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Biology 1101 LC 62
Lab #10
11/11/19

Photosynthesis

Abstract- For the first experiment, we used chromatography to extract and separate the pigments of a leaf. We pressed spinach with a coin onto the filter paper and put the paper in the chromatography solution. The results of the different colors produced were then recorded. For the second activity, we were trying to find out the role of light in carbohydrate synthesis. There were two parts to this activity, one with a leaf exposed to light and the other with a leaf kept in the dark for 48 hours. After boiling both leaves for 5 minutes (separately), they were kept in hot alcohol for 7 minutes. We then placed the leaves on petri dishes and added iodine to them. If starch was present then the leaf should've turned into a bluish-black color. Last, we used the alcohol which the leaves were kept in to measure the absorbance with a spectrovis.

Introduction-

Photosynthesis is a process that captures solar energy and transforms it into chemical energy. The energy is then stored in a carbohydrate. Photosynthesis takes place in the green pigments of plants. These green pigments are called chlorophyll and they absorb various portions of visible light. Iodine is an indicator for starch. When it is placed on a leaf it may turn into the color brownish-black. Since energy is stored in carbohydrates and photosynthesis occurs in the green pigments of plants, the produced color indicates the presence of starch as well as photosynthesis.

Materials-

- Test tubes
- Penny
- One leaf exposed to light
- One leaf kept in the dark for 48 hours
- One spinach leaf
- Two filter papers
- Paperclip
- Acetone
- Diethyl ether
- Isooctane
- Spirulina

- Spectrovis
- Cuvettes
- Boiling water
- Hot alcohol
- Petri dishes
- Iodine

Procedure (Chromatography)

- 1) Lay a strip of filter paper
- 2) Measure 2 cm on one of the strips from the bottom and place a fresh spinach leaf
- 3) Rub a penny across the leaf to transfer its pigment onto the filter paper
- 4) Attach the strip to a paper clip
- 5) Obtain a test tube and add 2 mL of isooctane, 1 mL of acetone and 1 mL of diethyl ether
- 6) Add the strip in the tube
- 7) Wait until the solvent reaches 2 cm from the top
- 8) Identify the different colors and record results

Data-

Leaf	Color
Spinach	dark green, light green, yellow, and orange.

Analysis Questions-

- 1) How many different pigments separate from the spinach extract ? From spirulina?
 - There were four different colors from the spinach extract; dark green, light green, yellow, and orange.
- 2) Are all the pigments represented between the two extracts?
 - Yes.
- 3) The mobile phase is non polar, what are the properties of each pigment
 - The pigments are polar.

Procedure (Carbohydrate Synthesis)

- 1) Pick a leaf exposed to light
- 2) Keep it in boiling water for 5 minutes

- 3) Place the leaf in hot alcohol for 7 minutes
- 4) Remove the leaf and place it in a petri dish
- 5) Add iodine to the dish
- 6) Indicate whether or not starch is present
- 7) Record your results
- 8) Repeat procedure for the leaf kept in the dark for 48 hours

Data-

	Leaf exposed to light	Leaf kept in dark for 48 hours
Color	Brownish-black	Greenish-white
Presence of starch	Yes	No

Procedure (Measuring absorbance)-

- 1) Set up Spectrovis accordingly
- 2) Insert geranium pigment from the bleaching reaction into a cuvette
- 3) Indicate absorbance
- 4) Record data

Data-

Solution	Absorbance measured
Green	Didn't absorb

Conclusion

In the chromatography activity, the spinach results were of four different colors; dark green, light green, yellow, and orange. As for the activity regarding carbohydrate synthesis, the leaf that was exposed to light abided with that color which proved the presence of starch. Its color was blackish-brown. On the other hand, the leaf kept in the dark for 48 hours didn't change and maintained its original color. This indicates that the light plants are exposed to play a major role in carbohydrate synthesis. For the last experiment, the green solution didn't absorb. Ultimately, each experiment did produce the expected results and the hypothesis was clearly supported.