protein) sweater in hot water → shrinks
 - egg white & yolk solidify when heated
- denatured enzymes lose their functionality
- substrate no longer fits the enzyme's active site
- chemical reaction won't be catalyzed

denaturation can be caused by:

1. very hot temperatures
2. strong acids (low pH)
3. strong bases (high pH)

Note: Each enzyme has an ideal temperature & pH at which it works best.



Industrial Uses of Enzymes

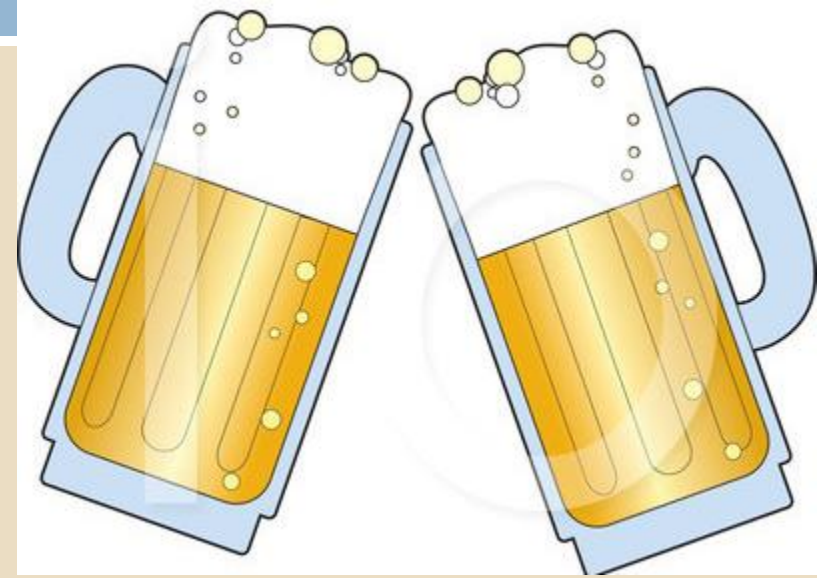
- Enzymes not only play a critical role in the human body, but it is also has many practical uses in other industries.

1) **Brewing, Baking and Wine making**

2) **Creation of Starch**

Example 1. Brewing, Baking and Wine

- **Yeast** cells produce enzymes which help convert glucose to **ethanol and CO₂**.
- In wine and beer, ethanol gives it the flavour and characteristics
- In baking, the **CO₂ bubbles** help to give bread and cake the sponge-like texture.



Example 2. Production of glucose

- Conversion of **starch** in corn and wheat into **glucose**
- Starches are broken down by enzymes (**amylase & maltase**) into glucose
- The glucose is then used as a **sweetener** in many of our foods.



Homework

1. Read page 54 (industrial uses of enzymes).
2. Do p. 35 # 6, 8 & p. 55 # 4, 5a