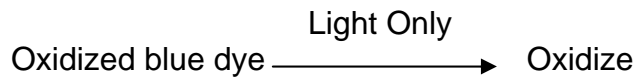
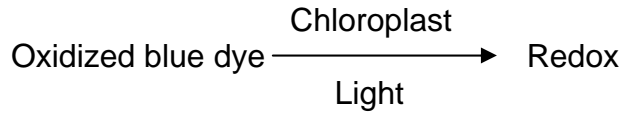


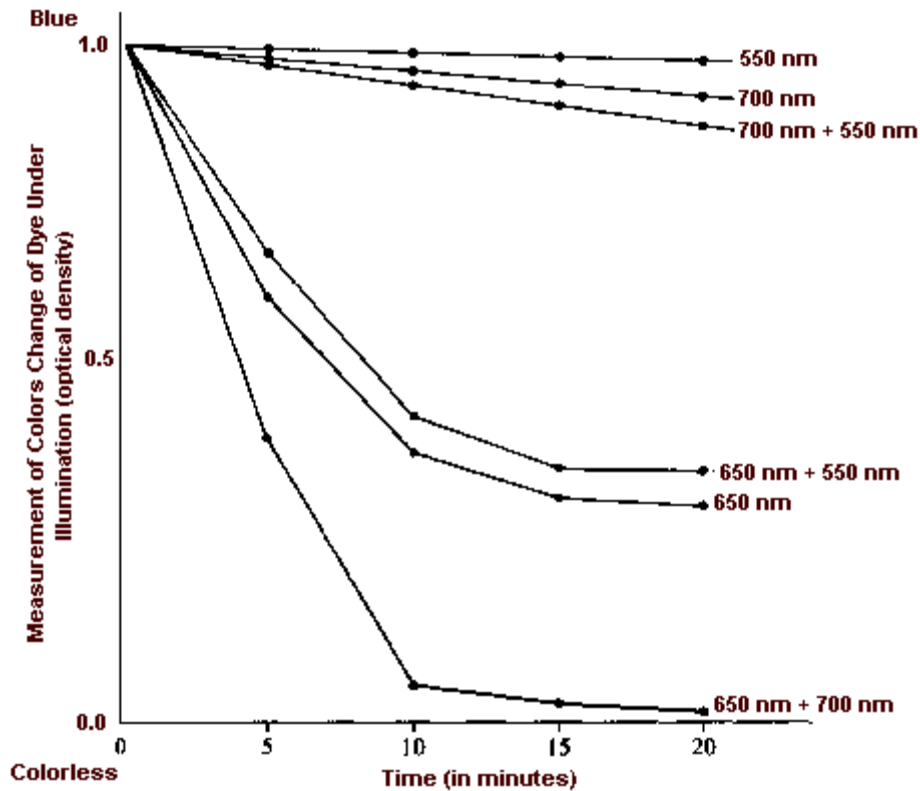
Lab 4: Photosynthesis Multiple Choice Questions

Questions 1-2

Intact chloroplasts are isolated from blended spinach leaves by low-speed centrifugation and are suspended in a cold, protective buffer. If these chilled chloroplasts are illuminated in the presence of an oxidized colored dye, one may observe the reduction of the dye as the dye loses its color.



An experiment is set up to determine the optimal reduction potential of the chloroplasts under different wavelengths of light energy. The chloroplast suspensions are individually or simultaneously exposed to the following wavelengths of light by the use of special filters: 550 nanometers (green), 650 nanometers (red), and 700 nanometers (far-red). All exposures are at the same light intensity. The data are given below.



1. According to these data, which of the wavelengths of light energy provides the LEAST energy potential for photosynthesis?

- (A) 550 nm only
- (B) 650 nm only
- (C) 700 nm only
- (D) 550 nm and 650 nm
- (E) 650 nm and 700 nm

(1986 #100)

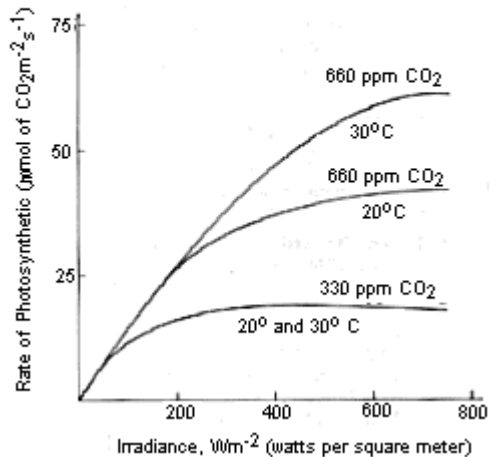
2. The greatest reduction of the blue dye by two different wavelengths of light suggests which of the following?

- (A) There are two pigment systems present within the same chloroplast, both absorbing at the same wavelength.
- (B) There are at least two pigment systems with different absorption spectra present within the same chloroplast.
- (C) Different portions of the plant (stems, leaves, etc.) absorb light from different wavelengths.
- (D) Both red and far-red light are transmitted by chloroplast.
- (E) Most photosynthesis occurs in green light.

