

BIOLOGY

BOOKS - ARIHANT NEET BIOLOGY (HINGLISH)

PHOTOSYNTHESIS IN HIGHER PLANTS

Check Point 20.1

1. Name the cells that act as kitchen of green plants

A. parenchyma cells

B. mesophyll cells

C. pith cells

D. epidermins

Answer: B



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2. The fluid containing proteinaceous matrix of chloroplast is

A. thylakoids

B. cytosol

C. cytoplasm

D. stroma

Answer: D



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3. Which of the following statements is false about structure of chloroplast ?

- A. It is a double membrane bound organelle
- B. A stack of thylakoids in chloroplast form a lamella
- C. Adjacent grana are connected by unstacked membranes
- D. The light absorbing pigments are present in the grana

Answer: B



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4. The site of light trapping in chloroplast is

A. thylokoid membranes

B. stroma

C. plasma fluid

D. stromal lamellae

Answer: A



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5. Name the part of chlorophyll, where electron rearrangement takes place when chlorophyll gets excited

- A. Mg atom
- B. porphyrin ring
- C. phytol chain
- D. hydrocarbon

Answer: B



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6. The proteins with which the phytol tail of chlorophyll molecules interact are present in which part of the chloroplast ?

- A. Stroma

B. Thylakoids

C. Outer surface of chloroplast

D. Attached to the ribosomes of chloroplast

Answer: B



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7. The major difference between chl-a and chl-b is that chl-a has

A. methyl group bonded to porphyrin

B. aldehyde group bonded to porphyrin

C. alcohol group bonded to phytol

D. aldehyde group attached to tail

Answer: A



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8. Which of the following groups of pigments represent accessory pigment ?

A. chl-b, carotenoids and phycobillins

B. chl-a, and carotenoids

C. phycobilins and carotenoids

D. xanthophylls only

Answer: A



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9. The yellow colour of autumn leavaes is due to

A. fucoxanthin

B. lutein

C. lycopene

D. zeauanthin

Answer: B



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10. According to Emerson the fall in quantum yield above 680 nm is called

- A. photosynthetic drop
- B. Emerson drop
- C. Warburg effect
- D. red drop

Answer: D



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11. The term quantasomers was given by

- A. Ruben

B. Park and Biggins

C. TW Engelmann

D. Emerson

Answer: B



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12. Which photosystem is found to be located on the outer surface of thylakoid ?

A. PS-I

B. PS-II

C. P_{890}

D. Both (a) and (b)

Answer: A



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13. Photosystem usually involved in both cyclic and non-cyclic photophosphorylation is

A. PS-I

B. PS-II

C. Both (a) and (b)

D. P_{890}

Answer: A



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14. Water splitting is concerned with photosystem

- A. PS-I
- B. PS-II
- C. Both (a) and (b)
- D. None of these

Answer: B



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Check Point 20 2

1. During photosynthesis which of the following event does not take place ?

A. Oxidation of CO_2

B. Reduction of CO_2

C. Oxidation of H_2O

D. Light absorption

Answer: A



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2. During electron transport system ?

A. reduction of NADP occurs

- B. oxidation of ADP occurs
- C. phosphorylation of NADP occurs
- D. hydrogenation of FAD occurs

Answer: A



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3. Who demonstrated photolysis of water ?

- A. Robin Hill
- B. TW Engelman
- C. Melvin Calvin
- D. P Mitchell

Answer: A



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4. The first electron acceptor in non- cyclic electron transfer is

A. cytochrome- $b_6 - f$

B. plastocyanin

C. NADP

D. plastoquinone

Answer: D



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5. Cytochrome carries electrons on Fe-atom , whereas

A. magnesium

B. copper

C. manganese

D. iron

Answer: B



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6. During cyclic photophosphoylation energy rich electrons form PS-I are first transferred to

A. Ferredoxin reducing substance

B. Cytochrome

C. NADP

D. Primary electron acceptor

Answer: A



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7. Which of the following is a prominent difference between cyclic and non - cyclic photophosphorylation ?

