(key)

Photosynthesis Absorption "Lab"

Another method of detecting the rate of photosynthesis involves using the blue dye DPIP and a fancy piece of equipment called a spectrophotometer. We do not have working spectrophotometers and they are very expensive, so we don't do the lab this way. A spectrophotometer shines light through a solution and measures how much of the light is transmitted through. A solution that blocked all light would have a transmittance of 0% while a solution that absorbed no light at all would have a transmittance of 100%.

DPIP is normally blue but when it is reduced it becomes clear. Plant leafs can be disrupted so that the normal electron transport chain is disrupted and passes electrons to DPIP instead.

1. What molecule does DPIP take the place of in normal photosynthesis?

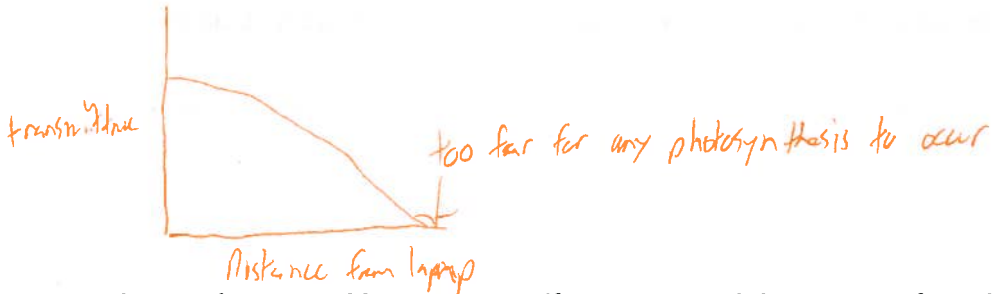
NADP+ (NADPH is reduced form)

2. How can this method be used to determine a rate of photosynthesis?

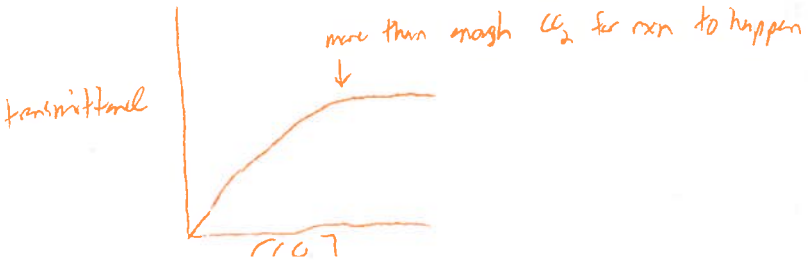
More light rxns = more reduction of DPIP = the solution becoming more clear

3. Would you expect transmittance to increase or decrease for a solution with suspended chloroplasts over time under light? Why? Increase. See above. Rxn should get more and more clear

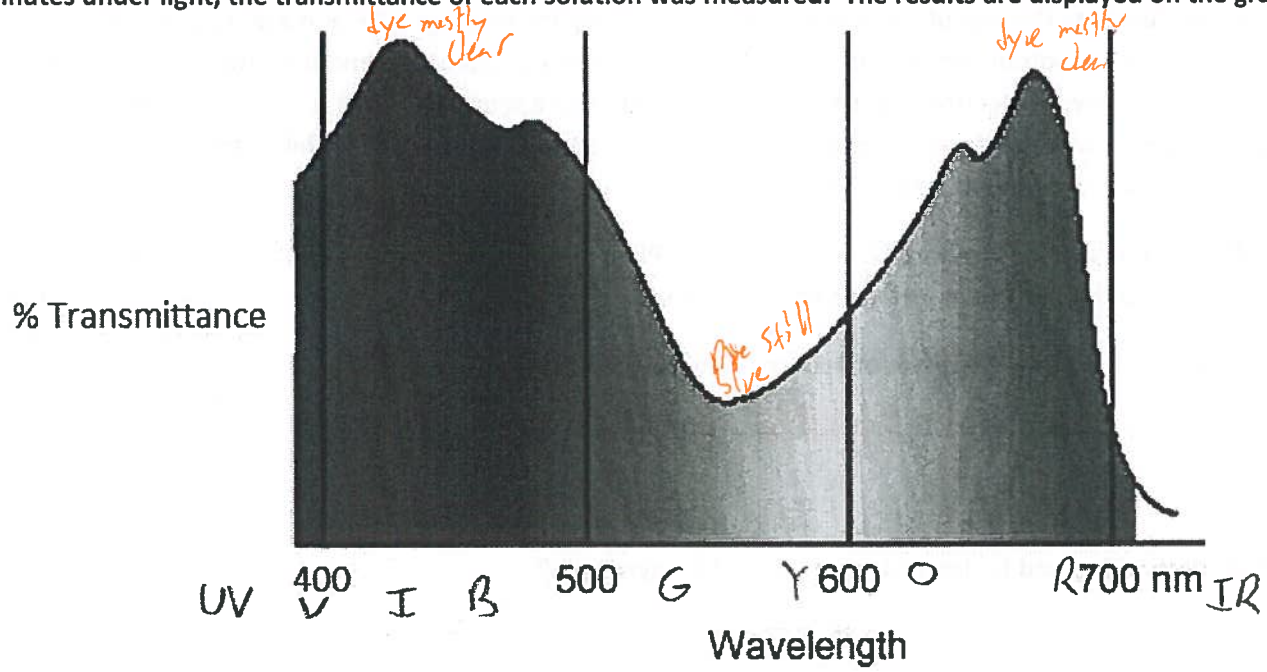
4. Sketch a graph you would expect to produce if you ran trial comparing distance of lamp from chloroplast solutions to transmittance of said solutions after 10 minutes of light



5. Sketch a graph you would expect to see if you compared the amount of CO2 in the solution to the transmittance.



6. An experiment was conducted that involved placing chloroplast solutions under various colors of light. After 10 minutes under light, the transmittance of each solution was measured. The results are displayed on the graph below:



Summarize the results:

Photosynthesis occurs most at Violet/Indigo or orange/red. Little photosynthesis in green light.

7. Based on the data, why does chlorophyll appear green?

Reflecting green light

8. Carotenoids are separate pigments in plants that appear yellow-orangeish. What does this say about the light they absorb?

Absorb non yellow/orange lights. Absorbs violet → green light. Helps plants absorb more energy.

9. From an evolutionary perspective, what are some reasons plants might have evolved to absorb these wavelengths of light? (i.e why not absorb UV light? Infrared light?)

UV light could damage? IR too little energy?

Most sunlight in visible spectrum?

Water filtered light so less green light?