

3. NUTRITION IN PLANTS (Solutions)

TEACHING TASK (Page 38 – 40)

SINGLE CORRECT ANSWER TYPE

1) Raw materials for photosynthesis:

(D) All of them

Solution: Photosynthesis requires carbon dioxide (CO₂), water (H₂O), and sunlight as raw materials to produce glucose and oxygen.

2) An example of an autotrophic plant is:

(D) Neem

Solution: Autotrophic plants produce their own food via photosynthesis. Neem is a green plant capable of photosynthesis, unlike mushrooms (saprophytic), mould (saprophytic), or dodder (parasitic).

3) An example of a saprophytic plant is:

(C) Mushroom

Solution: Saprophytic plants, like mushrooms, obtain nutrients from dead organic matter. Dodder is parasitic, and Monotropa is mycoheterotrophic, not strictly saprophytic.

4) The life processes that provide energy are:

(C) both nutrition and respiration

Solution: Nutrition provides raw materials for energy production, and respiration breaks down these materials to release energy.

5) Which of these is not necessary for photosynthesis?

(D) nitrogen

Solution: Photosynthesis requires carbon dioxide, chlorophyll, and light, but nitrogen is not directly involved in the process.

6) Of the following identify the carnivorous plant:

(C) Both of them

Solution: Both pitcher plants and Venus flytraps are carnivorous, as they trap and digest insects for nutrients.

7) CO₂ and O₂ balance in atmosphere is due to:

(B) photosynthesis

Solution: Photosynthesis consumes CO₂ and releases O₂, maintaining the balance of these gases in the atmosphere.

8) During photosynthesis the oxygen in glucose comes from:

(B) carbon dioxide

Solution: In photosynthesis, the oxygen atoms in glucose (C₆H₁₂O₆) are derived from CO₂, as confirmed by isotopic studies.

9) The source of O₂ liberated in photosynthesis is:

(C) water

Solution: The oxygen released during photosynthesis comes from the photolysis of water molecules in the light-dependent reactions.

10) Grana refers to:

(C) stacks of thylakoids

Solution: Grana are stacks of thylakoids, the structures in chloroplasts where the light-dependent reactions occur.

11) Which of the following wavelength of light is absorbed maximum for photosynthesis?

(A) Red light

Solution: Chlorophyll absorbs red light (around 660–680 nm) most efficiently, followed by blue light, for photosynthesis.

12) Which of the following is the least effective in photosynthesis?

(C) Green light

Solution: Green light is reflected by chlorophyll, making it the least effective for photosynthesis.

13) The assimilatory power in photosynthesis is:

(C) ATP and NADPH₂

Solution: ATP and NADPH (assimilatory power) are produced in the light-dependent reactions and used in the Calvin cycle to fix CO₂.

14) A specific function of light energy in the process of photosynthesis is to:

(A) activate chlorophyll

Solution: Light energy excites chlorophyll molecules, initiating the light-dependent reactions of photosynthesis.

15) ATP formation during photosynthesis is known as:

(B) photophosphorylation

Solution: ATP is formed during the light-dependent reactions through photophosphorylation, driven by light energy.

16) Dark reaction in photosynthesis is called so because:

(A) it does not require light energy

Solution: The dark reaction (Calvin cycle) does not directly require light, as it uses ATP and NADPH from the light reactions.

17) Dark reaction of photosynthesis occurs in the:

(A) stroma of the chloroplast outside the lamellae

Solution: The dark reaction (Calvin cycle) occurs in the stroma of the chloroplast, where CO₂ is fixed into glucose.

18) Holophytic nutrition means:

(A) autotrophism

Solution: Holophytic nutrition is synonymous with autotrophic nutrition, where organisms produce their own food (e.g., via photosynthesis).

19) Autotrophic nutrition occurs in:

(D) Both B and C

Solution: Plants and some protists/prokaryotes (e.g., algae, cyanobacteria) are autotrophic, producing food via photosynthesis.

20) Mushroom, Rhizopus, and Yeast are:

(D) Saprophytic

Solution: These organisms feed on dead organic matter, making them saprophytic.

21) Chlorophyll is present:

(A) in the grana of chloroplast

Solution: Chlorophyll is located in the thylakoid membranes within the grana of chloroplasts.

22) Chlorophyll cannot absorb one of the following:

(D) green light

Solution: Chlorophyll reflects green light, which is why plants appear green.

23) The oxygen in photosynthesis is released from:

(B) H_2O

Solution: Oxygen released during photosynthesis comes from the splitting of water molecules during photolysis.

24) Dark reaction of photosynthesis occurs in:

(B) Stroma

Solution: The dark reaction (Calvin cycle) takes place in the stroma of the chloroplast.

25) Photosynthesis proceeds in sequence of:

(C) Light phase and dark phase

Solution: Photosynthesis occurs in two stages: the light-dependent reactions (light phase) followed by the light-independent reactions (dark phase).

26) In bacterial photosynthesis, the hydrogen donor is:

(D) H_2S

Solution: In bacterial photosynthesis (e.g., in purple sulfur bacteria), H_2S is often the hydrogen donor, unlike H_2O in plants.

