



# PERL EDUCATION

PRIMARY EDUCATION & RIGHTEOUSNESS LEARNING

ALUMNI OF IITs / NITs

## JEE - 2021 RESULT



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## Ch - 6: Photosynthesis

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**Question 1:** What are the basic requirements of photosynthesis ?

**Question 2:** (i) Where are the chlorophyll pigments present in a cell.

(ii) Name the membrane that connects thylakoid of one granum With the other granum.

**Question 3:** Give some adaptations in a green leaf for photosynthesis.

**Question 4:** What is the importance of photosynthesis in the life of the following :

(i) Green plants (ii) Non-green plants (iii) Animals

**Question 6:** Why green leaves are thin and broad ?

**Question 7:** State one important function of chloroplasts.

**Question 8:** Which tissues and cells are mainly concerned with photosynthesis ?

**Question 9:** Why is photosynthesis important in nature ?

**Question 10:** How do non-green plants such as fungi and bacteria obtain their nourishment ?

**Question 11:** "Oxygen is a waste product of photosynthesis." Comment.

**Question 12:** What is meant by photolysis of water ?

**Question 13:** Oxygen given out during photosynthesis comes from water. Explain this statement.

**Question 14:** How is the rate of photosynthesis affected when a green plant gets green light ?

**Question 15:** Why is it not possible to demonstrate respiration in a green plant kept in the sunlight

**Question 16:** Explain why transpiration and photosynthesis are interlinked during the day.

**Question 17:** Explain, why respiration is said to be a reversed process of photosynthesis ?

**Question 18:** Name the molecules which are called assimilatory power ? Why are they called so ?

**Question 19:** What is the law of limiting factor ?

**Question 20:** Complete the following food chains by writing the names of appropriate organisms in the blanks:

(i) Grass → ..... → Snake → .....

(ii) ..... → ..... → Hen → Man.

(iii) Grass → ..... → Lion.

(iv) ..... → Mouse → ..... → Peacock.

**Question 21:** On a bright sunny day water weeds growing in an aquarium were actively giving off bubbles of gas. Use this information to answer questions that follow :

(i) Name the process occurring in the water weed that has resulted in evolution of these bubbles.

(ii) Of what gas do these bubbles consist ?

(iii) Briefly describe the reactions occurring in the leaves of the water weeds leading to the evolution of these bubbles.

(iv) Give an overall balanced chemical equation to represent the process named in (i) above.

**Question 22:** What is meant by destarched plant ? How can it be destarched ?

**Question 23:** Using the destarched plant describe step by step how would you proceed to prove that in the absence of light the leaf cannot manufacture starch ?

**Question 24:** A healthy croton plant bearing variegated leaves was kept in a dark cupboard to destarch it after which it was placed in sunlight for a few hours. One of the leaves was then plucked and an outline of the leaf marking the green and the non-green regions was drawn. The leaf was then tested for starch. Using the above information, answer the following questions :

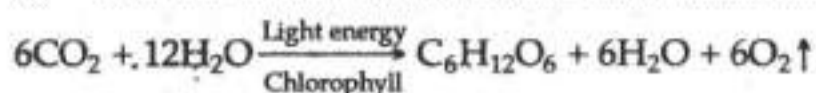
(i) State the aim of the above experiment.

(ii) Name the chemical used for testing the presence of starch.

(iii) Why is the leaf boiled in water and alcohol before testing for the presence of starch ?

(iv) What change is seen on the leaf after the starch test ?

(v) Give the chemical equation to represent the process of starch formation in plants.



**Question 25:** A candidate in order to study the importance of certain factors in photosynthesis took a potted plant and kept it in the dark for over 24 hours. Then in the early hours of the morning she covered one of the leaves with black paper in the centre only. She placed the potted plant in the sunlight for a few hours, and then tested the leaf which was covered with black paper for starch.

(i) What aspect of photosynthesis was being investigated ?

(ii) Is there any control in this experiment ? If so, state the same.

(iii) Why was the plant kept in the dark before the experiment ?

(iv) Describe step by step how the candidate proceeded to test the leaf for the presence of starch.

**Question 26:** A potted plant was taken in order to prove a factor necessary for photosynthesis. The potted plant was kept in the dark for 24 hours. One of the leaves was covered with black paper in the centre. The potted plant was then placed in sunlight for a few hours.

