

Biology
Photosynthesis / Respiration
2012 – 2013
#2

- I. How organisms acquire energy
 - A. autotrophs = convert the Sun's energy into food (glucose)
 - B. Heterotrophs = cannot make energy from the Sun – must eat other organisms

- II. Location = chloroplasts are the site where autotrophs convert the Sun's energy into glucose
 - A. grana = stack of thylakoids inside the chloroplast
 - B. thylakoid = “pillow” where the pigments are found
 - C. thylakoid space = area inside the thylakoid
 1. chlorophyll(s) = reflect the green wavelengths
 2. carotenoids = reflect the orange wavelengths
 3. xanthophylls = reflect the yellow wavelengths

- III. Photosynthesis = process where the Sun's energy is converted into chemical energy
 - A. $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{Sunlight} \rightarrow 6\text{CO}_2 + \text{C}_6\text{H}_{12}\text{O}_6$
 - B. Divided into 3 sets of reactions :
 1. **Light reactions** = dependent upon light
 - sunlight is absorbed by photosystem II in a chloroplast
 - a photosystem is an area in the thylakoid membrane that contains pigments
 - sunlight causes an electron (e-) to become “excited”
 - “excited” electron leaves photosystem II

- lost electron is replaced by the splitting of water (oxygen is a waste product, H⁺ is used later)

2. Electron transport chain

- “excited “ electron is passed from molecule to molecule
 - * energy from each “pass” is used to move hydrogen (H⁺) into the thylakoid space
- H⁺ flows back into the thylakoid membrane and makes ATP
 - enzyme ATP synthetase is used to speed up (catalyst) the reaction
- “excited” electron ends up at photosystem I
- photosystem I makes NADPH

3. Dark reactions

- CO₂ + organic molecules + ATP + NADPH → glucose
 - glucose is shipped to the mitochondria (to make ATP)
 - * some glucose is used in the chloroplast to make more organic molecules

Review website : www.khanacademy.org/video/photosynthesis--light-reactions-1?playlist=Biology