

2.5: Enzymes

Enzymes:

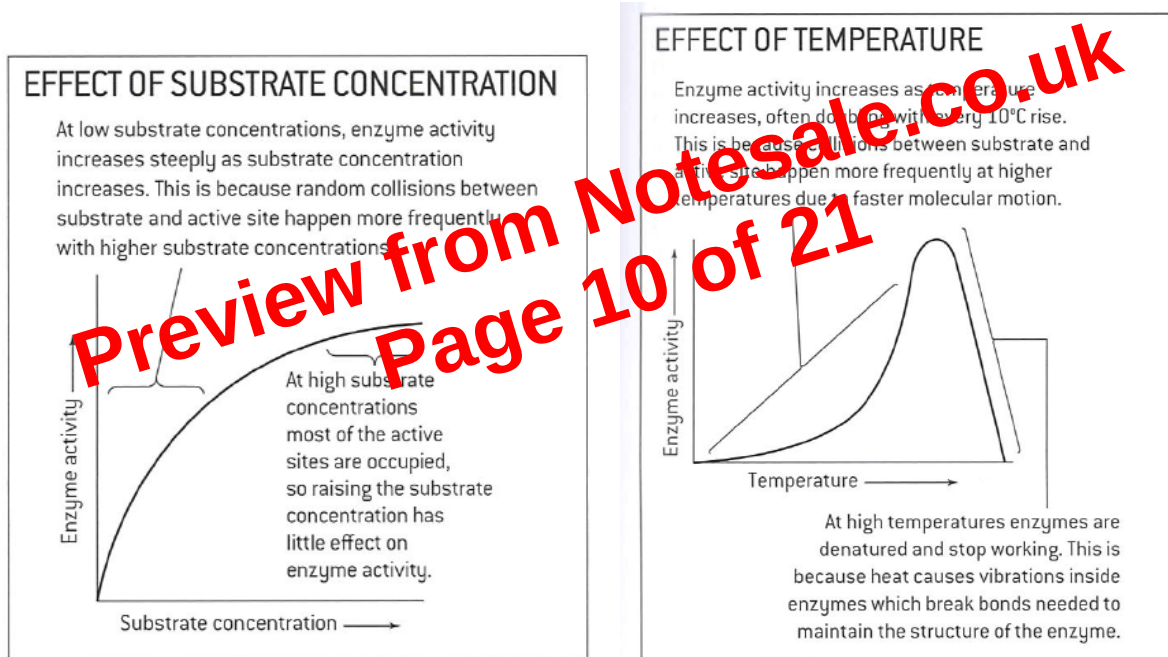
Enzymes are...

- Globular proteins
- Catalysts made by living cells which speed up chemical reactions in the body such as digestion and respiration
- Unchanged by a reaction and can be used over and over again
- Specific to their substrate
- Affected by temperature and pH

Active Site:

Active site and substrate complement each other in terms of both shape and chemical properties. Binding to the active site brings the substrate into close physical proximity, creating an enzyme-substrate complex. The enzyme catalyses the conversion of the substrate into a product, creating an enzyme-product complex. As the enzyme is not consumed in the reaction, after the product has formed, it can continue to work again and again, hence only low concentrations are needed.

Factors Affecting Enzyme Activity:



Advantages of Producing Lactose-Free Milk:

- Many people are **lactose intolerant** and cannot drink more than about 250ml of milk per day unless it's lactose-reduced.
- Galactose and glucose are **sweeter** than lactose, so less sugar needs to be added to sweet foods containing milk, such as milkshakes or fruit yoghurt.
- Lactose tends to **crystallise** during production of ice cream, giving a gritty texture. Because glucose and galactose are more soluble than lactose they remain dissolved, giving a smoother texture.
- Bacteria **ferment** glucose and galactose more quickly than lactose, so the production of yoghurt and cottage cheese is faster.

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2.9: Photosynthesis

Photosynthesis:

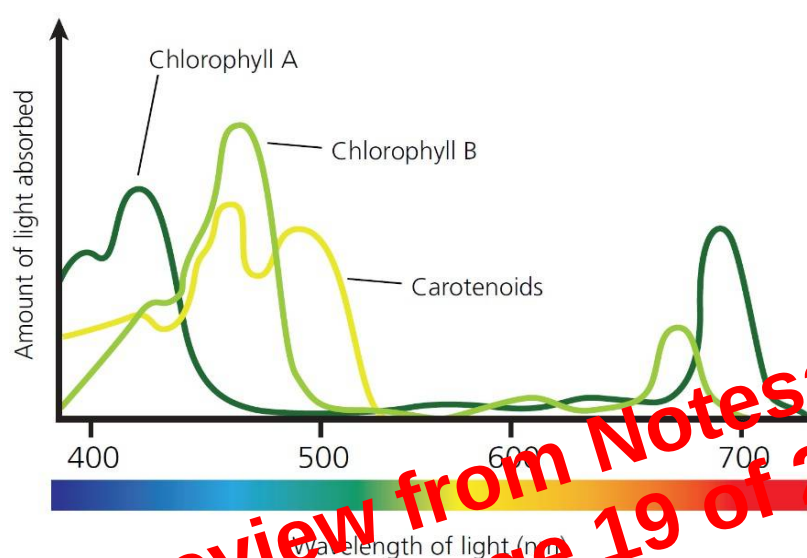
Photosynthesis is the process by which plants, algae and some bacteria produce carbon compounds (carbohydrates, lipids and proteins) from inorganic compounds (CO₂ and H₂O) using light energy and chlorophyll. Oxygen is released as a waste product.

The complex series of reactions that occur during photosynthesis, catalysed by enzymes, can be summarised as:



Chlorophyll:

Chlorophyll is the main photosynthetic pigment of plants. This is where light energy is trapped and turned into chemical energy.

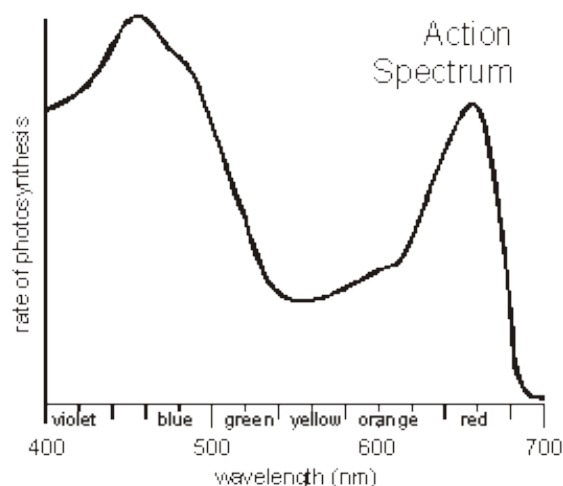


Chloroplasts contain a number of different pigments that are associated with light absorption.

This graph shows the absorption spectra for two types of chlorophyll and carotenoid pigments found in green plants.

The absorption spectrum shows the percentage of light absorbed at each wavelength by each pigment.

An action spectrum shows the rates of photosynthesis will be higher when red and blue light are absorbed as they provide the energy needed for photosynthesis.



Stages of Photosynthesis:

Photosynthesis occurs in two stages:

- **Light dependent reaction** – light energy is used to make ATP and splits water molecules into hydrogen and oxygen (photolysis).
- **Light independent reaction** – organic compounds are made from the products of the light dependent reactions (ATP and hydrogen). This is called carbon fixation.