

## Photosynthesis Concept Questions

1. Explain why almost all organisms depend on photosynthesis to satisfy their energy needs.
2. Photosynthesis can be thought of as a process that converts the energy in sunlight to glucose. Describe the three energy conversions that occur during photosynthesis.
3. Describe the relationship between the processes of photosynthesis and cellular respiration.
4. Identify where each of the reactants in photosynthesis comes from and where the products are produced.
5. Explain the cause of the change of color of leaves in the fall.
6. The Calvin cycle requires ATP and NADPH, products of the light reactions. A student in the class claims that the light reactions do not depend on the Calvin cycle and, with continual light, could continue producing ATP and NADPH. Provide reasoning to support or refute the claim.
7. Identify the *exact* locations of chlorophyll and the ETC.
8. Describe the events of the light reactions.
9. Identify the molecule in photosynthesis that is similar in function to NADH.
10. Describe the purpose of the electron transport chain in photosynthesis.
11. Explain how the electrons accepted by the ETC become high energy.
12. Electrons from the photosystems are used to reduce CO<sub>2</sub>. Explain why the photosystems never “run out” of electrons.
13. In an experiment, isolated chloroplasts are placed in an illuminated solution with the chemicals required to carry out ATP synthesis. Predict what would happen to the rate of photosynthesis if a compound is added to the solution that makes the membranes freely permeable to hydrogen ions.
14. Explain why the ATP produced in the chloroplasts is not available to the plant cell for cell work.
15. When plants photosynthesize, they always make more glucose than they require for energy. Propose a reason for plants doing this.
16. Explain how the products of the light reaction are used to reduce CO<sub>2</sub> in the Calvin cycle to form PGAL and describe what happens to this PGAL.
17. Describe the function of the Calvin cycle.
18. Identify the immediate energy source for the Calvin cycle.
19. An experiment is designed to divert all the G3P (PGAL) produced during photosynthesis in a green plant. Predict the effect on the plant.
20. A solution of chlorophyll, carbon dioxide, and water is placed in a beaker and illuminated with light of sufficient intensity to support photosynthesis. Predict whether the mixture will produce

sugar. Provide reasoning for your prediction.