The National Orthodox School Shmaisani

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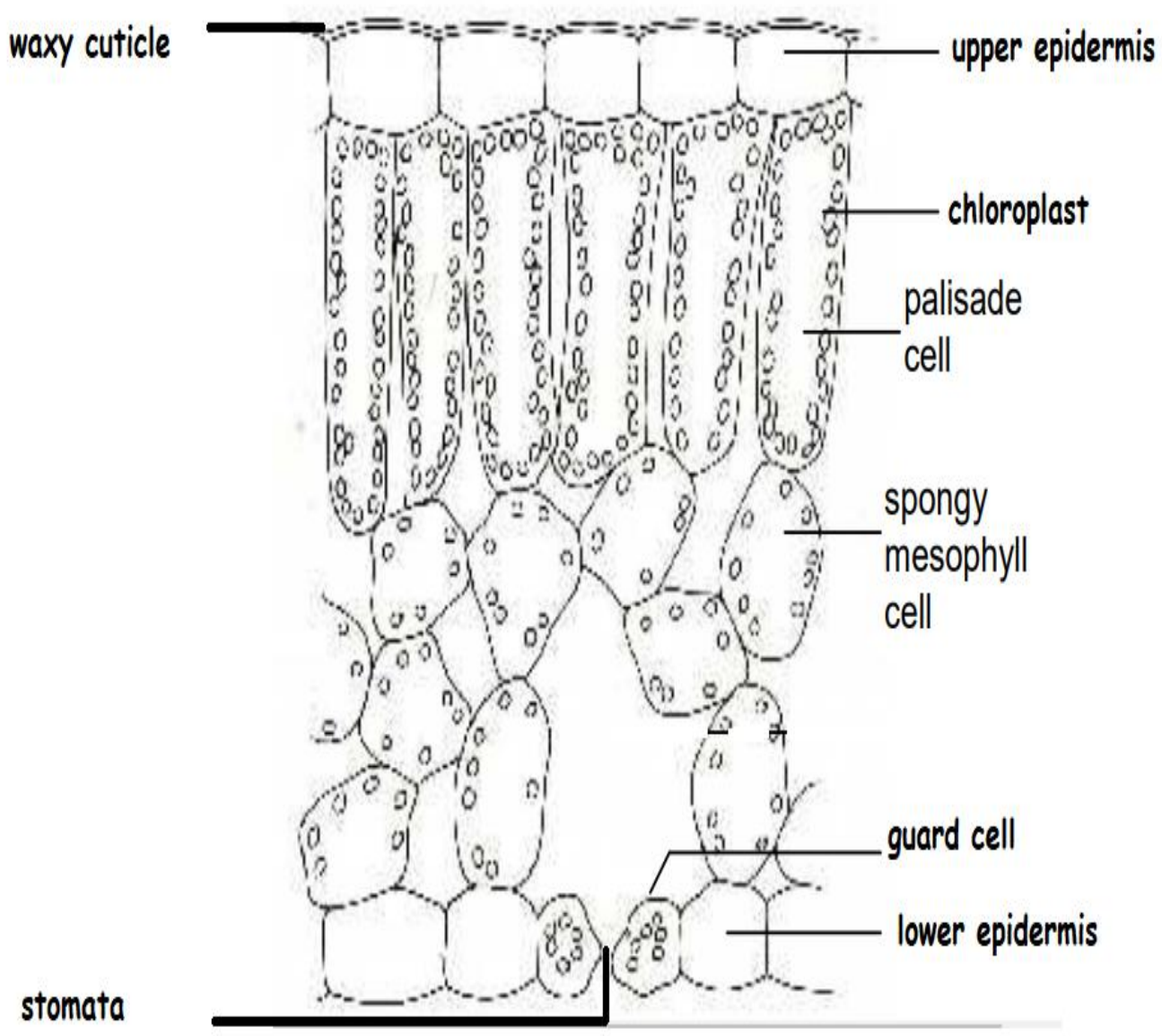
Subject: science ***Answer key***

