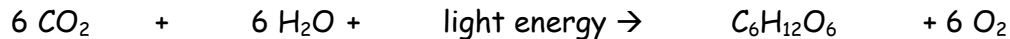


Light Energy and Photosynthetic Pigments

- Chemical equation of photosynthesis:



- This is an overall equation, that consists of three stages
- Stage 1 and 2 involves capturing light energy and using it to make ATP and NADPH (**light reaction**)
- Stage 3 involves using ATP and NADPH to make glucose from CO_2 (**Calvin cycle**)
- See Fig.1 on p. 147

Light

- Photons are packets of light energy that travel through space
- Light is energy made up of various colours each with a distinct wavelength
- The more energetic the photon, the shorter the wavelength (see Fig.3 on p. 148)
- **Pigments** are molecules that can absorb light; in photosynthetic organisms they trap photons from the sun
- Clusters of photosynthetic pigments are called **photosystems**, embedded in the thylakoid membrane of chloroplasts, transferring the energy to ADP, P_i , and NADP^+
- The electrons to reduce NADP^+ are supplied by water molecules

Read p. 149-152

- The absorption spectrum of pigments can be seen in Fig.11 on p. 152

Chlorophyll and Accessory Pigments

- The pigments located in the chloroplast are fat-soluble and include **chlorophylls a, b, c, and d, the carotenoids, and the xanthophylls**
- **Chlorophylls** absorb blue-violet and red wavelengths, and transmit green wavelengths (500nm and 600nm)
- **Carotenoids** absorb blue-violet, and transmit yellow to red wavelengths
- **Chlorophyll a** (bluish-green) is the main pigment involved in photosynthesis, while **chlorophyll b** and carotenoids transfer the energy they absorb to chlorophyll a
- Green plants contain mostly chlorophyll, but in the autumn they stop producing chlorophyll and therefore there are more carotenoids
- **Phycobilins** are other pigments that reflect red and blue wavelengths
- **Chromatography** is a method used to separate out the various pigments based on their solubility
- water soluble pigments can be found in the cell's vacuoles
- these are the **anthocyanins and anthoxanthins**
- the red colour of beets and the yellow colour of poppies are attributed to these pigments