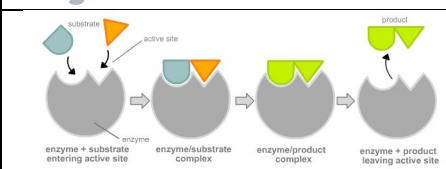
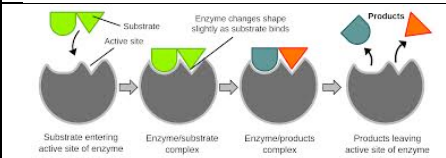


Enzymes

- ⇒ Globular proteins, which act as biological catalyst to speed up the rate of metabolic reactions.
- ⇒ Lower activation energy needed to achieve the transition state (state where existing bonds are strained) by providing an alternative pathway by forming an enzyme-substrate complex.
- ⇒ Highly specific.
- ⇒ Used in extracellular and intracellular processes.

Models

Stereo-specificity – relationship of substrate to active site.

	Mechanism	Diagram
Lock and key	Active site and substrate are complementary to each other.	 The diagram shows four stages: 1. A substrate (green Y-shape) approaching an enzyme's active site (blue Y-shape). 2. The substrate fitting into the active site. 3. The enzyme/substrate complex where the substrate is bound. 4. The enzyme releasing the product (green Y-shape) and returning to its original shape.
Induced fit	Active site and substrate are only fully complementary after the substrate has bound.	 The diagram shows four stages: 1. A substrate (green Y-shape) entering the active site of an enzyme. 2. The enzyme's active site changing shape to fit the substrate. 3. The enzyme/substrate complex where the substrate is bound. 4. The enzyme releasing the product (green Y-shape) and returning to its original shape.

Properties

- ⇒ Active site of enzymes is determined by the tertiary structure of the protein (which is determined by the primary structure - determined by genes).
- ⇒ Alterations to tertiary structure will affect the active site (pH and temperature)

Factors affecting enzyme activity

Temperature

- ⇒ Rate of reaction increases with an increase in temperature.
- ⇒ Molecules move around faster and have a greater chance of collisions.
- ⇒ Too high temperatures cause molecules to vibrate more and weaker bonds e.g. hydrogen bonds will break. The shape of the active site changes – enzyme denatures.

pH

- ⇒ Above or below the optimum temperature alters the ionic and hydrogen bonds:
 - ⇒ Charges on active site are no longer complementary to those on the substrate.
 - ⇒ Extreme pH changes can cause denaturation.

Substrate concentration

- ⇒ Increase in substrate increases enzyme activity.
- ⇒ Number of enzymes/active sites can become a limiting factor, when all enzymes are at saturation point and cannot accommodate more substrate.

Inhibitors

- ⇒ Competitive inhibitors – have a similar shape to the substrate; can bind with active site and block substrates from attaching.
 - ⇒ Reversible by an increase of substrate concentration.
- ⇒ Non-competitive inhibitors – binds to a different active site on the enzyme, altering the shape of the other active site preventing substrates from attaching.
 - ⇒ Reversible if the inhibitor concentration is diminished (there are many natural allosteric regulators).

[EXTRA]

- ⇒ ACE inhibitors:
 - ⇒ ACE – angiotensin converting enzyme.