27) Chlorophyll in chloroplasts is located in:

(A) grana

Solution: Chlorophyll is embedded in the thylakoid membranes of the grana.

28) Which of the following is the best equation representing photosynthesis?

(C) energy + 6 CO₂ + 12 H₂O → C₆H₁₂O₆ + 6 H₂O + 6 O₂

Solution: This equation accurately represents photosynthesis, showing the inputs (CO₂, H₂O, light energy) and outputs (glucose, water, oxygen).

29) In which part of chloroplast light reaction of photosynthesis occurs?

(A) Grana

Solution: The light-dependent reactions occur in the thylakoid membranes of the grana.

30) The raw materials for photosynthesis are:

(D) CO₂ and water

Solution: The primary raw materials for photosynthesis are carbon dioxide and water, with sunlight providing the energy.

OUR FOOD (Page 40 - 43)

1) Holophytic nutrition means:

(A) autotrophism

Solution: Holophytic nutrition refers to autotrophic nutrition, where organisms synthesize their own food (e.g., plants via photosynthesis).

Passage-based Questions (2–6):

The passage describes photosynthesis, where green plants convert solar energy into chemical energy to produce food.

2) The process represented by above equation is:

(A) Photosynthesis

Solution: The equation describes photosynthesis, where plants use sunlight to convert CO₂ and H₂O into glucose and oxygen.

3) The gas produced in above process are:

(A) Oxygen

Solution: Photosynthesis produces oxygen as a byproduct, released from the splitting of water molecules.

4) The essential factors for above process are:

(B) Sunlight and Chlorophyll

Solution: Sunlight provides the energy, and chlorophyll absorbs it, both essential for photosynthesis.

5) This process is stopped at night because:

(D) Sunlight is not available

Solution: Photosynthesis requires sunlight for the light-dependent reactions, so it stops at night.

6) In which substance the chemical energy is stored by the above process?

(C) $C_6H_{12}O_6$

Solution: Chemical energy is stored in glucose ($C_6H_{12}O_6$), the primary product of photosynthesis.

7) Autotrophic nutrition occurs in:

(D) Both B and C

Solution: Autotrophic nutrition occurs in plants and some protists/prokaryotes (e.g., algae, cyanobacteria).

8) Mushroom, Rhizopus, and Yeast are:

(D) Saprophytic

Solution: These organisms feed on dead organic matter, making them saprophytic.

9) Which of the following statements about the autotrophs is incorrect?

(C) They convert carbon dioxide and water into carbohydrates in the absence of sunlight

Solution: Autotrophs require sunlight for photosynthesis, so this statement is incorrect.

10) Select the correct statement:

(A) Heterotrophs do not synthesise their own food

Solution: Heterotrophs rely on other organisms for food, unlike autotrophs.

11) Chlorophyll is present:

(A) in the grana of chloroplast

Solution: Chlorophyll is located in the thylakoid membranes within the grana.

12) Chlorophyll cannot absorb one of the following:

(D) green light

Solution: Chlorophyll reflects green light, which is why plants appear green.

13) The process in which water is split during photosynthesis is:

(A) Photolysis

Solution: Phot and water is split into oxygen, protons, and electrons.

14) The oxygen in photosynthesis is released from:

(B) H₂O

Solution: Oxygen is released from the photolysis of water during the light-dependent reactions.

15) Dark reaction of photosynthesis occurs in:

(B) Stroma

Solution: The dark reaction (Calvin cycle) occurs in the stroma of the chloroplast.

16) Photosynthesis proceeds in sequence of:

(C) Light phase and dark phase

Solution: Photosynthesis involves light-dependent reactions followed by light-independent (dark) reactions.

17) In bacterial photosynthesis, the hydrogen donor is:

(D) H₂S

Solution: In bacterial photosynthesis, H₂S is often used as a hydrogen donor instead of H₂O.

18) Light waves where photosynthesis is maximum are:

(D) Violet-Blue and Red

Solution: Chlorophyll absorbs violet-blue and red light most efficiently for photosynthesis.

19) The carbohydrate reserve of plants is:

(A) Starch

Solution: Plants store carbohydrates primarily as starch.

20) Choose the event that does not occur in photosynthesis:

(C) Oxidation of carbon to carbon dioxide

Solution: Photosynthesis involves the reduction of CO₂ to carbohydrates, not the oxidation of carbon to CO₂.

21) Chlorophyll in chloroplasts is located in:

(A) grana

Solution: Chlorophyll is found in the thylakoid membranes of the grana.

22) Which of the following is the best equation representing photosynthesis?

(C) energy + 6 CO₂ + 12 H₂O → C₆H₁₂O₆ + 6 H₂O + 6 O₂

Solution: This equation accurately represents the stoichiometry of photosynthesis.

23) In which part of chloroplast light reaction of photosynthesis occurs?

(A) Grana

Solution: The light-dependent reactions occur in the thylakoid membranes of the grana.

24) The raw materials for photosynthesis are:

(D) CO₂ and water

Solution: CO₂ and water are the primary raw materials for photosynthesis.

25) Plants are green in colour because:

(B) they reflect green light

Solution: Plants appear green because chlorophyll reflects green light while absorbing other wavelengths.