A. No formation of NADH in cyclic photophosphorylation

B. Cyclic photophosphorylation occurs in grana

C. Non - cyclic photophosphorylation requires anaerobic condition

D. Cyclic photophosphorylation is inhibited by DCMU

Answer: A



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8. The concentration of protons is usually very high in

A. thylakoid lumen

B. stroma

C. granal membrane

D. cytosol

Answer: A



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9. DCMU is a herbicide, which blocks electron flow from

A. $PS - II \rightarrow PQ$

B. $PQ \rightarrow Cyt. b_6 - f$

C. $PS - I \rightarrow FRS$

D. $Cyt. b_6 - f \rightarrow$

Answer: B



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10. Which of the following photosynthetic inhibitor group damages PS-I ?

A. CMU

B. Paraquat

C. Atrazine

D. All of these

Answer: D



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11. Name the scientist who discovered dark reaction in 1905.

A. Blackman

B. Van Neil

C. Melvin Calvin

D. Engel man

Answer: A



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12. The five carbon containg primary acceptor of CO_2 in Calvin cycle is

A. RuBP

B. OAA

C. PEA

D. RuBisCO

Answer: A



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13. The steps of dark reactions are

A. regeneration → carboxylation → reduction

B. reduction → oxidation → hydrogenation

C. carboxylation → reduction → regeneration

D. reduction → carboxylation → regeneration

Answer: C



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14. Enzyme involved in the formation of Fructose 1, 6-diphosphate from phosphoglyceraldehyde is

- A. isomerase
- B. aldolase
- C. RuBisCO
- D. phosphatase

Answer: B



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15. Turns of Calvin cycle required to produce 7 glucose molecules are

A. 42

B. 35

C. 30

D. 60

Answer: A

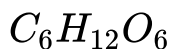


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Check Point 20 3

1. Which of the following correctly explains the reason why C_4 - pathway is name so ?

A. it requires four turns of Calvin cycle to produce one



B. First stable compound is 4C

C. Primary CO_2 acceptor is 4C

D. it requires four raw materials

Answer: B



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2. Name the scientists who first worked out the C_4 - pathway ?

A. Melvin Calvin

B. Robin Hill

C. Linnaeus

D. Hatch and Slack

Answer: D



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3. The primary CO_2 acceptor in CO_2 fixation in C_4 pathway is

- A. oxaloacetic acid
- B. citric acid
- C. RuBP
- D. Phosphoenol pyruvate

Answer: D



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4. The enzyme that catalyses carbon dioxide fixation in C_4 plants is

- A. aldolase
- B. PEP carboxylase

C. RuBP carboxylase

D. isomerase

Answer: B



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5. Enzyme that catalyses secondary CO_2 fixation in C_4 - pathway is

A. aldolase

B. PEP carboxylase

C. isomerase

D. RuBP carboxylase

Answer: D



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6. Optimum temperature for photosynthesis in C_4 plants is

A. $10 - 20^{\circ}C$

B. $15 - 25^{\circ}C$

C. $30 - 45^{\circ}C$

D. $50 - 60^{\circ}C$

Answer: C



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7. The plant family that does show CAM pathway is

A. Crassulaceae

B. Euphorbiaceae

C. Cactaceae

D. Gramineae

Answer: D



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8. The enzyme that converts oxaloacetate into malic acid is

A. malic dehydrogenase

B. oxalophosphatase

C. malic phosphatase

D. RuBP carboxylase

Answer: A



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9. The scientist who first observed photorespiration is

A. Dicker and Tijo

B. Otto Warburg

C. Ruben and Kamen

D. Joseph Priestly

Answer: B



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10. How many ATP and NADPH are formed during photorespiration ?

A. 3 and 6 respectively

B. 4 and 5 respectively

C. 1 and 9 respectively

D. zero

Answer: D



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11. The organelle where glycolate convert into glycine during photorespiration is

- A. chloroplast
- B. mitochondria
- C. peroxisome
- D. nucleus

Answer: C



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12. The reaction centre of bacteriochlorophyll is

- A. P_{670}

B. P_{890}

C. P_{680}

D. P_{700}

Answer: B



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13. Photosynthetically active radiation (PAR) represents the following range of wavelength

A. 700- 900 nm

B. 400-700nm

C. 200-400nm

D. 600-900nm

Answer: B



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14. At compensation point

- A. respiration is more than photosynthesis
- B. photosynthesis is more than respiration
- C. photosynthesis is equal to respiration
- D. No photosynthesis

