

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

The Success of Photosynthesis in Geranium Leaves Using Visible Light Wavelengths Week # \_\_\_\_\_

*Directions: Read, annotate, and complete each section.*

Photosynthesis is the process that plants use to make food. Green plants use pigments located in chloroplasts, to absorb the incoming light for use in the photosynthetic process. The end result of photosynthesis is glucose, which is used as an energy source for the plant.

Color of light is an important factor in photosynthesis. When sunlight is put through a prism, it will separate into a spectrum of different colors. The spectrum is divided into wavelengths measured in nanometers and each color corresponds to a range of nanometers.

In finding which colors affect the rate of photosynthesis, this experiment involves placing black, red, blue, and green filters over equal portions of four leaves and placing them in the sun for one week. The results of the control areas, where light was not filtered, will be compared to the results of the covered areas.

*Draw and label the experimental set up of the four leaves.*



After one week, the leaves were removed from the plant and were placed into separate petri dishes. Water was added to each dish, until the bottom of the dish was covered and the leaves were allowed to soak. The same number of drops of indicator solution, 10, were added to each of the petri dishes. A result of photosynthesis is the presence of glucose, and glucose turns orange in the presence of an indicator solution. A scale from 0 to 5 was created to rate the colors found underneath and outside of the filters. The areas where the least amount of glucose was found were light orange and given the rating of 0, and areas where the most amount of glucose was found were dark orange and given the rating of 5. A rating of 0 indicates the lowest rate of photosynthesis and a rating of 5 indicates the highest rate of photosynthesis. The results of the experiment are provided in Figure 1.

1. (SIN 301) What did the scientist test in this experiment?
  - a. how different types of leaves respond to light
  - b. how the amount of glucose in plants affects photosynthesis
  - c. how the size of a leaf determines the rate of photosynthesis
  - d. how color of light affects photosynthesis
2. (SIN 301) What is the dependent variable in this experiment?
  - a. the amount of glucose produced by leaves
  - b. the size of the leaves after photosynthesis
  - c. the amount of time leaves were left under light
  - d. the amount of water added to petri dishes

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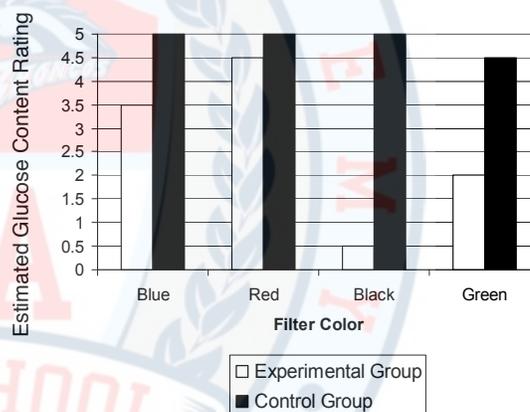
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3. (SIN 301) In the experiment, what was the purpose of the indicator solution?
- a. to indicate the amount of time needed for each leaf to produce glucose
  - b. to indicate what leaf experienced the most change in size
  - c. to indicate the amount of glucose produced in each leaf
  - d. to indicate how much water should be added to the petri dishes
4. (SIN 301) Which of the following did the scientist keep constant, or the same, in all four trials of the experiment?
- a. size of filter, time under light, and amount of glucose
  - b. time under light, size of filter, and drops of indicator solution
  - c. size of filter, drops of indicator solution, and color of light
  - d. amount of glucose and color of light
5. (SIN 403) What was the control group in the experiment?
- a. the leaves without filters
  - b. the leaves with filters
  - c. the portion of leaves without filters
  - d. the portion of leaves with filters

6. (IOD 301) According to Figure 1, what two colors of light resulted in the highest glucose content, suggesting the highest rates of photosynthesis?
- a. black and green
  - b. red and black
  - c. green and blue
  - d. blue and red

The Effect of Filter Color on Production of Glucose



7. (EMI 401) Given that oxygen is a byproduct of photosynthesis, if an oxygen sensor was placed in each of the petri dishes, which experimental group would likely have the least amount of detected oxygen?
- a. blue
  - b. red
  - c. black
  - d. green

Figure 1

8. (IOD 402) According to Figures 1 and 2, what range of wavelengths results in the highest rate of photosynthesis?
- a. 520-565 nm
  - b. 625-740 nm
  - c. 435-500 nm
  - d. 380-435 nm

Color	Wavelength (nm)
Red	625-740
Orange	590-625
Yellow	565-590
Green	520-565
Cyan	500-520
Blue	435-500
Violet	380-435

Figure 2