

Photosynthesis in Higher Plants

I. Select the correct answer from the following questions:

Question 1.

Kranz anatomy is found in or is typical of

- (a) C₃ plants
- (b) C₄ plants
- (c) C₂ plants
- (d) Succulents (CAM Plants)

▼ Answer

Answer: (b) C₄ plants

Question 2.

A cell that lacks chloroplast does not

- (a) Utilize carbohydrates
- (b) Evolve carbon dioxide
- (c) Require water
- (d) Liberate oxygen

▼ Answer

Answer: (d) Liberate oxygen

Question 3.

Energy is transformed from the light reaction step to the dark reaction step by

- (a) ATP
- (b) RUBP
- (c) ADP
- (d) Chlorophyll

▼ Answer

Answer: (a) ATP

Question 4.

Translocation of carbohydrates or sugars (photosynthetic products) in flowering plants occurs in the form of

- (a) Glucose
- (b) Starch
- (c) Maltose
- (d) Sucrose

▼ Answer

Answer: (d) Sucrose

Question 5.

Photo-respiration is induced by

- (a) High oxygen content
- (b) High temperature
- (c) High light intensity
- (d) High CO₂ content

▼ Answer

Answer: (a) High oxygen content

Question 6.

AH vegetation is only due to

- (a) Oxygen
- (b) CO₂
- (c) Water
- (d) Hydrogen

▼ Answer

Answer: (c) Water

Question 7.

Site of dark reaction is

- (a) Granum

- (b) Unit membrane
- (c) Lamella
- (d) Stroma

▼ Answer

Answer: (d) Stroma

Question 8.

All vegetation is only due to water was proved experimentally by

- (a) Aristotle
- (b) Van Helmont
- (c) Joseph
- (d) Stephen Hales

▼ Answer

Answer: (b) Van Helmont

Question 9.

Vegetation always purifies the air was proved experimentally first by

- (a) Liebig
- (b) Warburg
- (c) Stephen Hales
- (d) Joseph Priestly

▼ Answer

Answer: (d) Joseph Priestly

Question 10.

Reduction of NADP^+ to NADPH occurs during

- (a) PSI
- (b) Calvin Cycle
- (c) Cyclic photophosphorylation
- (d) Non cyclic photophosphorylation

▼ Answer

Answer: (d) Non cyclic photophosphorylation

Question 11.

Wastage of energy is associated with

- (a) Krebs cycle
- (b) Photorespiration
- (c) Photosynthesis
- (d) Glycolysis

▼ Answer

Answer: (b) Photorespiration

Question 12.

Green plants convert solar energy into chemical energy of organic matter was proved by

- (a) Joseph Priestly
- (b) Van Mayer
- (c) Semebier
- (d) Lavoisier

▼ Answer

Answer: (b) Van Mayer

Question 13.

When the rate of translocation is slow, the rate of photosynthesis shall

- (a) Increase
- (b) Decrease
- (c) Remain Unaffected
- (d) Become Zero

▼ Answer

Answer: (b) Decrease

Question 14.

The first visible product of photosynthesis is

- (a) Starch
- (b) Glycogen
- (c) Sugar
- (d) Fatty acids

▼ [Answer](#)

Answer: (b) Starch

Question 15.

The enzyme ribulose biphosphate carboxylase oxygenase is located in

- (a) Mitochondria
- (b) Chloroplasts
- (c) Golgi bodies
- (d) peroxisomes

▼ [Answer](#)

Answer: (b) Chloroplasts

Question 16.

C₄ plants are

- (a) Dicots
- (b) Monocots
- (c) Both dicots and monocots
- (d) Cereals

▼ [Answer](#)

Answer: (c) Both dicots and monocots

Question 17.

Photosynthesis has two reaction complexes, one followed by the other. The second reaction complex

- (a) Traps light energy
- (b) Fixes carbon dioxide
- (c) Synthesizes starch
- (d) Evolves oxygen

▼ [Answer](#)

Answer: (b) Fixes carbon dioxide

Question 18.

Calvin cycle of C₄ plants operates in

- (a) Stroma of bundle sheath chloroplasts
- (b) The statement is wrong
- (c) Grana of mesophyll chloroplasts
- (d) Stroma of bundle sheath chloroplasts

▼ [Answer](#)

Answer: (a) Stroma of bundle sheath chloroplasts

Question 19.