- (i) What aspect of photosynthesis was being tested ?
- (ii) Why was the plant placed in the dark before beginning the experiment ?
- (iii) During the starch test why was the leaf:
  - (1) boiled in water
  - (2) boiled in methylated spirit.
- (iv) Write a balanced chemical equation to represent the process of photosynthesis. .

**Question 27:** Write an experiment to demonstrate that CO<sub>2</sub> is necessary for photosynthesis.

**Question 28:** List the events taking place in the photo-chemical phase of Photosynthesis.

**Question 29:** If you are planning an experiment to show the effect of light on photosynthesis :

- (1) Will you select white light or green light ? Justify your answer.
- (2) Why would you select a destarched plant ?

### Give Reasons

**Question 1:** All life on earth Would come to an end if there were no green plants.

**Question 2:** Photosynthesis is considered as a process supporting all life on earth.

**Question 3:** Chlorophyll is necessary for photosynthesis.

**Question 4:** Chloroplasts are called energy converters.

**Question 5:** ATP is needed for dark reaction.

**Question 6:** Respiration is said to be the reversal of photosynthesis.

### Differentiate

**Question 1:** Light reaction and Dark reaction.

**Question 2:** Stroma of chloroplast and Grana of chloroplast.

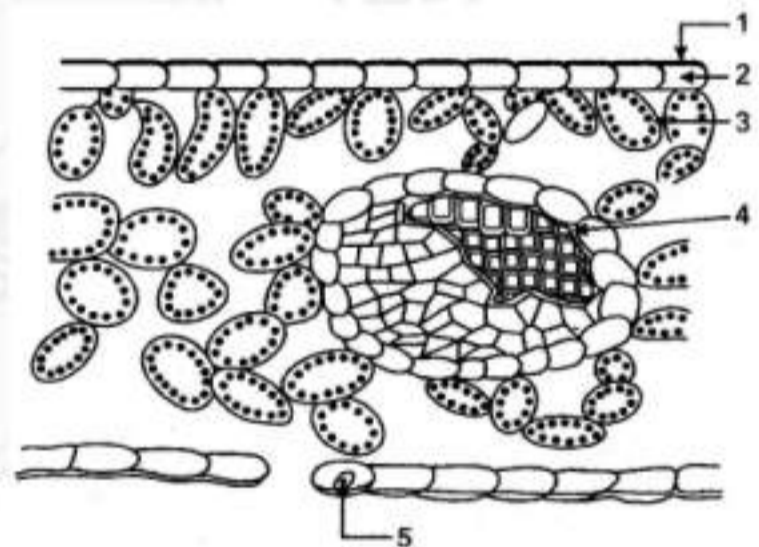
**Question 3:** Chloroplast and Chlorophyll.

**Question 4:** Autotrophs and Heterotrophs.

### Diagram Based Questions

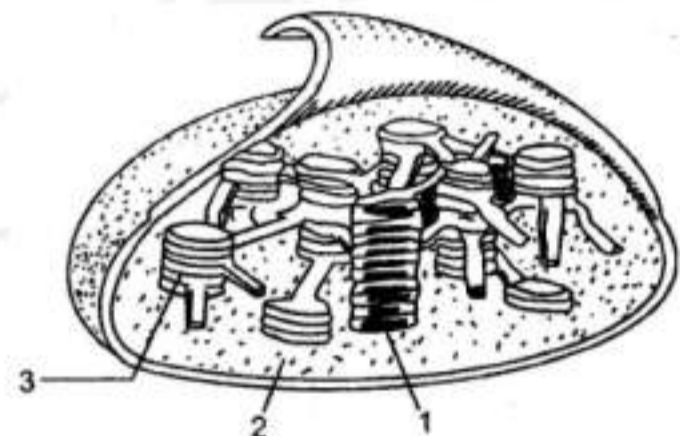
**Question 1:** The figure below represents the vertical section of a leaf:

- (i) Name the parts 1 to 5.
- (ii) How many veins have been shown.
- (iii) State the functions of part 4 and 5.



