

what are enzymes?

globular proteins that act as biological catalysts
 -> catalyst : substance which speeds up a chemical reaction and lowers activation energy but does not participate in the reaction itself.

– highly <mark>specific</mark>

--> due to complex primary. secondary. tertiary and quaternary structure of protein

--> specific action due to presence of active site in enzyme --- individual

--- specific shape

--- formed by fewer than 10 amino acids

- bonds certain types of substrates

How do enzymes work?

- complementary structure to active site

- --> specific
- --> any individual enzyme can only catalyse one

particular reaction

– originally thought that the way enzyme and substrate interacted was through lock and key model $% \mathcal{A}_{\mathrm{rel}}$

- --> cach enzyme fitted the substrate exactly
- --> no shape change
- later changed to induced fit model
 - --> active site changes shape when substrate bonds
 - --> places strain on the substrate bonds which break
 - --> induced fit brings chemical groups of refute into
- positions which enhance their abilities hork on substrate
 - --> as enzymes et al ge shape -> put strain of sa
- -> distorts bonds in molecule
 - --> lowers activation energy needed to break the bond -
- catalyses chemical reaction



Factors that affect enzymes

- for enzymes to work out
 - --> come into contact with substrate (collide)
 - --> have active site which is complementary to substrate
- temperatures (low and high)
- **PH**
- enzyme concentration
- substrate concentration
- inhibitors (competitive and non-competitive)
- denaturation

--> unfolding protein 310 shape and becomes a linear amino acid sequence

--> loss of secondary. tertiary or quaternary structure due to exposure to chemical or physical factors

--> primary structure stays intact -> formed by strong covalent bonds between amino acids

--> non-covalent bonds. hydrogen bonds and disulphice bridges forming secondary and tertiary structure of protein are broken due to high temperatures or pH outside optimal

--> all biological functions of centured protein are lost -> active site no longer fits (1) strate -> ES complex cannot form



what is activation energy?

– chergy needed to break the bonds in the reactants in order

for products to be formed

- enzymes lower activation energy for reaction

- enzyme destabilises bonds in the substrate by bonding

with the substrate -> acts process of bond breaking -> helps reaction take place

Lock and Key model	Induced Fit model
Old, outdated	Recent, accepted
 Active site is a fixed shape / doesn't change shape; it is complementary to one substrate After a successful collision, an enzyme- substrate complex 	 Before reaction, enzyme active site not completely complementary to substrate / doesn't fit substrate Active site shape changes as substrate binds and enzyme-substrate complex forms This stresses / distorts bonds in substrate leading to a reaction
forms leading to a reaction	Substrate Products