Flashing light experiment and existence of light and dark reactions were demonstrated first by

- (a) Van iteil
- (b) Emerson and Arnold
- (c) Blackmann
- (d) Warburg

▼ [Answer](#)

Answer: (b) Emerson and Arnold

Question 20.

Mass flow hypothesis was given by

- (a) Munch
- (b) Dixon
- (c) Devries
- (d) Curtis

▼ [Answer](#)

Answer: (a) Munch

Question 21.

Rate of photosynthesis is independent of

- (a) CO_2
- (b) Quality of light
- (c) Light duration
- (d) Light intensity

▼ Answer

Answer: (d) Light intensity

Question 22.

Carbon dioxide acceptor in C_3 plants is

- (a) RUBP
- (b) PGA
- (c) RMP
- (d) PEP

▼ Answer

Answer: (a) RUBP

Question 23.

Photosynthetic process is completed in

- (a) mitochondria
- (b) Chromatophores
- (c) Chloroplasts
- (d) Chlorophyll

▼ Answer

Answer: (c) Chloroplasts

Question 24.

In photosynthesis

- (a) CO_2 is reduced while water is oxidised
- (b) Both CO_2 and H_2O are oxidised
- (c) CO_2 is oxidised while H_2O is reduced
- (d) Both CO_2 and H_2O are oxidised

▼ Answer

Answer: (a) CO_2 is reduced while water is oxidised.

Question 25.

In C_3 plants, the first stable product of photosynthesis is

- (a) Ribulose biphosphate
- (b) Oxaloacetic acid
- (c) Phosphoglyceric acid
- (d) Glvceraldehyde 3-phosphate

▼ Answer

Answer: (c) Phosphoglyceric acid.

Question 26.

Chloroplast DNA or Cl^- DNA is

- (a) Circular
- (b) Single stranded
- (c) Naked
- (d) All of these

▼ Answer

Answer: (d) All of these

Question 27.

Photosynthetic units are of two types

- (a) Photosystem I and II
- (b) Chlorophylls and Carotenoids
- (c) Carotenoids and phvcobilins
- (d) Chlorophyll a and Chlorophyll b

▼ Answer

Answer: (a) Photosystem I and II

Question 28.

Most effective wave length of light for photosynthesis is

- (a) Yellow
- (b) Green
- (c) Red
- (d) violet

▼ Answer

Answer: (a) Red

Question 29.

Chloroplast pigments are

- (a) Chlorophylls
- (b) Phycobilins
- (c) Carotenoids
- (d) All of these

▼ Answer

Answer: (d) All of these

Question 30.

During synthesis of a glucose molecule, ATP and NADPH consumed are respectively

- (a) 12 and 8
- (b) 18 and 12
- (c) 15 and 12
- (d) 30 and 20

▼ Answer

Answer: (b) 18 and 12

Question 31.

If plant stop photosynthesis which gas will disappear

- (a) CO₂
- (b) O₂
- (c) NH₃
- (d) N₂

▼ Answer

Answer: (b) O₂

Question 32.

Which plant shows chloroplast dimorphism?

- (a) Rice
- (b) Sugar Beet
- (c) Sugarcane
- (d) Wheat

▼ Answer

Answer: (c) Sugarcane

Question 33.

First product of photorespiration is

- (a) Glycolate
- (b) Glycine
- (c) Phosphoglycolate
- (d) Glycine

▼ Answer

Answer: (c) Phosphoglycolate

Question 34.

Which is a C₄ Plant?

- (a) Sugarcane
- (b) sorghum
- (c) Maize
- (d) All of these

▼ Answer

Answer: (d) All of these

Question 35.

Natural hydrogen acceptor of Hill reaction is

- (a) NADPH
- (b) H₂O
- (c) NADP
- (d) None of these

▼ Answer

Answer: (c) NADP

Question 36.

Photorespiration is characteristic of

- (a) CAM Plants
- (b) C₃ plants
- (c) C₄ Plants
- (d) All of these

▼ Answer

Answer: (b) C₃ plants

Question 37.

Calvin cycle is

- (a) Dependent upon light
- (b) Independent of light
- (c) Inhibited by light
- (d) Supported by light

▼ Answer

Answer: (d) Supported by light

Question 38.

Which one is common product of both photosynthesis and respiration?

- (a) ATP
- (b) Chlorophyll
- (c) Cytochrome
- (d) Quinone

▼ Answer

Answer: (a) ATP

Question 39.

