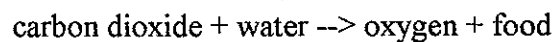


## Honors Biology Lab: Measuring the Rate of Photosynthesis

### Photosynthesis

Green plants have a food-making process called photosynthesis. Photosynthesis means putting together with light. Your plant needs light, carbon dioxide and water to show that photosynthesis has happened. Green plants use energy from light to combine carbon dioxide and water to make food. Our food comes from the energy-converting activity in green plants. Green pigments called chlorophyll absorb the light used in photosynthesis. Chlorophyll is in small bodies called chloroplasts, that are in plant leaves. In chloroplasts, light energy splits water molecules into hydrogen and oxygen atoms. Then in complicated steps, hydrogen atoms combine with carbon dioxide from air to make sugar and oxygen. Photosynthesis produces chemical energy in the form of sugar. Photosynthesis uses the carbon dioxide and water to produce sugar and oxygen.



### Purpose of baking soda:

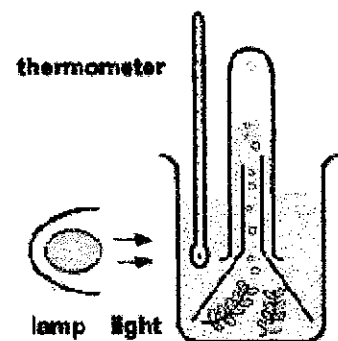
Plants use carbon dioxide to make food. Since water does not contain very much carbon dioxide, extra carbon dioxide has to be added to the water for this type of experiment to work. Baking soda added to water produces carbon dioxide in the water. For Elodea to produce a lot of oxygen bubbles, a baking soda solution makes it work the best.

### Materials

test tube	40 watt light bulb
glass funnel	100 watt light bulb
2-3 elodea sprigs, 20 cm long	green and red cellophane
600 ml beaker	500 ml of 5% baking soda and water solution
thermometer	

### Procedure: Elodea Setup

1. Add 450 mls. of baking soda and water solution to a beaker.
2. Put two or three sprigs of elodea in the beaker.
3. Place the side end of the funnel over the elodea as shown at right. The end of the funnel with the small opening should be pointing up. The elodea and funnel should be completely under the solution.
4. Fill a test tube with the remaining baking soda and water solution. Place your thumb over the end of the test tube. Turn the test tube upside down, taking care that no air enters. Hold the opening of the test tube under the solution, and place the test tube over the small end of the funnel. Try not to let any solution leak out of the test tube as you do this.
5. Place the elodea setup in a dark cabinet until you are ready to perform the experiment.



**There are 6 parts to this experiment. When you have your light set up, remove the beaker from the cabinet and begin each part.**

**Experiment Part 1**

Place a 40W light bulb 10 cm away from the beaker and count the bubbles released from the elodea for 10 minutes. Note the temperature of the solution. Record your data in the chart.

**Experiment Part 2**

Move the 40W bulb to a distance of 20 cm away from the beaker and count the bubbles released for 10 minutes. Note the temperature of the solution. Record your data in the chart.

**Experiment Part 3**

Change the 40W bulb to a 100W bulb and place it 10 cm away from the beaker. **Make sure you use heat mitts and place the bulb out of the way so you don't burn yourself.** Count the bubbles released from the elodea for 10 minutes. Note the temperature of the solution. Record your data in the chart.

**Experiment Part 4**

Move the 100W bulb to a distance of 20 cm away from the beaker and count the bubbles released for 10 minutes. Note the temperature of the solution. Record your data in the chart.

**Experiment Part 5**

Cover the beaker with a piece of red cellophane. Tape it together so it stays in place. Place the 100W bulb a distance of 10 cm from the beaker. Note the temperature of the solution. Count the bubbles released for 10 minutes. Record your data in the chart.

**Experiment Part 6**

Remove the red cellophane and replace it with green cellophane. Keep the bulb at a distance of 10 cm and count the bubbles released for 10 minutes. Note the temperature of the solution. Record your data in the chart.

Name \_\_\_\_\_

## Measuring the Rate of Photosynthesis Data Sheet

### Data Table

Experiment Part	Size of Bulb (Watts)	Color of beaker	Distance	Temperature (°C)	Oxygen bubbles per time	Oxygen bubbles per minute
1						
2						
3						
4						
5						
6						

### Data Questions

1. Summarize the main steps of photosynthesis.

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2. State the source of the oxygen produced during photosynthesis.

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3. Identify the factors that affect the rate of photosynthesis.

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4. Is a control included in this experiment? If yes, tell what it is. If no, design a control group setup.

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