

CHAPTER 8.3—8.5: Photosynthesis—Dark Reactions and More

1. What happens during carbon fixation?

2. List the materials the plant uses during the Calvin cycle and the source of the materials.

3. The products of the Calvin cycle are:

4. How did they determine the roles of oxygen gas and carbon dioxide in the Calvin Cycle?

5. What environmental and internal challenges have forced both C4 and CAM plants to evolve alternatives to the photosynthesis system used by other plants?

6. Why do high oxygen levels inhibit photosynthesis?

7. What happens during photorespiration and why is it considered bad for plants?

Name: _____

Note Set 20

8. What evolutionary adaptations to the Calvin cycle are seen in C4 plants like sugar cane?

9. Draw a diagram to show the anatomical adaptations seen in C4 plants to accommodate their variation on the Calvin cycle. Explain how they are different from C3 plants.

10. What evolutionary adaptation to the Calvin cycle is seen in CAM plants like cacti?

END OF CHAPTER 8 MULTIPLE CHOICE

1. In noncyclic photosynthetic electron transport, water is used to
 - A) excite chlorophyll.
 - B) hydrolyze ATP.
 - C) reduce chlorophyll.
 - D) oxidize NADPH.
 - E) synthesize chlorophyll.

2. Which statement about light is true?
 - A) An absorption spectrum is a plot of biological effectiveness versus wavelength.
 - B) An absorption spectrum may be a good means of identifying a pigment.
 - C) Light need not be absorbed to produce a biological effect.
 - D) A given kind of molecule can occupy any energy level.
 - E) A pigment loses energy as it absorbs a photon.

3. Which statement about chlorophylls is not true?
 - A) Chlorophylls absorb light near both ends of the visible spectrum.
 - B) Chlorophylls can accept energy from other pigments, such as carotenoids.
 - C) Excited chlorophyll can either reduce another substance or fluoresce.
 - D) Excited chlorophyll may be an oxidizing agent.
 - E) Chlorophylls contain magnesium.

4. In cyclic electron transport,
 - A) oxygen gas is released.
 - B) ATP is formed.
 - C) water donates electrons and protons.
 - D) NADPH + H⁺ forms.
 - E) CO₂ reacts with RuBP.

5. Which of the following does not happen in noncyclic electron transport?
 - A) Oxygen gas is released.
 - B) ATP forms.
 - C) Water donates electrons and protons.
 - D) NADPH + H⁺ forms.
 - E) CO₂ reacts with RuBP.

6. In the chloroplasts,
- A) light leads to the pumping of protons out of the thylakoids.
 - B) ATP forms when protons are pumped into the thylakoids.
 - C) light causes the stroma to become more acidic than the thylakoids.
 - D) protons return passively to the stroma through protein channels.
 - E) proton pumping requires ATP.
7. Which statement about the Calvin cycle is not true?
- A) CO_2 reacts with RuBP to form 3PG.
 - B) RuBP forms by the metabolism of 3PG.
 - C) ATP and $\text{NADPH} + \text{H}^+$ form when 3PG is reduced.
 - D) The concentration of 3PG rises if the light is switched off.
 - E) Rubisco catalyzes the reaction of CO_2 and RuBP.
8. In C_4 photosynthesis,
- A) 3PG is the first product of CO_2 fixation.
 - B) rubisco catalyzes the first step in the pathway.
 - C) 4-carbon acids are formed by PEP carboxylase in bundle sheath cells.
 - D) photosynthesis continues at lower CO_2 levels than in C_3 plants.
 - E) CO_2 released from RuBP is transferred to PEP.
9. Photosynthesis in green plants occurs only during the day. Respiration in plants occurs
- A) only at night.
 - B) only when there is enough ATP.
 - C) only during the day.
 - D) all the time.
 - E) in the chloroplast after photosynthesis.
10. Photorespiration
- A) takes place only in C_4 plants.
 - B) includes reactions carried out in peroxisomes.
 - C) increases the yield of photosynthesis.
 - D) is catalyzed by PEP carboxylase.
 - E) is independent of light intensity.