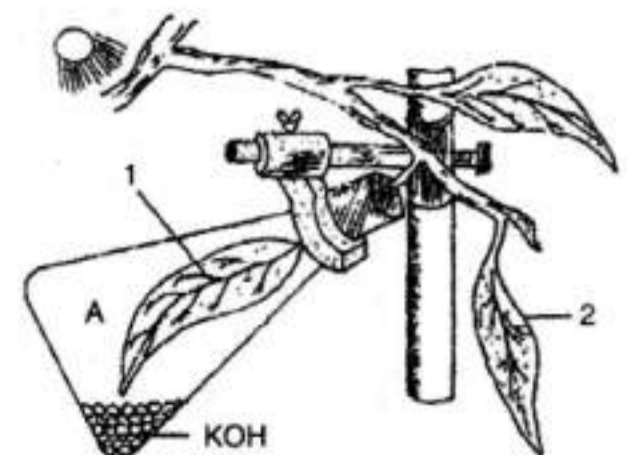
**Question 2:**

- (i) Identify the above diagram.
- (ii) Label the guidelines 1-3.
- (iii) Name the phenomenon which takes place in the above diagram.
- (iv) Define the phenomenon.
- (v) What is the importance of the above phenomenon ?



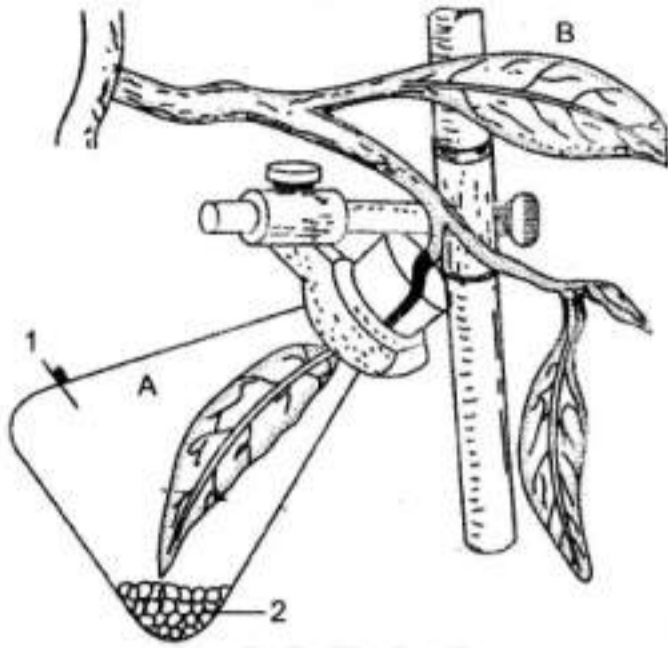
**Question 3:** The figure given below represents an experiment to demonstrate a particular aspect of photosynthesis. The alphabet 'A' represents a certain condition inside the flask.

- (i) What is the aim of the experiment ?
- (ii) Identify the special condition inside the flask.
- (iii) Name an alternative chemical that can be used instead of KOH.
- (iv) In what manner do the leaves 1 and 2 differ at the end of the starch test ?



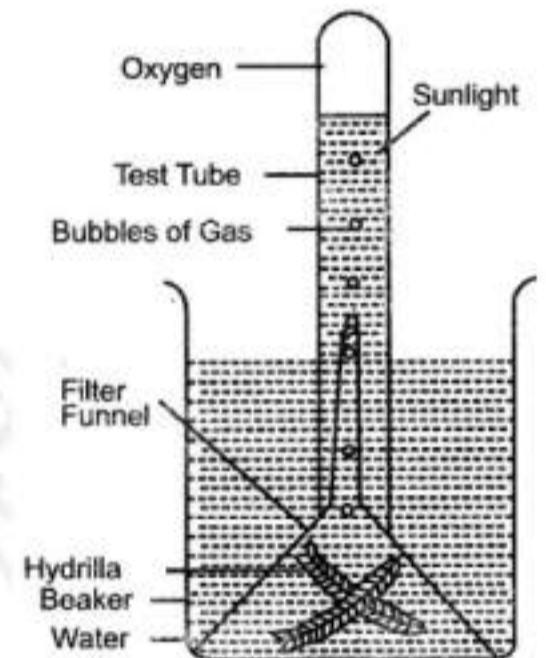
**Question 4:** The figure below represents an experiment performed to demonstrate a particular aspect of photosynthesis. The apparatus was kept in sunlight for almost the whole day. The numeral '1' represents a certain condition inside the flask and the numeral '2' represents a chemical responsible for this condition.

- (i) What is the object of the experiment ?
- (ii) What is the special condition inside the flask ?
- (iii) What is the chemical substance numbered '2'?
- (iv) In what way will the three leaves (A, B and C) differ at the end of the experiment, when tested with iodine solution?



