Leaf Disk Investigation

**Question**: What is the effect of carbon dioxide on photosynthesis?

1. Write 1-2 sentences to describe what you know about photosynthesis.

I knew it was how a plant eats. It takes carbon dioxide, sunlight, oxygen, and water to make the glucose (plant food).

1. How did you investigate this research question? (Describe the procedure in 5 or 6 sentences)

We had to label 3 cups water, breath, and baking soda. You had to breathe into the “breath” cup for 60 seconds to add carbon dioxide, add baking soda to the baking soda cup, and keep water plain. Then you added 1-2 drops of soap in each cup. You then took a whole puncher and made 12 leaf disks, put them in a syringe full of water from a certain cup and made a vacumm 3-4 times. Then we went outside and poured the leaf disks in the beaker full of that type of water, and put it in the sun. We recorded our data every minute to see if any start to float.

1. Write your predictions for the leaf disks in each cup.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predictions | | |
| Breath Beaker | Baking Soda Beaker | Water Beaker |
| What will happen to the disks? | I predicted that most of the leaf disks will float. | I predicted that some leaf disks in the baking soda cup will float. | I predicted that none of the leaf disks will float in the water beaker. |
| Why do you think this will happen? | The breath cup had the most carbon dioxide in it because our breath is almost all carbon dioxide. | It’s only some because baking soda only has a little of carbon dioxide. | The water beaker had no carbon dioxide to help start photosynthesis. |

1. As you conduct the investigation, record your data in the following chart. Time 0 is just after you put the disks in the beaker and they have settled at the bottom.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Time  (minutes) | Breath | | Baking Soda | | Water | |
| Number Floating | Number NOT floating | Number Floating | Number NOT floating | Number Floating | Number NOT floating |
| 0 | 0 | 12 | 0 | 12 | 0 | 12 |
| 1 | 0 | 12 | 0 | 12 | 0 | 12 |
| 2 | 0 | 12 | 0 | 12 | 0 | 12 |
| 3 | 0 | 12 | 0 | 12 | 0 | 12 |
| 4 | 0 | 12 | 0 | 12 | 0 | 12 |
| 5 | 0 | 12 | 0 | 12 | 0 | 12 |
| 6 | 0 | 12 | 0 | 12 | 0 | 12 |
| 7 | 0 | 12 | 1 | 11 | 0 | 12 |
| 8 | 0 | 12 | 3 | 9 | 0 | 12 |
| 9 | 2 | 10 | 9 | 3 | 0 | 12 |
| 10 | 3 | 9 | 12 | 0 | 0 | 12 |
| 11 | 4 | 8 | 12 | 0 | 0 | 12 |
| 12 | 7 | 5 | 12 | 0 | 0 | 12 |
| 13 | 9 | 3 | 12 | 0 | 0 | 12 |
| 14 | 11 | 1 | 12 | 0 | 0 | 12 |
| 15 | 12 | 0 | 12 | 0 | 0 | 12 |
| 16 | 12 | 0 | 12 | 0 | 0 | 12 |
| 17 | 12 | 0 | 12 | 0 | 0 | 12 |
| 18 | 12 | 0 | 12 | 0 | 0 | 12 |
| 19 | 12 | 0 | 12 | 0 | 0 | 12 |
| 20 | 12 | 0 | 12 | 0 | 0 | 12 |

1. Use the following chart to describe what you learned from your data.

|  |  |
| --- | --- |
| **What evidence from your leaf-disk experiment helps you answer your research question?** (you may add more rows by pressing the tab key if you have run out of space.) | **Related Science Ideas** (You may have information from the reference readings or even prior experiences that relate to evidence from your experiment.) |
| Example: Bubbles formed around the edges of the leaf disks in the water with the baking soda | Example: The bubbles caused the leaf disks to float because gas is less dense than water. |
| The water cup had no carbon dioxide, and none of the leaves floated | Photosynthesis cannot work without carbon dioxide. |
| The leaf disks got lighter when put in sunlight. | They started photosynthesis when put in sunlight. |
| We had to create a vacuum in the syringe, so the substance could sink into the leaf disks. | Carbon dioxide needs to be inside the leaf for photosynthesis to work. |

1. Write a sentence to answer your research question (this is your claim)  
   Photosynthesis is affected by carbon dioxide greatly, because photosynthesis can’t take place without carbon dioxide present.
2. How did your results compare to your predictions?  
   They were half right. I predicted that the water cup would have no leaves floating ad none did. But, I predicted that the breath had more carbon dioxide and that only some of the leaf disks would float. In reality the baking soda had more carbon dioxide, and the all the leaves floated in both mixtures.
3. What did you learn from the demonstration that helped you understand the leaf disk activity?  
   I learned that carbon dioxide is needed for photosynthesis, and that baking soda has carbon dioxide in it.
4. Were the results of your experiment similar to those of other teams? If so, what could be some factors that account for the differences?  
   Yes. Some of the differences might be accounted for by accidents, or following the instructions.
5. Refer back to the ideas about photosynthesis you wrote in question #1. Do your experimental data provide information that either support or contradict some of your initial ideas about photosynthesis? Please explain.   
   Yes, I actually didn’t think that carbon dioxide was all that important in photosynthesis. But this experiment really opened my eyes to how important carbon dioxide really is.