Name: **Investigating Photosynthesis**

Date: **Grade-Section**: Grade 8

Objective: Investigating the process of photosynthesis

Part 1 : Leaf structure



Part 2 :

A. Testing for starch in leaves :

Objective : to detect the presence of starch in leaves

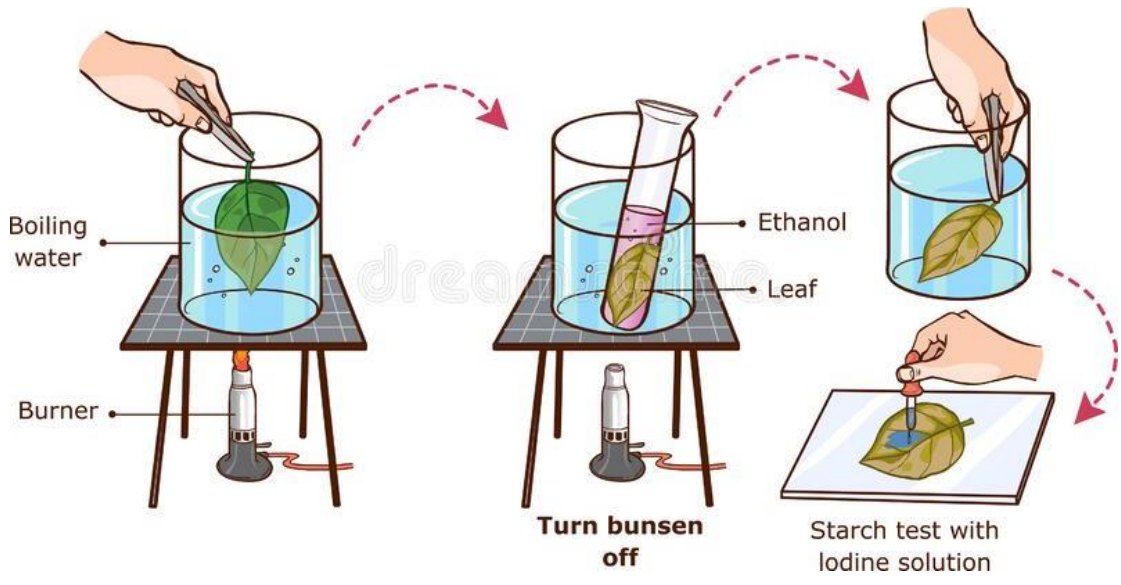
Iodine solution is used to test leaves for the presence of starch , before we start we must have a de-starched plant.

De -starching a plant

A plant can be 'de-starched' by leaving it in the dark for 2 to 3 days , **in dark the plant uses all the starch by respiration** .

Steps :

1. Heat a plant leaf in boiling water for 30 seconds to soften the cell wall .
2. Then heat it in boiling **ethanol** for a few minutes (this removes most of its colour)
3. Wash with water and spread onto a white tile.
4. Add iodine solution from a dropping pipette.



After a few minutes, the parts of the leaf that contain starch turn blue-black.

Note : Ethanol is heated using a hot water bath because it boils at 78°C,this is safer than using a Bunsen burner because ethanol is **flammable**.

- **Leaves** have green parts (where the cells contain chlorophyll) and white parts (where there is no chlorophyll).

Only the parts that were green become blue-black with iodine solution, showing the importance of chlorophyll in photosynthesis.

B. Production of Oxygen in photosynthesis :

Objective : to observe the production of oxygen bubbles using underwater plants .

Steps :

1. Place water plant in a beaker containing pond water.

2 . Cover the plant with short stemmed funnel.