**Question 5:** The figure below represents an experiment set up to study a physiological process in plants:

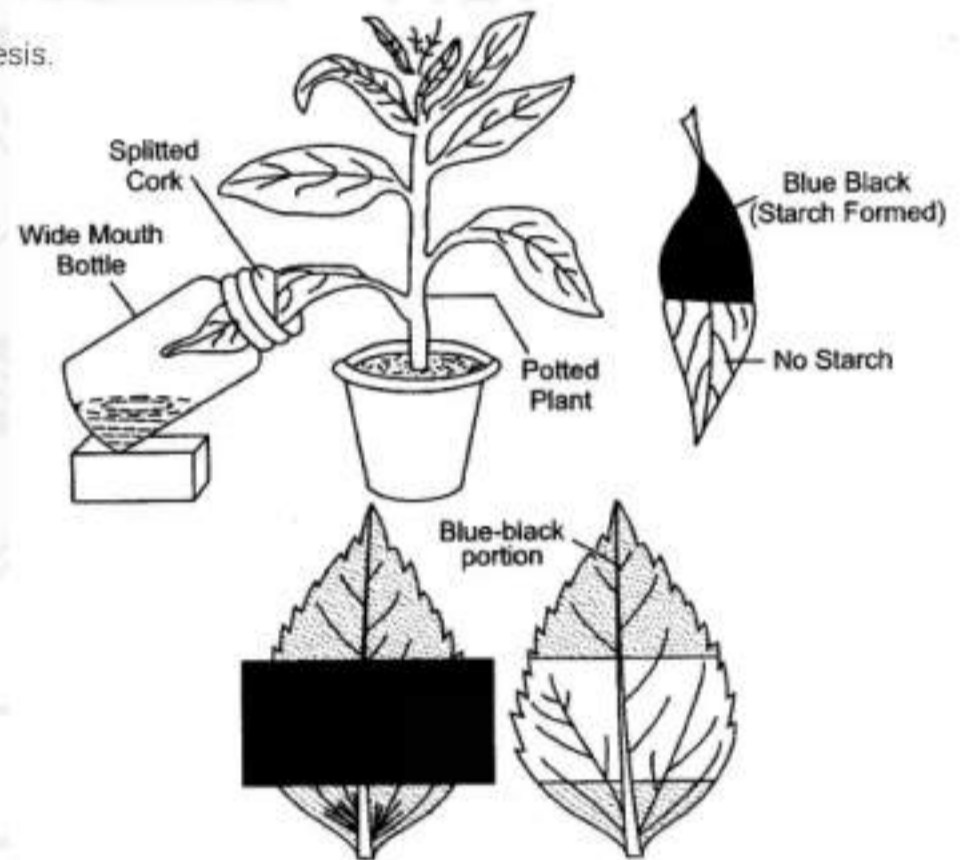
- (i) Name the physiological process being studied.
- (ii) Explain the process.
- (iii) What is the aim of the experiment?
- (iv) Give a well balanced equation to represent the process.



**Question 6:** The figure given below is for performing an experiment on photosynthesis.

Answer the following:

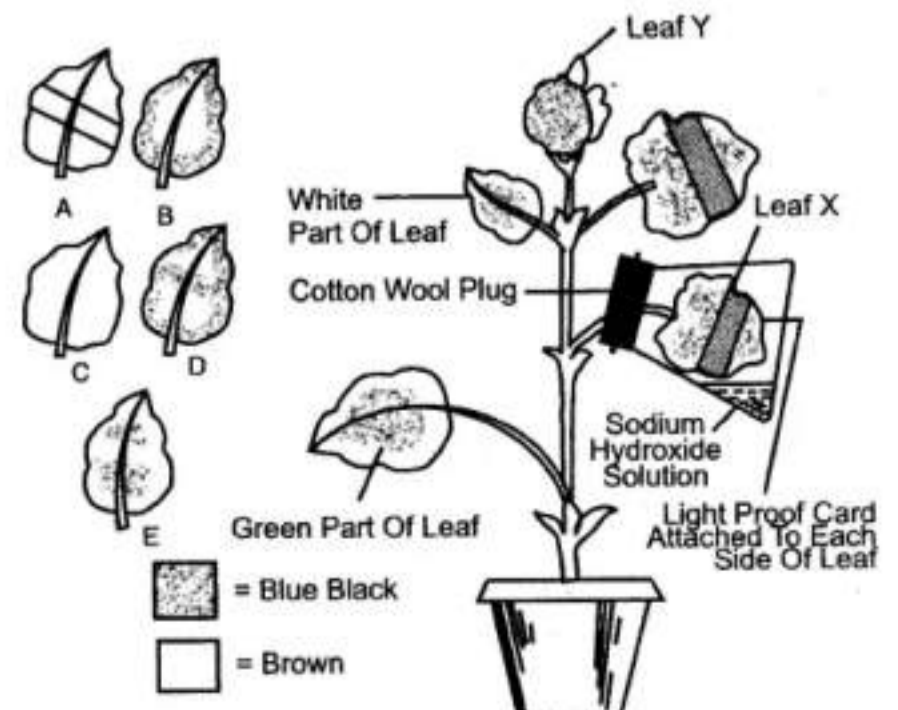
- (i) What is the aim of this experiment?
- (ii) Describe an experiment to show that light is necessary for photosynthesis.
- (iii) What do you conclude from this experiment?
- (iv) What is the role of light in photosynthesis?



