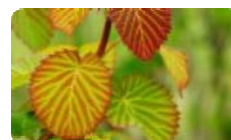


Testing Leaves for Starch

Demonstrating That Light is Dissipated as Chlorophyll a Fluoresces

Introduction:

Leaves come in different shapes, sizes, colors, thicknesses and different types. The plant where the leaf is usually obtained is a geranium.



Photosynthesis happens in the mesophyll cells of leaves. The mesophyll cells contain tiny bodies called chloroplasts, which contain chlorophyll, which is used to catch the light energy needed in photosynthesis. Glucose can be converted into starch and stored. Both starch and sucrose can be turned back into glucose and used in respiration. Most plants store starch. They can turn starch back into glucose when they need it for respiration.



Exp. 1/ Testing Leaves for Starch

Aim of the Experiment:

The aim of the experiment is to see if a green leaf that had been left in the light for 48 hours would have the same amount of starch as a leaf that had no light for 48 hours.

Hypothesis:

The prediction is that both the green leaf that has been in the light will have starch present. The one left in the dark will not have starch present. The leaf will turn brown/black if starch is present.



Equipment:

- Beaker
- Test tube
- Water
- Boiling water
- Ethanol
- Gauze
- White tile
- Iodine solution
- Bunsen burner
- Safety Goggles
- Heatproof mat
- Leaves
 - one that has been in light for 48 hours
 - one that has had no light for 48 hours



Safety procedures:

- Wear goggles
- Keep ethanol away from Bunsen burner; ethanol is flammable

- Tie Hair back

Method:

1. Set up the equipment.
2. Light the bunsen and boil the water. When the water had boiled add the first geranium leaf (the one that had been the light for 48 hours).
3. Wait one minute for the leaf to boil (this is to get rid of the waterproof layer and break the open cells and make it soft).
4. Turn off the Bunsen burner (for safety reasons, we are going to use ethanol), and take out the leaf.
5. Put the leaf in a boiling tube and cover with ethanol.
6. Put the tube of ethanol plus leaf into the beaker of hot water. Ethanol boils at 80° so it should come to boil even though the bunsen is off.
7. Dip it back into the hot water so it can get the ethanol off.
8. Spread the leaf out on a tile. Add about five drops of iodine on to the leaf and observe. After about two minutes the iodine had soaked in.
9. Repeat using a leaf that had been in the dark for 48 hours.

References:

www.wacklepedia.com

Exp.2 / Demonstrating That Light is Dissipated as Chlorophyll a Fluoresces:

Introduction:

When a molecule of chlorophyll a absorbs a photon of light, an electron is excited from the ground state to a higher energy state. In an acetone extract, the light energy is not used in the photochemical processes of photosynthesis. Therefore, electrons are returned to the ground state and results in energy being re-emitted as fluorescent light. This light can be seen in the red region of the spectrum and is generally at higher wavelengths than the absorption maximum of chlorophyll a.

Aim of the Experiment:

-To demonstrate that light is dissipated as chlorophyll a fluorescences. This is depicted as a red ring on the very top of the test tube.

-Fluorescence represents a means by which a molecule dissipates excess energy. It represents excess energy in a molecule releasing light.

Materials:

- Acetone
- Spinach
- Test tube with cap/cover
- Flashlight
- Gloves
- Sand

Procedure:

Preparation of spinach:

- The solution should be stored in a tightly capped bottle.
 - To prepare a saturated solution of spinach, add 50 ml acetone or nail polish remover in a fairly large test tube to 5 leaves of spinach (as needed) and 1 tablespoon of sand (if available). Mix well and allow the solution to chill in the freezer overnight.
 - A dark free liquid on the top of the test tube indicates that the chlorophyll is successfully extracted from the membrane of the chloroplast.
1. Remove test tube of solution from the refrigerator (very carefully).
 2. Turn the lights off. Room should be dark to get the full effect!!!
 3. While one student is holding the test tube of saturated spinach another should turn the flashlight on directly towards the test tube.

4. Observe. The spinach/acetone solution will have a red ring on the top of the solution, indicating that the molecule of chlorophyll absorbs light and then sends the ray of light seen as the red ring.

Note: Fluorescent light is not used in the process of photosynthesis and therefore to prevent it from accumulating, a photon is emitted (not absorbed).

References:

www.books.nap.edu

Result Sheet