3. Invert the test tube full of water and cover the stem of the funnel.

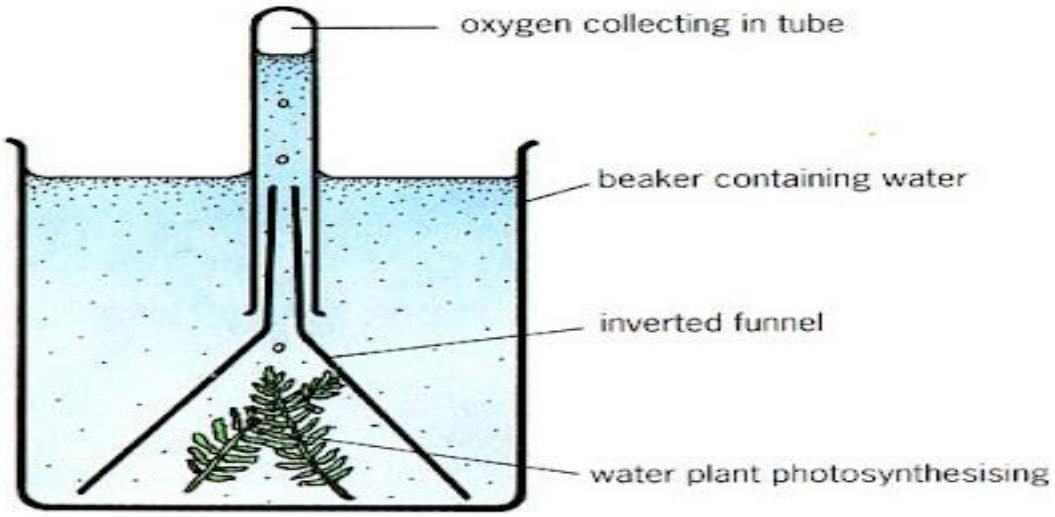
4. While placing the test tube, ensure that the level of the water in beaker is above the level of stem of funnel.

5. Expose the apparatus to the sunlight.

6. After few hours, gas bubbles will form and collect in the test tube.

7. Test the gas in the test tube.

8. A **glowing splinter** bursts into the flame shows the presence of oxygen.



Question : describe the effect of increasing the light intensity on the number of bubbles produced during photosynthesis .

As the light intensity increases the rate of photosynthesis increases so the number of oxygen bubbles will increase.

Part 3 :
Lab report : The importance of carbon dioxide in photosynthesis

Objective : To investigate the importance of carbon dioxide in photosynthesis.

1) Writing a fully focused research question

What is the effect of the presence of carbon dioxide on glucose production in photosynthesis?

2) Hypothesis: ***Outline a hypothesis to predict the outcome of the experiment and explain it using logical scientific reasoning (what do you think is going to happen).***

If sodium hydrogen carbonate is used it will add carbon dioxide into the air which will be used by the plants to produce glucose by photosynthesis.

If soda lime is used it will absorb carbon dioxide from the air and the plants cannot produce glucose by photosynthesis.

3) Scientific explanation for hypothesis ***(This is the explanation to the previous hypothesis.*** **Why do you think that your hypothesis is correct? Explain it in detail with reasons and causes.**

- **Plants use sunlight and carbon dioxide present in air to produce food .**
- **Food produced is in the form of starch**
- **Starch can be tested chemically using Iodine solution – it turns starch blue black.**

4) Manipulating the variables:

Controlled Variable	How will you keep this controlled? Stating the values and the equipment that you will be using	How could it affect your results if not controlled?
plants	De- starched identical plants	The results will be different
water	Measuring cylinder	The results will be different
sun (put the plants in the same place)	(put the plants in the same place) Under the sun	Plants cannot produce glucose in dark .

5) Materials and Method:

- State your materials

1. 2 potted identical plants .
2. 2 plastic bags .
3. Sodium hydrogen carbonate solution .
4. Soda lime.
5. Water

- Method : What are the steps of the investigation?

