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

**Regular Photosynthesis Lab - Elodea & Bromothymol Blue**

**Background:**

In this lab, you will investigate the process of photosynthesis. More specifically, you will learn how the amount of light affects photosynthesis. In order to do this, you will use an **Elodea plant**, the chemical **Bromothymol Blue** (which acts as an indicator to show if photosynthesis is occurring). Bromothymol blue works because it is able to detect the presence of **CO2** (needed for photosynthesis) and **O2** (released during photosynthesis) in solution.

In a test tube, you will see that:

* bromothymol blue + CO2 = *green color*
* bromothymol blue + O2 = *blue color*

**Equation:**

Write the equation for photosynthesis.

**Hypotheses:**

*If we place the test tube in the* ***light****, then the bromothymol blue will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tomorrow because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.*

*If we place the test tube in the* ***dark****, then the bromothymol blue will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tomorrow because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.*

**Procedure:**

1. Pour 75 mL of water into a 250 mL beaker.
2. Add 2 mL of bromothymol blue to the water. It should be a blue solution.
3. Using a straw, GENTLY blow into the solution causing it to bubble for approximately 1 minute.
4. Label 3 large test tubes: 1, 2, & 3
	* Tube 1 will be the control (no Elodea)
	* Tube 2 will be the Elodea in the dark
	* Tube 3 will be the Elodea in the light
5. Pour 25 mL of the bromothymol blue + water solution into each of the three test tubes.
6. Cover Tube 1 with aluminum foil (there is no Elodea in Tube 1) and place it in the test tube rack.
7. Add a 7 cm piece of Elodea to Tube 2. Using your straw, GENTLY push the Elodea to the bottom of the test tube. Then cover Tube 2 with tinfoil and place it in the test tube rack.
8. Add a 7 cm piece of Elodea to Tube 3. Using your straw, GENTLY push the Elodea to the bottom of the test tube. Cover the test tube with plastic wrap or a stopper. Then place it in the test tube rack.
9. Place the entire test tube rack under a light source and allow to sit overnight.

**Tube 1 Tube 2 Tube 3**

**No Elodea Elodea Elodea**

**+ + +**

**Covered in tinfoil Covered in tinfoil In the light**

**Pre-Lab Questions:**

Predict what will happen to the color of the solution when you blow into the straw (causing the bromothymol blue + water solution to bubble). Explain your prediction.

*The color of the solution will turn \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.*

Predict what color Tube 1 will be after the experiment. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Predict what color Tube 2 will be after the experiment. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Predict what color Tube 3 will be after the experiment. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Results:** Record your results in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Sample** | **No Elodea +****Tinfoil (Control)** | **Elodea +****Tinfoil** | **Elodea +****Light** |
| **Color Before Experiment** |  |  |  |
| **Color After Experiment** |  |  |  |

**Post-Lab Analysis:**

What color does the bromothymol blue solution turn after you exhale into it? Explain your answer.

*The bromothymol blue turns \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ after you exhale into it because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.*

What happened to the color in Test Tube 1? Explain why you obtained the results that you did.

*The bromothymol blue turned \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.*

7. What happened to the color in Test Tube 2? Explain why you obtained the results that you did.

 *The bromothymol blue turned \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.*

8. What happened to the color in Test Tube 3? Explain why you obtained the results that you did.

 *The bromothymol blue turned \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.*

What is the purpose of the control? *The purpose of the control is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.*

Compare the Elodea in the dark to the Elodea in the light. How do you account for any differences in color? There are differences between the Elodea in the dark and light because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

What gas (or gases) can bromothymol blue serve as an indicator for? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What gas do you exhale? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What gas do plants give off? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

List three things that a plant needs to undergo photosynthesis.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Write the overall equation for photosynthesis.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_