

Designing an experiment to test the rate of photosynthesis

Control Procedures:

PREPARATION OF THE LEAF DISKS:

- 1) Use the hole puncher to cut out 20 spinach disks.
- 2) Put disks in a syringe and suck up ~5 cc (5 ml) of sodium bicarbonate solution
- 3) Put finger over end of syringe, pull back on plunger and hold this position for 30 seconds.

You should see air coming out the sides of the disks.

As this is done, the **oxygen** is being **removed** from the spongy layer of the leaf and the **sodium bicarbonate** is **entering** the spongy layer.

This is the source of carbon dioxide needed for the plant to carry out photosynthesis

**** **REPEAT several times** ****

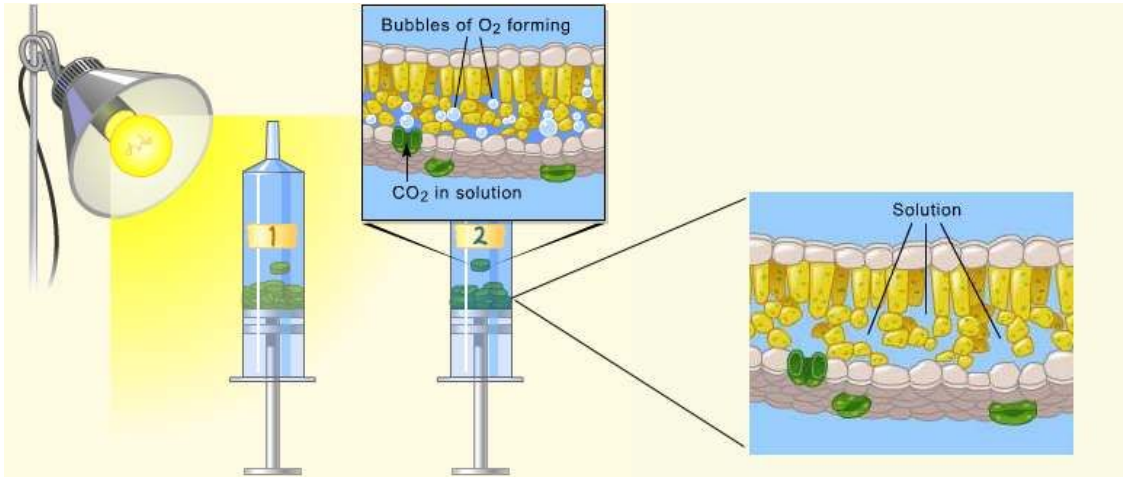
- 4) Check to see if the plant disks sink.
If they don't, REPEAT step 3 again.
- 5) Carefully pour disks and solution into a beaker with bicarbonate solution to a depth of *about* 3 cm. (Use the same depth for each trial)
- 6) Make sure enough disks are available to properly complete a controlled experiment (min. 10).



CONTROL OBSERVATIONS

The disks will **float** when they have produced enough **oxygen** through photosynthesis.

The **time** needed for the disks to float is an **indirect measure** of the **rate** of photosynthesis occurring in the leaf disks. The faster the float, the faster photosynthesis is occurring.



8) Place the beaker 30 cm from the light source.

9) At the end of **each** minute, record the **TOTAL** number of floating disks. Then **gently** swirl the disks to dislodge any that are stuck against the sides of the cup.

10) Continue until all disks are floating or for 10 minutes.

****Note that after a while the disks begin to sink.****

Why? Cellular respiration removes the oxygen from the cell spaces. The rate that the disks sink is an indirect measure of the rate of cellular respiration.