1. De- starch 2 plants (this step was done for you)
2. Tie a clear bag containing soda lime, around the plant.
3. Tie a clear bag containing sodium hydrogen carbonate around the other plant.
4. Place the plants in bright light for several hours.
5. Test the leaves of both plants for starch using iodine

6) Observation :

Draw a diagram to show your observation :

7) Result :

The leaf of the plant with sodium hydrogen carbonate will turn blue black when we test for starch .

8) Conclusion :

Plants need carbon dioxide for photosynthesis

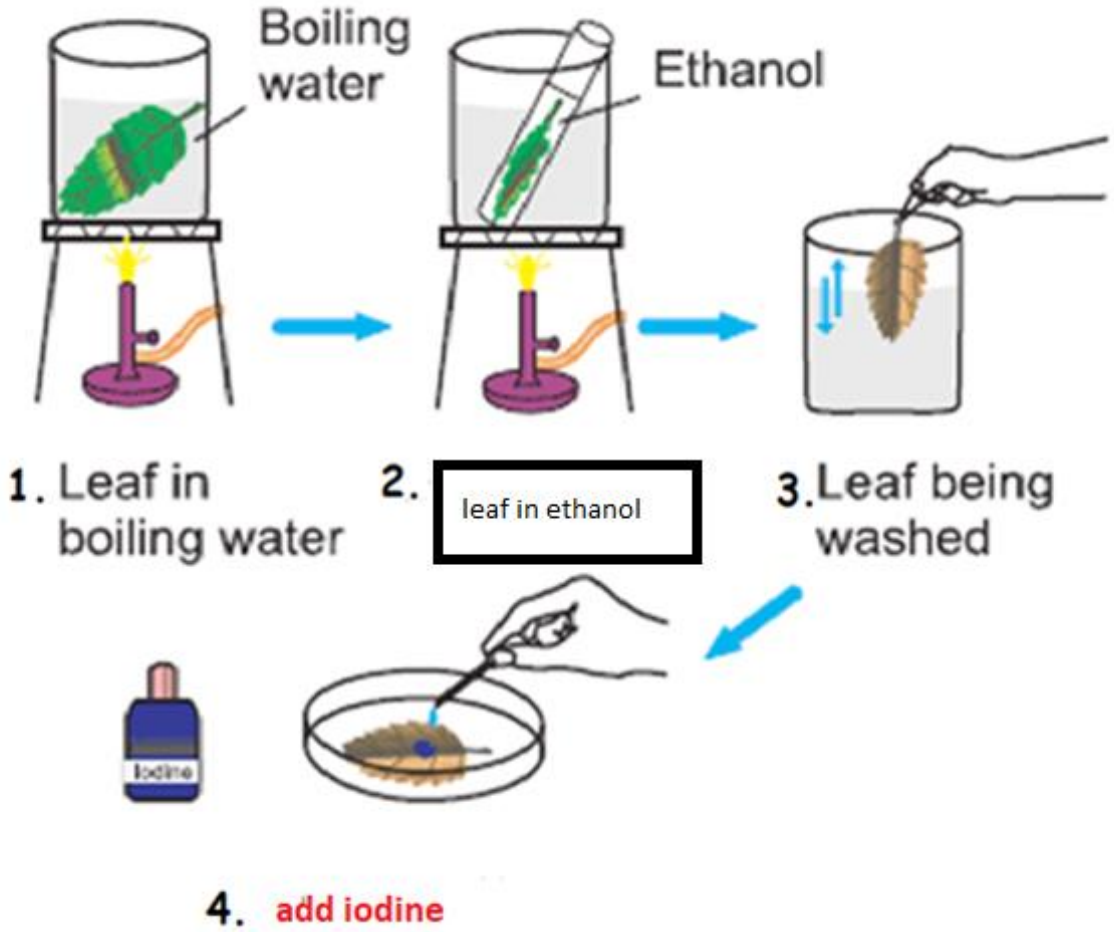
Sodium hydrogen carbonate releases carbon dioxide that is needed for the process of photosynthesis .