(1986 #101)

For questions 3-5 use the information below

The graph below shows the relationship of photosynthetic rate and irradiance (light intensity) as it is influenced by both temperature and carbon dioxide level



3. According to the graph, the greatest rate of photosynthesis occurs when CO_2 is present at

- (A) high concentrations
- (B) low concentrations
- (C) high concentrations and low irradiance levels
- (D) low concentrations and high irradiance levels
- (E) high concentrations and high irradiance levels

(1986 #106)

4. From the data in the graph, which of the following conclusions is most reasonable?
- (A) The rate of photosynthesis is inversely proportional to light intensity.
 - (B) The rate of photosynthesis at 660 ppm CO₂ is more dependent on temperature than the rate at 330 ppm CO₂.
 - (C) There is no theoretical maximum for the rate of photosynthesis.
 - (D) Attempts to increase the photosynthetic yield in field crops should involve the lowering of CO₂ levels.
 - (E) Photosynthesis is unaffected by temperature.

(1986 #107)

5. Which of the following seems most likely from the data?
- (A) Light produces heat, which causes increases in the rate of photosynthesis.
 - (B) Light causes the saturation of cytochrome oxidase, which then limits the use of CO₂.
 - (C) The photosynthetic rate could be increased further by decreasing the CO₂ concentration.
 - (D) Increasing irradiance levels above 800 Wm⁻² would have less effect on the rate of photosynthesis than would increasing the CO₂ concentration.
 - (E) The rate of photosynthesis at 25 degrees Celsius and 660 ppm CO₂ would be the same as that observed at 20 degrees Celsius and 660 ppm CO₂.

(1986 #108)

6. The end products of the light-dependent reactions of photosynthesis are
- (A) ADP, H₂O, NADPH₂
 - (B) ADP, PGAL, RuBP (RuDP)
 - (C) ATP, CO₂, H₂O
 - (D) ATP, NADPH₂, O₂
 - (E) CO₂, H⁺, PGAL

(1990 #43)

7. Dichlorophenolindophenol (DPIP) is a blue dye that is decolorized when it is reduced. After being mixed with DPIP, which of the following would show the greatest change in color?

- (A) Isolated chloroplasts in the light
- (B) Isolated chloroplasts in the dark
- (C) Chlorophyll extract in the dark
- (D) Boiled chloroplasts in the light
- (E) Boiled chloroplasts in the dark

(1990 #65)

8. The O₂ released during photosynthesis comes from

- (A) CO₂
- (B) H₂O
- (C) NADPH
- (D) RuBP (RuDP)
- (E) C₆H₁₂O₆

(1994.#33)

9. Which of the following is an important difference between light-dependent and light-independent reactions of photosynthesis?

- (A) The light-dependent reactions occur only during the day; the light-independent reactions occur only during the day.
- (B) The light-dependent reactions occur in the cytoplasm; the light-independent reactions occur in chloroplasts.
- (C) The light-dependent reactions utilize CO₂ and H₂O; the light-independent reactions produce CO₂ and H₂O.
- (D) The light-dependent reactions depend on the presence of both photosystems I and II; the light-independent reactions require only photosystem I.
- (E) The light-dependent reactions produce ATP and NADPH; the light-independent reactions use stored energy in ATP and NADPH.

(1994.#34)

10. Carbohydrate-synthesizing reactions of photosynthesis directly require

- (A) light
- (B) products of the light reactions
- (C) darkness
- (D) O₂ and H₂O
- (E) chlorophyll and CO₂

(1994 #58)

11. In a mesophyll cell of a leaf, the synthesis of ATP occurs in which of the following?

I. Ribosomes II. Mitochondria III. Chloroplasts

- (A) I only
- (B) II only
- (C) III only
- (D) II and III only
- (E) I, II, and III

(1999 #18)

Directions: Each group of questions below consists of five lettered headings followed by a list of numbered phrases or sentences. For each numbered phrase or sentence select the one heading that is most closely related to it and fill in the corresponding oval on the answer sheet. Each heading may be used once, more than once or, not at all in each group.

Questions 12-13

- (A) Glycolysis
- (B) Krebs cycle (citric acid cycle)
- (C) Calvin cycle (light-independent reactions of photosynthesis)
- (D) Light-dependent reactions of photosynthesis
- (E) Chemiosmosis

12. Process in which O_2 is released as a by-product of oxidation-reduction reactions.

(1999 #82)

13. Process in which CO_2 is released as a byproduct of oxidation-reduction reactions.

(1999 #83)

14. Process in which carbon from CO_2 is incorporated into organic molecules

(1999 #84)

15. Process found in both photosynthesis and cellular respiration (1999 #85)

16. Process in which sugar is oxidized to pyruvic acid (1999 #86)