**Question 7:** A well watered healthy potted plant with variegated leaves was kept in darkness for about 24 hours. It was then set up as shown in the diagram and exposed to light for about 12 hours. At the end of this time leaf X and leaf Y were tested for starch. Study the diagram and answer the questions that follow:

- (i) Why was the plant initially kept in darkness for 24 hours?
- (ii) What is the function of sodium hydroxide solution in the flask?
- (iii) Select the correct leaf from the five available choices shown in the diagram as A, B, C, D and E. Rewrite the correct answer for the filling in the appropriate letter from the questions that follow:

1. After the starch test, leaf X would look like.
2. After the starch test, leaf Y would look like.



**Question 8:** Select the correct answer out of the available choices given under each question.

(i) From the graph it seems likely that the rate of bubbling per minute at 50 cm., would have been :

(a) 2-0 (b) 2-5 (c) 3-0 (d) 3-5 (e) 4-0

(ii) The gas produced by the plant during the experiment was :

(a) Air (b) Oxygen (c) Carbon dioxide (d) Nitrogen (e) Hydrogen

(iii) The gas collected comes due to the breakdown of:

(a) Glucose (b) Starch (c) Water (d) Air (e) ATP

(iv) If ice cubes were added to the water, the rate of bubble formation would :

(a) Remain the same.

(b) Increase because more water is added.

(c) Decreases because the temperature drops.

(d) Decreases because water freezes.

(e) Cannot tell from the information given.

(v) If some sodium bicarbonate is added to the water the rate of bubble formation:

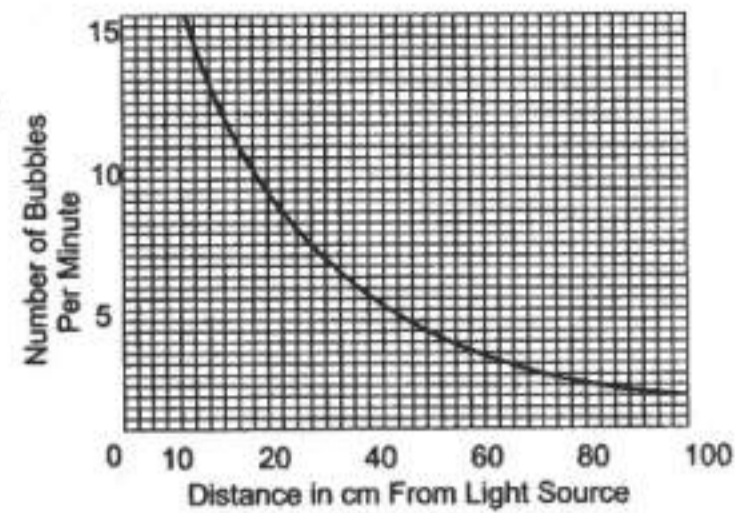
(a) Increases because more respiration occurs.

(b) Increases because more photosynthesis occurs.

(c) Increases because the gas becomes less soluble.

(d) Decreases because carbon dioxide acts as a limiting factor.

(e) Decreases because respiration decreases.



**Question 9:** (i) Draw a neat and well-labelled diagram of the Chloroplast.

(ii) List the events taking place in the photo-chemical phase of Photosynthesis.

(iii) If you are planning an experiment to show the effect of light on photosynthesis :

(a) Will you select white light or green light ? Justify your answer.

(b) Why would you select a destarched plant ?

### Explain the Terms

**Question:**

1. ATP
2. Calvin Cycle
3. Free Energy
4. NADPH
5. Plastoquinone
6. Photosynthesis
7. Photosynthetic Membrane
8. Phosphorylation
9. NADP
10. Photophosphorylation
11. Carbon cycle.

