Photosynthesis

1. What are the stages of photosynthesis?
    a. Capturing of energy from the sunlight
    b. Using the energy to make ATP and reducing power in the form of a compound called NADPH
    c. Using ATP and NADPH to power the synthesis of organic molecules from CO2 in the air (carbon fixation).
2. What part of a plant carries out photosynthesis?
    a. Chloroplast
3. Describe the three stages of photosynthesis.
    a. The first two are called light dependent reactions because they can not occur without light.
    b. The last does not require light and it occurs as long as there is ATP and NADPH.
4. What is the Calvin cycle?
    a. Also known as light independent reaction, it is the last step of photosynthesis where organic molecules are made from carbon fixation.
5. Summarize the overall reaction of photosynthesis.
    a. 6 carbon dioxides and 12 waters along with light yield glucose 6 waters and 6 oxygens.
6. Describe the contents of a chloroplast.
    a. Internal membrane of chloroplast called thylakoids which are organized into sacs stacked on one another in columns called grana.
    b. These membranes house the photosynthetic pigments for capturing light energy and the machinery to make ATP.
    c. Those membranes are surrounded by semiliquid substance called stroma which contains the enzymes needed to assemble organic molecules from CO2 using ATP and NADPH.
    d. The pigments inside the thylakoid membrane cluster together to make up the photosystem.
7. Describe the transfer of energy occurring inside the thylakoid membranes.
    a. When light hits a pigment, it captures the light energy called photon. This energy passes from one chlorophyll molecule to another.
    b. The energy finally gets to a right cholorophyll molecule touching a membrane bound protein.
    c. Now the energy passes through a series of membrane proteins to put the energy to work to make ATP and NADPH.
8. Explain the overall reaction of photosynthesis in detail.
    a. The water used here splits to give us the free oxygen.
    b. The light dependent reactions use the energy of light to reduce NADP (an electron carrier molecule) to NADPH and make ATP.
    c. The H from the splitting of water is used to convert CO2 into organic matter in the process called carbon fixation.
    d. The reducing power supplies high energy electron from NADPH to replace the low energy electrons in the C-O bonds of carbon dioxide.

    e. These high energy electrons from the C-H bonds of the newly synthesized organic molecules.
9. What is the relationship between the energy content of a photon and the wavelength of the light?
    a. Inversely proportional…
        i. Short wavelength of light contain photons of higher energy.
10. What does the absorbance of the energy of light by electron depend on?
    a. Depends on the amount of energy carried by the photon.
11. What are the two pigments that are responsible for the absorption of light?
    a. Chlorophyll
        i. Type a – Primary photosynthetic pigment
        ii. Type b – secondary photosynthetic pigment that absorbs energy the a cant.
    b. carotenoids – These capture energy from wavelengths of light not absorbed by chlorophyll.
12. Describe the contents of chlorophylls and carotenoids.
    a. Chlorophylls – contain ring structure called porphyrin ring with alternating single and double bonds.
    b. Carotenoids – consist of carbon rings linked to chains with alternating single and double bonds. Note that beta carotene is a typical carotenoid.
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