

Photosynthesis (3.8)

Define photosynthesis (3.8.1)

- Photosynthesis involves the conversion of light energy into chemical energy
- The synthesis of organic compounds from inorganic sources in the presence of sunlight
- **Chemical equation:** $6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow{\text{chlorophyll} + \text{sunlight}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$

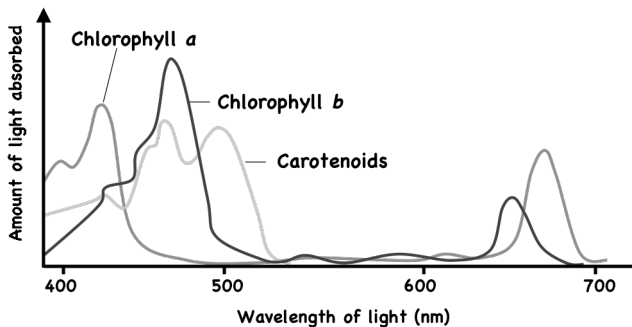
State the wavelengths of light (3.8.2)

Remember: **ROY G. BIV**

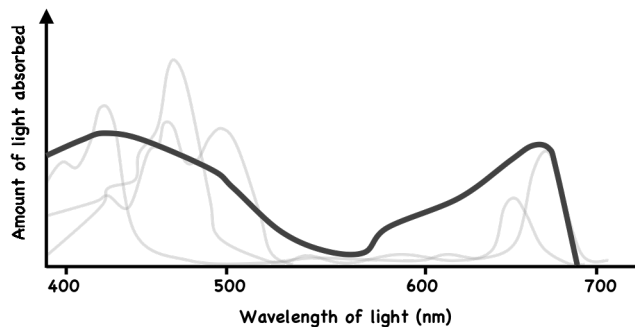
- Light contains a range of wavelengths from short (*blue* $\approx 400\text{nm}$) to long (*red* $\approx 700\text{nm}$)
- In order (*long to short*): **R**ed, **O**range, **Y**ellow, **G**reen, **B**lue, **I**ndigo, **V**iolet

Explain light absorption in green plants (3.8.3 / 3.8.4 / 8.2.7 [HL] / C.4.7 [SL])

- Chlorophyll are the main photosynthetic pigment
- Chloroplast contain many different types of chlorophyll (main one = *chlorophyll a*)
- **Absorption spectrum:** The spectrum of light absorbed by chlorophyll
- **Action spectrum:** The spectrum of light used for photosynthesis



Absorption Spectrum



Action Spectrum

- Plants **absorb red** and **blue** light and **reflect green** light

Outline the two stages of photosynthesis (3.8.5 / 3.8.6)

Light Dependent Reaction:

- Light energy is used to produce ATP and to split water (photolysis) into hydrogen and oxygen

Light Independent Reaction:

- ATP and hydrogen (photolysis of water) are used to fix carbon molecules to make organic compounds

Measuring photosynthesis (3.8.7)

Oxygen Production:

- Formation of air bubbles from submerged plant

CO₂ Uptake:

- pH change in water with submerged plant

Change in Biomass (*indirect*):

- Weight change in a dehydrated plant

Factors affecting rate (3.8.8)

- Temperature
- Light Intensity
- CO₂ concentration