C₄ Cycle was discovered in

- (a) Chrysanthemum
- (b) Groundnut
- (c) Apple/Pea
- (d) Sugarcane

▼ Answer

Answer: (d) Sugarcane

Question 40.

In C₄ Plants, fixation of CO₂ occurs in

- (a) cortex of stem
- (b) palisade tissue
- (c) Transfusion
- (d) Spongy mesophyll and bundle sheath cells

▼ Answer

Answer: (d) Spongy mesophyll and bundle sheath cells

Question 41.

Calvin cycle is investigated by the use of

- (a) C¹⁴
- (b) C¹²

- (c) O^{18}
(d) O^{16}

▼ Answer

Answer: (a) C^{14}

Question 42.

The first receiver of CO_2 in C_4 plants is :

- (a) Malic acid
(b) Phosphophenol
(c) Oxaloacetic acid
(d) Aspartic acid

▼ Answer

Answer: (c) Oxaloacetic acid

Question 43.

The acceptor of CO_2 in C_3 plants is

- (a) Xglucose-5-Phosphate
(b) 3- phosphoglyceric acid
(c) Phosphoenol pyruvic acid
(d) Ribulose 1, 5 biphosphate

▼ Answer

Answer: (c) Ribulose 1, 5 biphosphate

Question 44.

RUBP of Calvin cycle is called in C_4 plants

- (a) Secondary of final acceptor of CO_2
(b) Primary acceptor of CO_2
(c) Both (a) and (b)
(d) None of these

▼ Answer

Answer: (a) Secondary of final cycle is called in CO_2

II. Fill in the blanks:

Question 1.

All animals including human beings depend on for their food.

▼ Answer

Answer: plants

Question 2.

Green plants carry out process by which they use light energy to derive the synthesis of organic compounds.

▼ Answer

Answer: photosynthesis a physico chemical

Question 3.

Photosynthesis is important for life due to two reasons: It is the by which all food gets synthesised on earth and is also responsible for the release of into the atmosphere by plants.

▼ Answer

Answer: mechanism, oxygen

Question 4.

A first, of photosynthesis was thus described.

▼ Answer

Answer: action, spectrum

Question 5.

A milestone contribution to the understanding of was that made by a microbiologist, (1897-1985), who based on his studies of and green

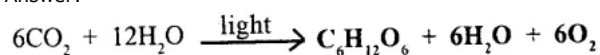
▼ Answer

Answer: photosynthesis, Cornelius van Niel, purple, bacteria

Question 6.
 $6\text{CO}_2 + 12\text{H}_2\text{O} \dots\dots\dots$

▼ Answer

Answer:



Question 7.
The membrane system is responsible for trapping the light energy and synthesising of and

▼ Answer

Answer: ATP, NADPH

Question 8.
The former sets or reactions since they are light dependent are called

▼ Answer

Answer: light reactions

Question 9.
ATP and NADPH, can theoretically take place in the dark and are called

▼ Answer

Answer: dark reactions

Question 10.
Chromatography, that literally means '.....'

▼ Answer

Answer: colour writing

Question 11.
We see in leaves is not due to a single pigment but due to four pigments: chlorophyll a (bright or blue green in the chromatogram), chlorophyll b (yellow green), (yellow) and (yellow to yellow-orange).

▼ Answer

Answer: Xanthophylls, Carotenoids

Question 12.
Of course you are familiar with the wavelength of the visible spectrum of light as well as the

▼ Answer

Answer: VIBGYOR

Question 13.
The pigments chlorophyll b and the carotenoids -Xanthophylls and carotene are called

▼ Answer

Answer: accessory pigments

Question 14.
In PSI the reaction centre chlorophyll a has an absorption peak at 700 nm hence is called while in PS II it has absorption maximum at 680 nm, and is called

▼ Answer

Answer: P₇₀₀, P₆₈₀

Question 15.
When the two photosystems work in a series, first PS II and then PS I, a process called occurs.

▼ Answer

Answer: non-cyclic photo-phosphorylation

Question 16.

The Calvin pathway occurs in

▼ Answer

Answer: all photosynthetic plants

Question 17.

C₄ plants are special they have a special type of anatomy they tolerate higher they show a response to high light, they lack a process called and have greater productivity.

▼ Answer

Answer: leaf, temperatures, intensities, photorespiration

Question 18.

