Comparing rate of photosynthesis Natalie Loo 12A

Aim:

To compare two methods used to measure the rate of photosynthesis

Diagram:

Please see the attached sheet

Results:

Method 1-

Disc	Time taken for each disc to rise/s	Rate/s^{-1}
1	0	0.0000000
2	345	0.0028985
3	346	0.0028901
4	464	0.0021552
5	502	0.0019920
6	540	0.0018519
7	573	0.0017452
8	574	0.0017422
9	579	0.0017271
10	584	0.0017123
11	585	0.0017094
12	624	0.0016026
13	626	0.0015974
14	680	0.0014706
15	680	0.0014706
16	681	0.0014684
17	681	0.0014684
18	700	0.0014286
19	700	0.0014286
20	782	0.0012788

Method 2-

Trail	Column of gas/cm	Time/s	Rate/cm s^{-1}
1	1.60	300	0.0053333
2	1.50	300	0.0050000
3	1.90	300	0.0063333
4	2.00	300	0.0066667
5	1.40	300	0.0046667
Average	1.68	300	0.0056000

Conclusion and Evaluation:

Looking at the results, method 2 seemed to be a better method for measuring photosynthesis, since the average rate in method 2 is higher than the ones being measured in method 1. However, we have to bear in mind that two different types of plants have been used. In method 1 a dry or in other words a land plant was used and in method 2 a water plant was used. The plant type has an effect on the rate of photosynthesis.

Considering the inaccuracy of the techniques, the meniscus might be misread in both methods; the timing for both methods might also be inaccurate. In method 1, the transfer of the discs into the beaker containing 3% sodium bicarbonate solution might not be quick enough. Also, when a number of discs were rising at once, the time recorded for those discs might be slightly inaccurate since I didn't record the results quick enough. To solve these problems, replication of the experiment is needed to increase the accuracy and the reliability of the results. In addition, when the beaker was placed in a well-lit place, the light intensity wasn't constant due to the changing intensity of sunlight. Light intensity is a limiting factor to photosynthesis therefore this might have an effect on the rate. A lamp can be used in replacement because it provides a constant amount of light. Though some of my procedures were inaccurate, this method is quite easy to replicate.

In method 2, I had to ensure that no air bubbles can be present in the microburette and the clip on the rubber tubing also has to be screwed completely tight. This can guarantee the gas column being measured is the volume of gas given off only by the aquatic plant but nothing else. The mouth of the filter funnel can't touch the bottom of the beaker too, or else water can't be circulated around the set up. Moreover, when the gas is drawn into the capillary, sometimes the meniscus can't be observed therefore results might be inaccurate. In order to overcome this difficulty, the clip needs to be entirely unscrewed with caution for the meniscus to travel along the capillary steadily.

Respiration might have some effects on my results of both methods; however, the rate of photosynthesis should have exceeded respiration. In conclusion, there were inaccuracies in both methods but method 2 seemed to be a better method for measuring the rate of photosynthesis.