### Name the Following

**Question:**

1. The process by which plants produce their food.
2. The green colouring matter of the plants.
3. The principal site in a green leaf for photosynthesis.
4. Source of oxygen given out in photosynthesis.
5. The site of light reaction in the cell of a leaf.
6. Light in which maximum rate of photosynthesis takes place.
7. A high energy reduced compound formed in the light reaction and enter into the dark reaction.
8. The immediate product of photosynthesis.
9. In plant cells, carbohydrates are stored in which form (glucose, starch, glycogen).
10. The chemical substance used to test the presence of starch in the cell of a leaf.

## Give Technical Terms

### Question:

1. Name the process which is responsible for conversion of solar energy to chemical energy that is essential to sustain the life on this earth ?
2. Name the structure where photophosphorylation takes place.
3. Form of energy which is converted into chemical energy during photosynthesis.
4. In photosynthesis radiant energy is converted into which form ?
5. What is the percentage of CO<sub>2</sub> in air ?
6. Organisms which cannot prepare their own food by photosynthesis.
7. The main reaction which means the breaking up of water molecules through light.
8. Which process is the ultimate source of energy for all living organisms ?
9. Name only one plant, you are familiar with which has no chlorophyll.
10. Name the tissue that transports manufactured starch from the leaves to all parts of the plant.
11. What does ATP abbreviated for ?
12. What does NADP stand for ?
13. The part of the chloroplast where the dark reaction of photosynthesis takes place.
14. Name the experiment to demonstrate the importance of light for photosynthesis.

## Fill in the Blanks

### Complete the following sentences with appropriate words :

1. A light induced reaction which leads to splitting of water is \_\_\_\_\_ of water.
2. A plant that does not perform photosynthesis is \_\_\_\_\_.
3. One of the product of \_\_\_\_\_ of water is oxygen.
4. \_\_\_\_\_ are regarded as complete photosynthetic units of plants.
5. AMP stands for \_\_\_\_\_.
6. \_\_\_\_\_ molecules of chlorophyll make one quantasome.
7. Carbon dioxide enters the leaf through \_\_\_\_\_.
8. Xanthophyll is \_\_\_\_\_ coloured pigment.
9. The conversion of physical energy of light into chemical energy by the chloroplast is called \_\_\_\_\_.
10. Calvin cycle was proposed by \_\_\_\_\_.
11. A dark reaction is a \_\_\_\_\_ reaction.
12. A light reaction is a \_\_\_\_\_ reaction.

## True & False

### Mention, if the following statements are True or False. If false rewrite the wrong statement in its correct form:

1. Photosynthesis occurs only in plants.
2. Too much light destroys chlorophyll.
3. The unit of light absorbed by the chlorophyll during photosynthesis is the proton.
4. The process of photosynthesis takes place in the dark.
5. CO<sub>2</sub> is the life supporting gas produced due to photosynthesis.
6. Photolysis is the reaction which means the breaking up of water molecules.
7. Radiant energy is converted into chemical energy by photosynthesis.
8. Leaves are broad and flat to increase the surface area for photosynthesis
9. The raw materials for photosynthesis include water and CO<sub>2</sub>.
10. Photosynthesis results in loss of dry weight of the plant.
11. Land plants obtain their CO<sub>2</sub> from atmosphere.
12. Photosynthesis occurs in all the cells of a plant.
13. No transpiration occurs during photosynthesis.
14. A variegated leaf (one that has green as well as white patches) will only photosynthesize in the green areas.
15. The dark reaction of Photosynthesis is light independent.
16. All the starch produced in a leaf remains stored in it for 2-3 weeks before it is used by other parts of plant.
17. Photosynthesis can also occur n artifidal light such as that of a 100 watt electric lamp.
18. KOH absorbs CO<sub>2</sub>.
19. Out of nine types of chlorophyll, chlorophyll 'a' and 'b' are most abundant.

### State the Location

Name	Location
Thylakoid	
Stomata	
Chlorophyll	
Stroma	

### State the Function

Write the functional activity of the following structures:

Name	Function
Granum	
Stroma	
Chloroplasts	
Thylakoids	

### Choose the Odd One Out

1. Grana, Thylakoid, Stroma, Root.
2. Chlorophyll, Chlorophyll b, n-carotene, Photon.
3. Glucose, Water, Oxygen, Carbon-dioxide.
4. Light intensity, Water content, Temperature, Chlorophyll.

