Name _____ Date _____

WORKSHEET 7.2
Why Are Plants Green?

Introduction

A pigment is a molecule that absorbs light in the visible portion of the electromagnetic spectrum. The leaves of most plants are rich in pigments. These pigments absorb light and convert it into chemical energy to fuel the production of sugars. The primary photosynthetic pigment is chlorophyll a. Other pigments such as chlorophyll b and carotenoids are referred to as accessory pigments. These absorb light and funnel the energy to chlorophyll a.

Different pigments absorb different types (wavelengths) of light. Some pigments might absorb blue light better than other wavelengths of light, for example. Others may absorb all of the colors well, or none.

A spectrophotometer is a machine used by scientists to measure the absorbance of light by substances. The better a pigment absorbs a color (wavelength) of light, the higher its percent of absorbance reading. The data in the Table 7.1 give possible spectrophotometer absorbance readings for the two plant chlorophylls.

Graphing

Graph the data for chlorophyll a and chlorophyll b on the same graph. The line for each is an approximation of the absorption spectrum for that molecule.

Table 7.1. Data

Wavelength	Chlorophyll a % Absorption	Chlorophyll b % Absorption
400 nanometers	32	8
425 nanometers	60	29
450 nanometers	10	62
475 nanometers	3	51
500 nanometers	0	8
525 nanometers	0	0
550 nanometers	4	3
575 nanometers	2	4
600 nanometers	4	2
625 nanometers	3	20
650 nanometers	21	29
675 nanometers	44	4
700 nanometers	12	0

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Why Are Plants Green?, *Cont'd.*

Analysis

Using information provided by your teacher or other available resources, find the colors of light that correspond to each wavelength in the data table. Some wavelengths may fall in the transition range between two colors. Color code your graph in a way that clearly shows the color range between 400 and 700 nanometers.

1. Based on the data and your graphs, what can you conclude about the two chlorophylls and their absorption spectra? In what ways are the two similar? Different?

2. Chlorophylls are the predominant pigments in leaves. Based on the data and your graph, give a possible explanation for why plants are green.

3. If some wavelengths (colors) of light are absorbed by chlorophylls, what happens to the other wavelengths that are not absorbed? Give any possibilities you can think of.

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Why Are Plants Green?, *Cont'd.*

Background Information

Find out more about how color is created by light and pigments. Use the Internet or resources provided by your teacher.

Follow-Up

1. Explain why leaves are green. Begin your explanation with white light coming from the sun and ending in your eye.

2. Based on the above data and your graph, which type of light is most important to plants for photosynthesis? Explain.

3. Design an experiment to collect evidence that supports your answer for Question 2 above.