The particularly large cells around the vascular bundles of the C₄ pathway plants are called and the leaves which have such anatomy are said to have '.....' anatomy.

▼ Answer

Answer: bundle sheath cells, Kranz

Question 19.

In C₃ plants some O₂ does bind to RuBisCo, and hence CO₂ fixation is decreased. Here the RUBP instead of being converted to PGA is broken down in a pathway called

▼ Answer

Answer: Photorespiration

Question 20.

The C₄ plants respond to and show higher rate of while C₃ plants have a much

▼ Answer

Answer: higher temperatures, photosynthesis, temperature optimum

III. Mark the statement True (T) or False (F)

Question 1.

Water stress causes the stomata to close hence reducing the CO₂ availability.

▼ Answer

Answer: True

Question 2.

Tropical plants have a higher temperature optimum than that of the plants adapted to temperate climates.

▼ Answer

Answer: True

Question 3.

The C₄ plants show saturation at about 450 μL^{-1} while C₃ responds to increased CO₂ concentration and saturation is seen only beyond 360 μL^{-1}

▼ Answer

Answer: True

Question 4.

Green plants carry out 'photosynthesis', a physico-chemical process by which they use light energy to drive the synthesis of organic compounds.

▼ Answer

Answer: True

Question 5.

Julius Von Sachs in 1770's performed a series of experiment that revealed the essential role of air in growth of green plants.

▼ [Answer](#)

Answer: False

Question 6.

Joseph Priestley showed that sunlight is essential to the plant process that somehow purifies the air fouled by burning candles or breathing animals.

▼ [Answer](#)

Answer: False

Question 7.

Jan Ingenhousz provided evidence for production of glucose when plants grow.

▼ [Answer](#)

Answer: False

Question 8.

The former set of reactions since they are light dependent, are called light reactions.

▼ [Answer](#)

Answer: True

Question 9.

The pigments are organised into two discrete photochemical light harvesting complexes (LHC) called photosystem I (PS-I) and Photosystem II (PS II).

▼ [Answer](#)

Answer: True

Question 10.

Reduction is the most crucial step of the Calvin cycle where CO_2 is utilised for the carboxylation of RUBP.

▼ [Answer](#)

Answer: False

Question 11.

C_4 Plants are special: They have a special type of leaf anatomy, they tolerate higher temperatures, they show a response to high light intensities, they lack a process called photorespiration and have greater productivity of biomass.

▼ [Answer](#)

Answer: True

Question 12.

The primary CO_2 acceptor is 3 carbon molecule phosphoenol pyruvate (PEP) and is present in the mesophyll cells.

▼ [Answer](#)

Answer: True

Question 13.

Oxygen is the major limiting factor for photosynthesis.

▼ [Answer](#)

Answer: False

Question 14.

The C_3 plants respond to higher temperatures and show higher rate of photosynthesis while C_4 plants have a much lower temperature optimum.

▼ [Answer](#)

Answer: False

Question 15.

The vascular bundles of the C_4 pathway plants are called bundle sheath cells, and the leaves which have such anatomy are said to have 'kranz' anatomy.

▼ Answer

Answer: True

IV Match the items in Column I with the items in Column II

Column I	Column II
(a) Photosynthesis	1. Out 18 ADP
(b) It was not until about 1854 that Julius	2. Law of limiting factors
(c) T.W Engelmann	3. Consisting of cytochromes
(d) The former set of reactions since they are directly light driven	4. a physico-chemical process
(e) Wavelength of the visible spectrum	5. light absorption, water splitting, oxygen release
(f) electrons transport system	6. the plants adapted to temperate climates.
(g) Calvin cycle : In 18 ATP	7. Von Sachs provided evidence for production of glucose when plants grow.
(h) Calvin cycle : In six CO_2	8. of light as well as the VIBGYOR.
(i) RiBulose bisphosphate carboxy-lase-oxygenase	9. Using a prism he split light into its spectral components and then illuminated a green alga, cladophora.
(j) Blackman's (1905)	10. are called dark reactions
(k) Tropical plants have a higher temperature optimum than	11. out one Glucose
(l) Photochemical phase	12. (RuBisco)
(m) PS I	13. P_{700}
(n) PS II	14. Purple and green bacteria
(o) Cornelius Van Niel (1897 – 1985), who based on his studies of	15. P_{680}

▼ Answer

Answer:

Column I	Column II
(a) Photosynthesis	4. a physico-chemical process
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