### Multiple Choice Questions

1. Chlorophyll is present:
  - (a) In the grana of chloroplast
  - (b) On the surface of chloroplast
  - (c) Dispersed throughout the chloroplast
  - (d) In the stroma of chloroplast
2. The specific function of light energy in the process of photosynthesis is to:
  - (a) Reduce carbondioxide
  - (b) Synthesize glucose
  - (c) Activate chlorophyll
  - (d) Split water
3. Which one of the following would not be a limiting factor for photosynthesis ?
  - (a) Oxygen
  - (b) Light
  - (c) Carbon dioxide
  - (d) Chlorophyll
4. A cell that lacks chloroplast does not:
  - (a) Evolve carbon dioxide
  - (b) Liberate oxygen
  - (c) Require water
  - (d) Utilize carbohydrates
5. Which would do maximum harm to a tree?
  - (a) Loss of half of its branches
  - (b) Loss of half of its flowers
  - (c) Loss of all of its leaves
  - (d) Loss of a little branch
6. NADP is expanded as:
  - (a) Nicotinamide, adenosine dinucleotide phosphate
  - (b) Nicotinamide, adenine dinucleotide phosphate
  - (c) Nicotinamide, adenine dinucleous phosphate
  - (d) Nicotinamide, adenosine dinucleous phosphate
7. A plant is kept in a dark cupboard for about 48 hours before conducting any experiment on photosynthesis to:
  - (a) Remove starch from the plant
  - (b) **Ensure that starch is not trans-located from the leaves**
  - (c) Remove chlorophyll from the leaf of the plant
  - (d) Remove starch from the experimental leaf

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8. The main difference between chlorophyll 'a' and 'b' is:

- (a) Chlorophyll 'a' is a linear chain compound and 'b' is branched chain
- (b) Chlorophyll 'a' has no Mg ion in centre of molecule
- (c) In chlorophyll 'a' there is — CH<sub>3</sub> group whereas in 'b' it is — CHO group
- (d) All of the above

9. Compensation point means the condition:

- (a) When the entire food manufactured in photosynthesis remains unutilised
- (b) When the pot is watered just to meet the full requirement of the plant
- (c) When rate of photosynthesis is equal to rate of respiration
- (d) Where there is neither photosynthesis nor respiration.

### Match the Column

**Column 'II' is a list of items related to ideas in Column 'I'. Match the term in Column 'II' with the suitable idea given in Column 'I'.**

Column I	Column II
(i) Grana	(a) Decomposers
(ii) Autotrophs	(b) Light reaction
(iii) By-products of photosynthesis	(c) Animals
(iv) Photolysis	(d) Oxygen
(v) Bacteria and fungi	(e) Stimulated by light
(vi) Chloroplast	(f) Power
(vii) Oxygen and water	(g) Raw material
(viii) Sunlight	(h) Machinery
(ix) CO <sub>2</sub> and water	(i) End products
(x) Glucose (sugar)	(j) Workrooms
(xi) Cells in the leaf	(k) By-products.



**Question .1. Name the following:**

- (i) The structure where photosynthesis takes place.
- (ii) The part of the chloroplast where the dark reaction of photosynthesis takes place.
- (iii) Plants that prepare their own food from basic raw materials.
- (iv) The energy currency of the cell.
- (v) The process by which green plants prepare their own food.
- (vi) The product of photosynthesis.
- (vii) A plant that does not perform photosynthesis.
- (viii) A gas released by green plants during photosynthesis.
- (ix) The raw materials needed for photosynthesis.
- (x) The site of light reaction.
- (xi) The substance from which oxygen is evolved during photosynthesis.

**Question .2. State true or false:**

- (i) Photosynthesis occurs in all the cells of a plant.
- (ii) Stomata is stimulated by light.
- (iii) Grana helps in diffusion of gases.
- (iv) Photosynthesis results in the loss of dry weight of the plant.
- (v) The unit of light absorbed by the chlorophyll during photosynthesis is the proton.
- (vi) Photosynthesis stops to occur at a temperature above 35 °C.
- (vii) Plants can be de-starched by keeping in dark for 48 hours.

