

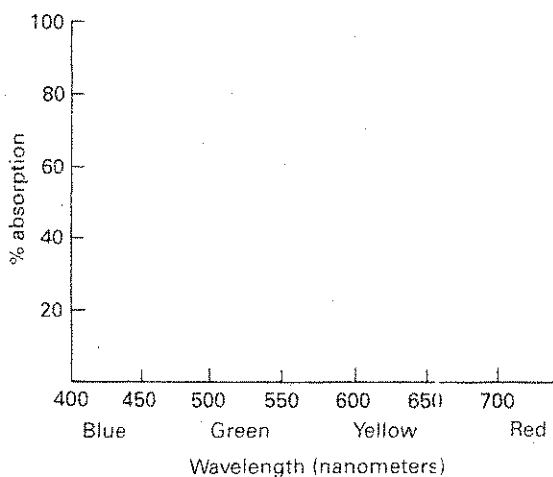
Photosynthesis 1

The Absorption of Light by Pigments

Photosynthesis is the process by which green plants convert the energy of sunlight into chemical energy. This process requires special pigments that have the ability to absorb the energy in light.

Study the chart below that shows the amount and kind of light absorbed by two kinds of chlorophyll common to green plants. Plot these data on the graph on the right. Then answer the questions.

Wavelength	Chlorophyll A % Absorption	Chlorophyll B % Absorption
400 nanometers	30	0
450 nanometers	65	40
500 nanometers	0	85
550 nanometers	0	0
600 nanometers	10	10
650 nanometers	45	25
700 nanometers	10	10



1. Chlorophyll A absorbs the greatest amount of light at a wavelength of _____ nanometers.
2. Chlorophyll B absorbs the greatest amount of light at a wavelength of _____ nanometers.
3. Why do artificial plant-growth lights have a light spectrum that favors the blue and red portions of the spectrum?

4. Using the graph above, explain why the leaves of trees are green in summer.

5. The plant pigment xanthophyll absorbs light in the range of 400 to 550 nanometers and reflects all other light. What colors are tissues that contain only xanthophylls? Why?

ACT Practice: Cell Respiration

PASSAGE III

A scientist wanted to observe the effects of altitude on the respiratory system of mammals. Four different species of mammals were placed in a chamber that underwent gradual changes in pressure (measured in atmospheres, or atm) to simulate the atmosphere at high altitudes. After 5 minutes at each atmospheric pressure tested, the average number of

breaths per minute (*respiratory rate*) was determined for each of the 4 mammals while they remained at rest. The data from the experiment are shown in the following graph. (Note: Larger animals typically have slower respiratory rates. Higher respiratory rates indicate rapid breathing, a sign of distress in some mammals.)

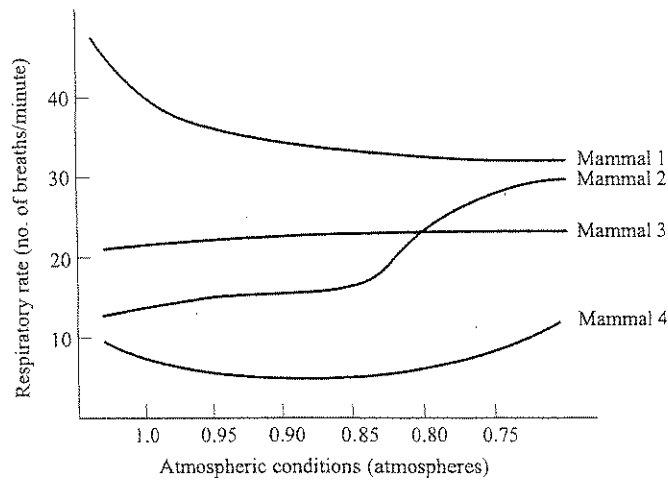


Figure 1

14. What is the general relationship between respiratory rate and atmospheric pressure for Mammal 2?
 - F. Decreases in pressure decrease the respiratory rate.
 - G. Decreases in pressure increase the respiratory rate.
 - H. Pressure changes have no effect on the respiratory rate.
 - J. Increases in pressure increase the respiratory rate.
15. At approximately which pressure, in atmospheres, did Mammals 2 and 3 have the same respiratory rate?
 - A. 1.0
 - B. 0.95
 - C. 0.80
 - D. 0.75
16. Further measurements showed that Mammal 4 used significantly more oxygen per minute than Mammal 2. This would be consistent with the data from the graph if:
 - F. Mammal 4 was in a warmer environment than Mammal 2.
 - G. Mammal 4 was significantly larger than Mammal 2.
 - H. Mammal 2 was significantly larger than Mammal 4.
 - J. Mammals 2 and 4 were the same weight.
17. A higher respiratory rate causes mammals to have a higher metabolic rate. Which of the mammals would have a higher metabolic rate at a pressure of 1.0 atm than at .80 atm?
 - A. 1 only
 - B. 2 only
 - C. 4 only
 - D. 1 and 4 only
18. Based on the data in the graph, which of the mammals might be native to higher-altitude environments (meaning that they are more comfortable at higher altitudes than at lower altitudes)?
 - F. 1 only
 - G. 2 only
 - H. 3 only
 - J. 4 only

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