sec.:____ Name:_____

Experiment: Chloroplast, Chlorophyll & Color

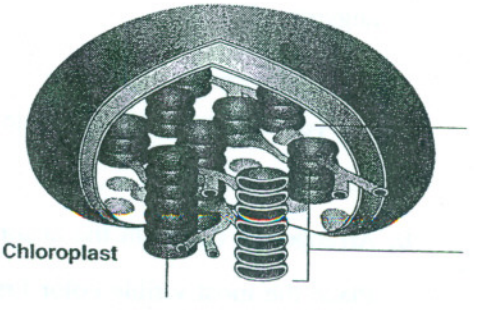
(B. Science 10-8-3a)

Purpose: To understand the relationship between chloroplasts, chlorophyll and color that is needed for photosynthesis.

Materials:
microscope slides of cross section of leaf
prisms slide projector green filter.

Methods:
1. Place the prism in front of the slide projector so that it separates white light into all the colors of the rainbow. Record these colors in order starting with red.
2. Record the acronym to help you remember the colors of white light.
3. Now place a green filter in front of the prism. Record the colors that are transmitted on through and the colors that are absorbed by this filter.
4. Chlorophyll is inside the chloroplasts. Numerous chloroplasts in plants are what makes the plants green. Record the wavelengths of light that chlorophyll transmits and that it absorbs.
5. Obtain a microscope and a microscope slide of the cross section of a leaf. Focus this on low power and draw a simple sketch of the entire cross section of a leaf. You may have to move the slide under the microscope to make the observations of the entire leaf.
6. Now focus the specimen so that one cell is in the center of the field of vision. Now turn the microscope to a higher magnification (43x). Draw a sketch of one of these cells, and label the cell membrane, cell wall, nucleus and chloroplasts.
7. Observe the diagram of a Chloroplast. Label the thylakoid, granum, and stoma.

Results:
1. Colors of white light: _____
2. acronym: _____
3. transmitted: _____ absorbed: _____
4. transmitted: _____ absorbed: _____
5. cross section of leaf 6. cross section of one cell 7. Chloroplast

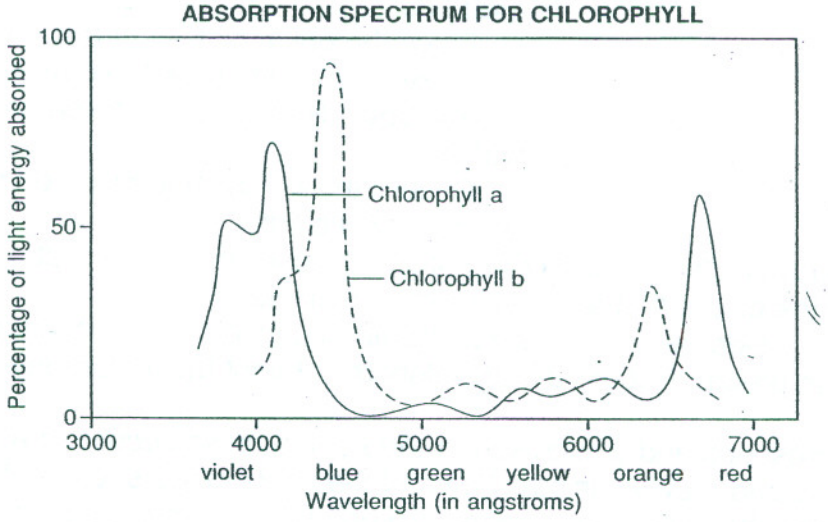


The Absorption of Chlorophyll

Conclusions:

A pigment is a substance that absorbs and reflects light of particular wavelengths. For example, the yellow-green color of a leaf is due to a pigment in the leaf called chlorophyll. When white light (which contains all of the colors of the spectrum) shines on chlorophyll, the chlorophyll absorbs most of the red, orange, blue, and violet and reflects most of the green and yellow. That is why you see a yellow-green color. Think of a pigment as a sponge that soaks up all of the other colors of the spectrum except the one you see.

A spectrophotometer is an instrument that is used to measure the amount of light absorbed by a pigment. Below is a graph showing the percentage of light energy reflected for the absorption spectrum for chlorophyll. The highest peaks represent colors that chlorophyll absorbs the most. Therefore, they are the least visible.



Use the above graph to answer the following questions.

1. Which of the colors absorbed by chlorophyll is least visible? _____
2. What is its approximate wavelength? _____
3. What percentage of light energy absorbed does this peak represent? _____
4. How much of this color is being reflected? _____
5. What percentage of light energy absorbed by chlorophyll does the orange spectrum peak represent? _____
6. Why would you say there are no peaks in the range between 5000 angstroms and 6100 angstroms? _____
7. Are you able to see the light in the yellow-green part of the spectrum? Explain why. _____
8. Arrange the colors in the absorption spectrum of chlorophyll in order of their visibility. Place the most visible color first. _____