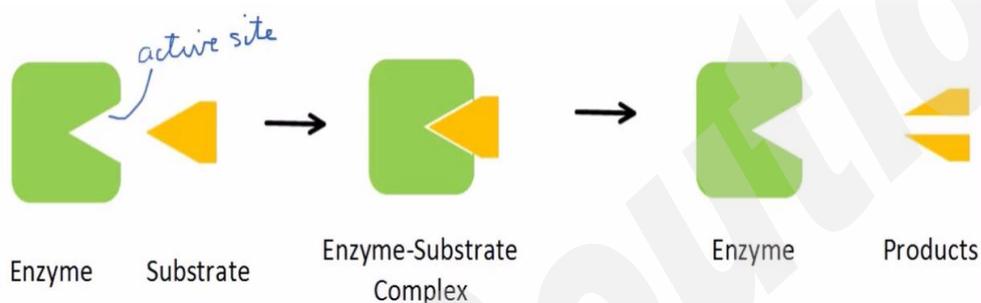


Enzymes

(IGCSE Biology Syllabus 2016-2018)

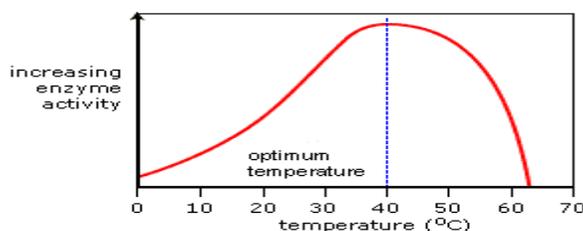
- Catalyst: a substance that speeds up a chemical reaction and is not changed by the reaction
- Enzymes: proteins that function as biological catalysts
- Enzymes lower the amount of energy needed for reaction to take place
- Lock and key theory:



- Substrate: the molecules before they are made to react
- Product: the molecules that are made in a reaction
- Catabolic reaction: molecules are broken down
- Anabolic reaction: molecules are combined

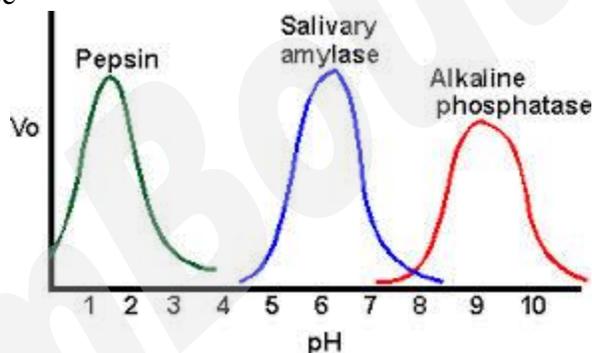
Effect of Temperature on Enzymes

- Enzymes have an **optimum temperature**: the temperature at which they work best giving the fastest reaction
- When temperature increases, molecules move faster so collide with an enzyme in less time
- Having more energy makes them more likely to bind to active site
- If temperature is too high, enzyme is **denatured** → it loses its shape and will no longer bind with a substrate
- When the temperature is too low, there is not enough kinetic energy for the reaction so it reacts too slowly



Effect of pH on Enzymes

- Enzymes are sensitive to pH
- Some enzymes work best in an acid, some work best in a neutral condition and others in an alkaline
- Enzymes work best at their optimum pH
- If the pH is changed then the enzyme will denature and will no longer fit with substrate – no reaction takes place



Enzymes and their Uses

- **Seeds to germinate:** the enzyme turn insoluble stored food to soluble
- **Biological washing powders:** enzymes are added to washing powder to help remove stains from clothes
 - Lipase: digest lipids from fatty food and greasy fingerprints
 - Protease: digest proteins from blood stains
- **Food industry:**
 - Isomerase converts glucose to fructose which is sweeter, so less is needed to give a sweet taste
 - Pectinase helps break down cell walls in fruit juice production so it increases yield, lowers viscosity and reduces cloudiness