**Photosynthesis and Carbon Dioxide Consumption Lab**

**Background:**

Photosynthesis is the process by which plants take carbon dioxide from the atmosphere, add water, and use the energy of sunlight to produce sugar. It occurs in the chloroplast, an organelle in plant cells that contains the molecule chlorophyll. Chlorophyll absorbs the energy of sunlight. That light energy is converted to chemical energy through the steps of photosynthesis.

The reactions of photosynthesis can be divided into two major types: light-dependent reactions and light-independent reactions. The light-dependent reactions convert energy from the sun into a form that the chloroplast can then use to make sugar from carbon dioxide; in the process producing oxygen as a waste product. The light-independent reactions use that energy to make glucose from carbon dioxide and water. The reactions of photosynthesis can be divided into two major types: light-dependent reactions and light-independent reactions. The light-dependent reactions convert energy from the sun into a form that the chloroplast can then use to make sugar from carbon dioxide; in the process producing oxygen as a waste product. The light-independent reactions use that energy to make glucose from carbon dioxide and water.

In this lab, you will use bromothymol blue as an indicator to show how much CO2 is left in test tubes containing plants and exposed to light. A small piece of elodea will be introduced to a solution containing bromothymol blue and CO2. The point is to determine whether the elodea will have an effect on CO2 levels.

**Materials List:**

Test tubes (4), test tube rack, 10cm *Elodea*, 25ml bromothymol blue (BTB), masking tape, 250 Erlenmeyer flask, scissors, marker, 10ml graduated cylinder, a straw, and a large container of water.

**Safety Precautions:**

Handle glassware with care. Wear goggles during step 3, when you blow into the beaker.

**Procedure:**

*Please carefully read the entire lab before starting and make a hypothesis before starting the lab. Also, please remember to raise your hand and ask questions if you do not understand any part of the lab.*

Write a hypothesis about what will happen to CO2 levels in a solution if an aquatic plant is photosynthesizing.

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**Steps:**

1. Using piece of masking tape, label the four test tubes: Control, 1.25cm Elodea, 4cm Elodea, and 4cm Dark.
2. Measure 25ml of BTB solution into a 100 ml beaker.
3. **WEARING GOGGLES**, gently bubble one lungful of air through the straw into the beaker. (The liquid should turn a greenish color.)
4. Fill the test tubes half-full with the greenish BTB solution, leaving space for your plant.
5. The test tube marked Control is sealed with masking tape. (No plant is added.)
6. To the other test tubes, add the designated length of elodea, gently pushing each down into the solution with the straw.
7. Wrap the 4cm Dark test tube in aluminum foil, so that no light gets in.
8. Place test tubes in rack and place the rack behind a 500ml beaker full of water in front of the light source.
9. After a half hour view the colors of the test tubes and record your results in the chart on the back.

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| **Test Tube** | **Observations:** |
| Control |  |
| 1.25cm  Elodea |  |
| 4cm  Elodea |  |
| 4cm Dark |  |

**Questions:**

*Please answer the following questions using full sentences.*

1. Did the plants alter the level of CO2 in the test tubes? What is the relationship between the size of the plant and the difference in C02 levels?

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2. Why did you initially blow into the solution to turn it green?

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3. What was the control? What is the purpose of the control?

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4. Compare the 4cm dark to the 4cm in the light test tube. How do you account for any differences in color?

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5. Why was it important to place a large beaker of water between the test tubes and the light source? What variable would be added if this step was not done?

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6. Do you support or reject your hypothesis? What qualitative data did you use to come to your conclusion?

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7. Write out the equation for photosynthesis, identify the reactants and products, and briefly describe the process.

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