Photosynthesis Worksheet (colored lights)

Group Number: \_\_\_\_\_\_\_\_\_

Name(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Your group has two copies of this worksheet. Only write on and turn in one sheet. The other copy is just for you to read instructions.

Your teacher will assign a number, either 1, 2, 3, or 4 to your group. Write your group number in the space provided at the top of one worksheet. Write your names on the same worksheet. Your group number will matter in Steps 2a, 3, 4a, and 5c.

1. Send two group members with a straw to prepare a 0.2% sodium bicarbonate solution. They should take the copy of the worksheet without your names on it. The rest of the group should proceed to Step 2.
   1. Measure 200 mL of distilled water into a 250mL beaker.
   2. Weigh 0.4g of sodium bicarbonate.
   3. Use your straw to stir sodium bicarbonate into the water until it is completely dissolved.
   4. Add one drop of dish soap to your beaker.
   5. Gently stir the solution with your straw. Try to dissolve the soap in the solution without creating foam or suds.
   6. Return to your group with the beaker full of sodium bicarbonate solution.
2. Remaining group members prepare a syringe.
   1. Hold your syringe so that you can see the numbers, with 5 at the top and 30 at the bottom. Just below the 30 there is some space above the handles. Write your group number in that space.
   2. Remove the plunger from the syringe.
   3. Use your straw to punch 10 leaf disks as your teacher demonstrated. Try to avoid veins in the leaves. Put the 10 leaf disks in the syringe.
   4. Put the plunger back in the syringe. Taking care not to crush any of the leaf disks, depress the plunger to the 5mL mark.
   5. Your two group members should be back with the sodium bicarbonate solution. Place the tip of your syringe in the beaker and pull back on the plunger to draw liquid into the syringe. The plunger should be between the 15 mL and 20 mL marks.
   6. Be careful not to completely remove the plunger from the syringe. Block the opening of your syringe with your thumb and pull the plunger back to the 30 mL mark. This will create a vacuum in the syringe and draw air out of the leaf disks. Hold the plunger for five seconds and then release it.
   7. Repeat Step 2f until the leaf disks sink in the solution. Show your syringe to your teacher.
3. Group 4 only! Wrap a piece of aluminum foil around your syringe to prevent light from reaching the leaf disks.
4. Place syringes.
   1. When all groups’ syringes are prepared, have one member from each group take the syringe and place it in front of a lamp. Group 1: Red light, Group 2: Green light, Group 3: Blue light, Group 4: White light. (The foil on Group 4’s syringe will prevent light from reaching the inside of the syringe, but to keep all other variables the same, they will still place it in front of a light).
   2. Stand the syringe on its plunger so that the open end is pointing up.
   3. Everyone should agree on a clock and note the time (or set a single timer for 5 minutes).
   4. Turn the lights on.
5. Count floating disks.
   1. Count the number of floating disks in each syringe. Record the numbers in the table below.
   2. Group 4 will have to unwrap their syringe, count, and re-wrap their syringe. Turn off the lamp or move the syringe away from the lamp while the syringe is unwrapped.
   3. Each group should record the number of floating leaf disks for all syringes, not just their own.
   4. While waiting for the next observation, discuss photosynthesis as directed by your teacher.
   5. When the timer rings, reset it for five more minutes and restart it.
   6. Repeat steps a-e until there are a total of 7 observations per syringe. There is no need to reset the timer after it rings at the 30 minute mark.

**Number of floating disks**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Time | Syringe #1 | Syringe #2 | Syringe #3 | Syringe #4 |
| Condition: | Red Light | Green Light | Blue Light | Dark (foil wrapped) |
| 0 minutes |  |  |  |  |
| 5 minutes |  |  |  |  |
| 10 minutes |  |  |  |  |
| 15 minutes |  |  |  |  |
| 20 minutes |  |  |  |  |
| 25 minutes |  |  |  |  |
| 30 minutes |  |  |  |  |

1. Answer these questions, then turn in a single worksheet. (The worksheet you turn in should have your names, a completed chart, and the answers to these questions.)

Which color(s) of light caused the leaf disks to float first?

Which color(s) of light caused the greatest number of leaf disks to float?

Did any leaf disks float in the dark syringe?

Why is the sodium bicarbonate solution important for photosynthesis to occur?