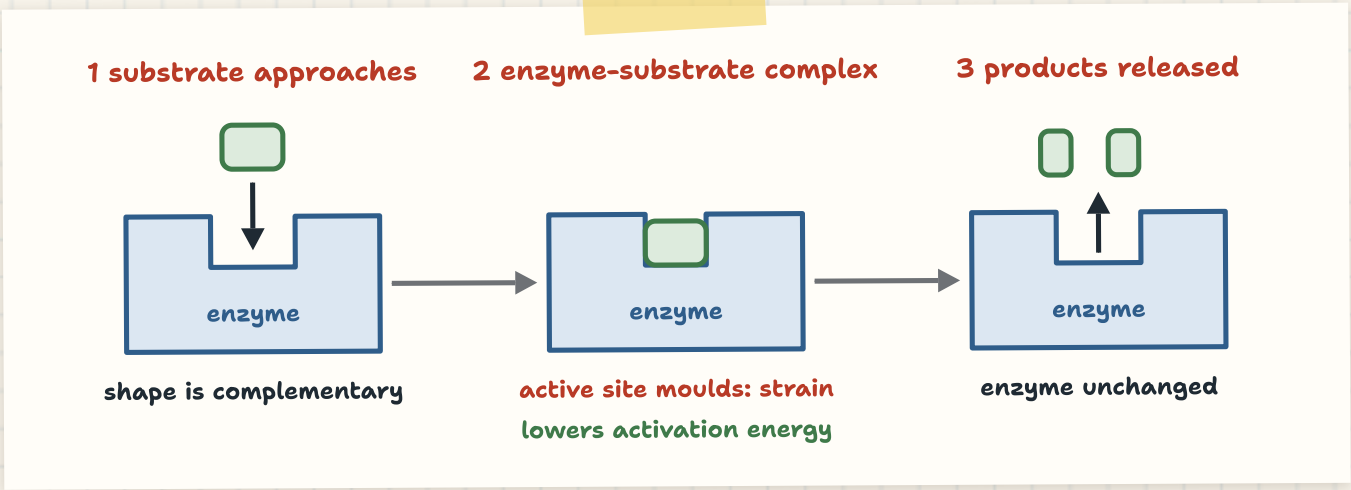
How Enzymes Work: Active Site and Induced Fit

A specific active site binds the substrate and, by induced fit, lowers the activation energy.



Key terms

active site	the region of the enzyme's tertiary structure whose shape is complementary to its substrate.
substrate	the molecule the enzyme acts on.
enzyme-substrate complex	formed when the substrate binds to the active site; the enzyme is unchanged afterwards.
activation energy	the energy needed to get a reaction going; enzymes lower it.
induced fit	the active site changes shape slightly and moulds around the substrate, straining its bonds.
complementary	matching in shape and in charges, not identical.

I can...

- [ ] Each enzyme lowers the activation energy of the reaction it catalyses
- [ ] Induced-fit model
- [ ] Properties relate to tertiary structure of the active site and ability to form enzyme-substrate complexes
- [ ] Specificity of enzymes
- [ ] Appreciate how models of enzyme action have changed over time
- [ ] Enzymes catalyse intracellular and extracellular reactions

EXAM TRAP

An enzyme lowers the activation energy; it never gives energy. The active site is complementary to the substrate, not the same shape, and is part of the tertiary structure.

4 marks: what earns them

1. Active site has a specific tertiary structure / shape that is complementary to the substrate, so only that substrate fits (specificity)
   Not: same shape as the substrate; secondary structure of the active site
2. Substrate binds to the active site forming an enzyme-substrate complex
   Not: enzyme and substrate join permanently; enzyme is used up
3. Active site changes shape slightly / moulds around the substrate (induced fit), which puts strain on the bonds in the substrate
   Not: enzyme changes shape completely; enzyme denatures
4. This lowers the activation energy, so more molecules have enough energy to react / reaction is faster
   Not: enzyme provides, gives or adds energy; lowers the energy of the products

Remember

Specific active site, so the complex forms.
Induced fit strains the bonds.
Activation energy falls.

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