**Question .3. Choose the correct alternative:**

- (i) A plant is kept in a dark cupboard for about 48 hours before conducting any experiment on photosynthesis to (remove chlorophyll from leaves, remove starch from the plant, ensure that no photosynthesis occurs, ensure that leaves are free from starch).
- (ii) The site of light reaction in the cells of a leaf is (grana, cytoplasm, stroma).
- (iii) The chemical substance used to test the presence of starch in the cell of a leaf is (cobalt chloride paper, iodine solution, Benedict's solution).
- (iv) The specific function of light energy in the process of photosynthesis is to (reduce carbon dioxide, synthesize glucose, activate chlorophyll, and split water).
- (v) If the rate of respiration becomes more than the rate of photosynthesis plants will (continue to live but will not be able to store food, be killed instantly, grow more vigorously because more energy will be available, stop growing and gradually die of starvation).
- (vi) Which one of these reaction occurs during photosynthesis? (carbon dioxide is reduced and water is oxidized, water is reduced and carbon dioxide is oxidized, carbon dioxide and water both are oxidized, carbon dioxide and water both are reduced).

**Question .4. Give exact location and function of:**

- (i) Stoma,
- (ii) Thylakoids,
- (iii) Guard cell,
- (iii) Grana.

**Question .5. (i) Explain the following terms: Photolysis.**

- (ii) What is meant by photolysis of water?

Question .6. Answer the following:

- (i) Name the two phases of photosynthesis.
- (ii) What is the role of light in this process?
- (iii) Describe any three adaptation in a green leaf for photosynthesis.
- (iv) Describe an experiment to show that light is necessary for photosynthesis.

Question .7. Define:

- (i) Photophosphorylation.

Question .8. Re-write the correct form of statement by inserting a suitable word/words at right place.

Do not delete any word in the statement:

- (i) Destarching a plant means removing the starch from the plant.
- (ii) The splitting of water molecules into hydrogen and hydroxyl ions is termed photolysis.

Question .9. Re-write the terms in correct order in a logical sequence:

- (i) Water molecules, oxygen, grana, hydrogen and hydroxyl ions, photons.

Question .10. Complete the following process to show how the oxygen in the air reaches a mesophyll cell of the leaf.

Oxygen in air → -- → -- → Mesophyll cell.

Question .11. Fill in the blanks: Chloroplasts and \_\_\_\_\_.

Question .12. Distinguish between the following:

- (i) Light reaction and Dark reaction.
- (ii) Autotrophs and Heterotrophs.
- (iii) Stroma and Grana.
- (iv) Photosynthesis and Respiration.
- (v) Chloroplast and chlorophyll.

Question .13. Enumerate the steps involved in testing a green leaf for the presence of starch.

Question .14. Write the full form of NADP and ATP.

Question .15. A healthy Croton plant bearing variegated leaves was kept in a dark cupboard to destarch it, after which it was placed in sunlight for few hours. One of the leaves was then plucked and an outline of the leaf marking the green and non-green regions was drawn. The leaf was then tested for starch. Using the above information, answer the following questions:

- (i) State the aim of the above experiment.
- (ii) Name the chemical used for testing the presence of starch.
- (iii) Why is the leaf boiled in water and alcohol before testing for the presence of starch?
- (iv) What change is seen on the leaf after the starch test?
- (v) Give the chemical equation to represent the process of starch formation in plants.

Question .16. A candidate in order to study the importance of certain factors in photosynthesis, took a potted plant and kept in the dark for over 24 hours. Then in the early hours of the morning she covered one of the leaves with black paper in the centre only. She placed the potted plant in the sunlight for a few hours and then tested the leaf which was covered with black paper for starch.

- (i) What aspect of photosynthesis was being investigated?
- (ii) Is there any control in this experiment? If so state the same.
- (iii) Why was the plant kept in the dark before the experiment?
- (iv) Describe step by step how the candidate proceeded to test the leaf for the presence of starch?

Question .17. Give biological reasons:

- (i) A tiger owes its existence to chlorophyll.
- (ii) Oxygen given out during photosynthesis comes from water.

Question .18. (i) Fill in the blank in the following equations for two chemical reactions:

- 1. \_\_\_\_\_ + 12H<sub>2</sub>O → C H O + \_\_\_\_\_ + \_\_\_\_\_.
- 2. \_\_\_\_\_ + 6O<sub>2</sub> → 6 \_\_\_\_\_ + 6 \_\_\_\_\_ + Energy.

- (ii) Name the two process represented by the above two reactions.
- (iii) Which one of these two reactions is the support of all life on earth.

Q.19. Draw a neat labeled diagram of the experimental set up to show that green plants give out oxygen during photosynthesis.