Part 4 :

Check your understanding :

Question 1:

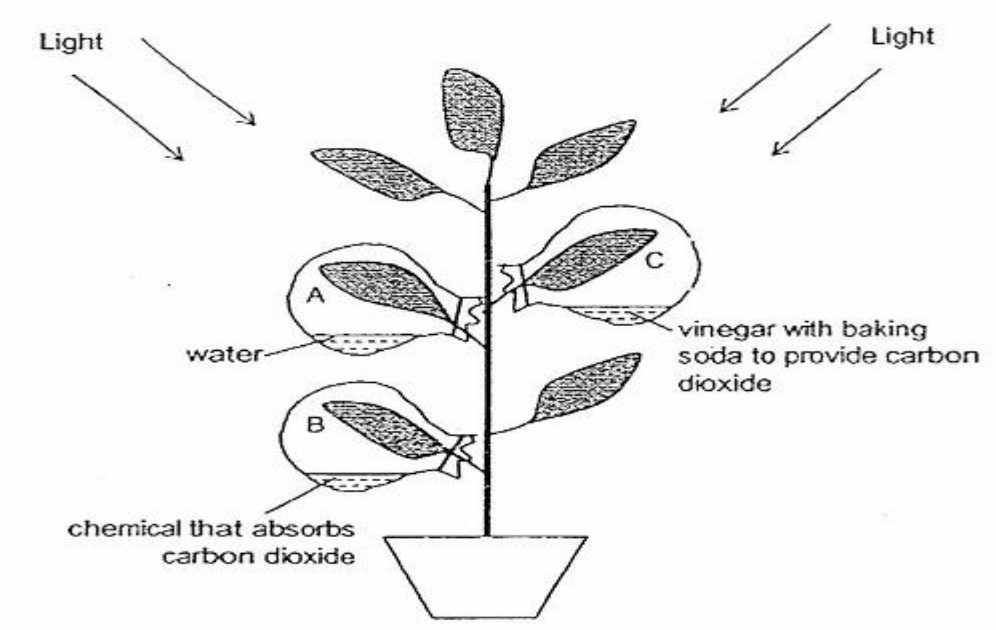
Describe the steps 2 and 4 to detect the presence of starch in leaves :



Question 2 :

Carbon dioxide is needed for photosynthesis

Use the diagram below to answer the following questions .

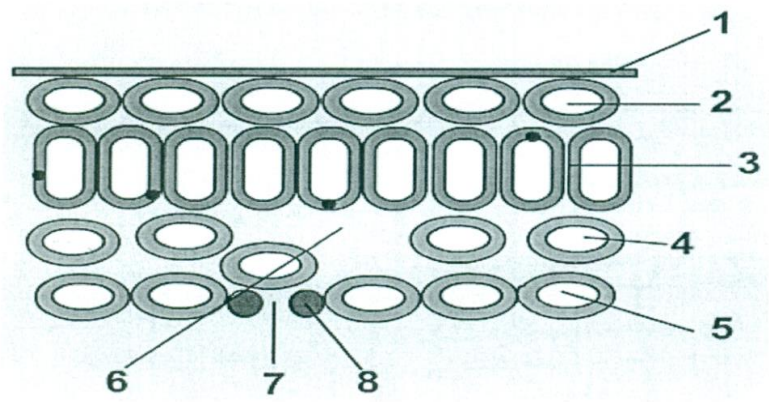


1. Vinegar with baking soda is used to produce carbon dioxide
2. Leaves can make photosynthesis because they have chloroplasts

3. In photosynthesis plants need water ,carbon dioxide and produce starch and oxygen in the presence of light.
4. Which leaf A,B or C will turn blue black when iodine is added. C

Question 3 :

1. The figure below shows a cross section in a leaf .



- Name the following parts :
  2: Upper epidermis
  4: Spongy mesophyll
  8: Guard cells

- What is the function of part 3 ? Most photosynthesis takes place in this part (it absorbs light)

- Photosynthesis is an important process in plants .

  a. Write the word equation of photosynthesis.