Answer: C



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15. The principle of limiting factors was proposed by:-

A. Warburg

B. Blackman

C. Decker and Tijo

D. Liederburg

Answer: B



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Chapter Exercises A Taking It Together

1. The most unique feature of photosynthesis is

- A. production of oxygen
- B. production of food
- C. conversion of light energy into chemical energy
- D. All of the above

Answer: D



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2. The source of energy for carbon assimilation is

- A. water

B. sunlight

C. carbon dioxide

D. chlorophyll

Answer: B



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3. In photosynthesis , chlorophyll serves as

A. hydrogen acceptor

B. hydrogen donor

C. energy converter

D. raw material

Answer: C



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4. If all the plants are to die, all the animals will also die due to deficiency of

- A. carbon dioxide
- B. nitrogen
- C. oxygen
- D. Both (a) and (b)

Answer: C



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5. Plants are known as purifiers for air due to the process of

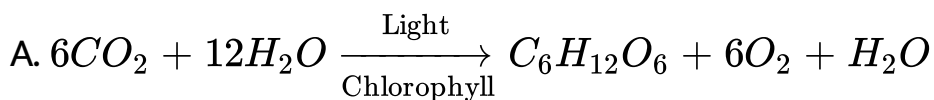
- A. Respiration
- B. Photosynthesis
- C. Transpiration
- D. Desiccation

Answer: B

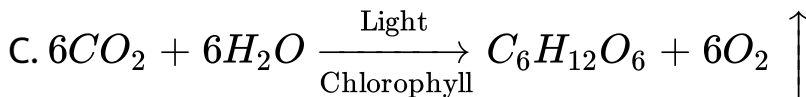
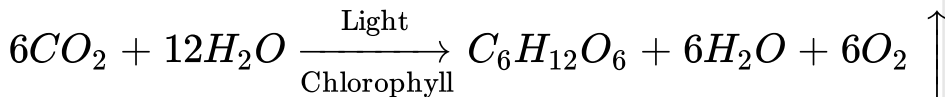


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6. Which of the following equations sums up photosynthetic reaction most accurately



B.



D. None of the above

Answer: B



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7. The sequence of energy change in photosynthesis is

A. light -electrical chemical

B. light -chemical

C. light -electrical

D. electrical -chemical

Answer: B



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8. During photosynthesis

A. water gets reduced and carbon dioxide gets oxidised

B. CO_2 gets reduced and water gets oxidised

C. Both (a) and (b)

D. both carbon dioxide and water get reduced

Answer: B



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9. The first experiment on photosynthesis in flashing light were carried out by

- A. Robert Hill
- B. Melvin Calvin
- C. FF Blackman
- D. Emerson and Arnold

Answer: D



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10. Which of the following scientist confirmed that O_2 comes from water during photosynthesis ?

A. Van Neil

B. Ruben

C. Hill

D. Ruben and Kamen

Answer: D



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11. A photosynthesising plant is releasing ^{18}O more than the normal. The plant must have been supplied with

A. O_3

B. H_2O with $.^{18}O$

C. CO_2 with $.^{18}O$

D. $C_2H_{12}O_6$ with $.^{18}O$.

Answer: B



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12. Photosynthetic pigments in chloroplast lie embedded in

A. chloroplast envelope

B. plastoglobule

C. matrix

D. thylakoids

Answer: D



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13. Which metal ion is a constituent of chlorophyll?

A. Iron

B. copper

C. Magnesium

D. Zinc

Answer: C



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14. Water soluble pigment is

- A. chlorophyll
- B. carotene
- C. phycocyanin
- D. xanthophyll

Answer: C



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15. Carotenes and phycobilins are also known as

- A. respiratory pigments
- B. accessory pigments
- C. photosynthetic pigments
- D. necessary pigments

Answer: B



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16. The graph representing absorption of light at different wavelength is called

- A. absorption spectrum
- B. action spectrum

C. Both (a) and (b)

D. None of these

Answer: A



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17. Chlorophyll molecules absorb light maximum in

A. green region

B. orange region

C. yellow region

D. red and blue region

Answer: D



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18. The graph showing rate of photosynthesis at different wavelength of light is called

- A. absorption spectrum
- B. action spectrum
- C. Both (a) and (b)
- D. None of these

Answer: B



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19. Which of the following is least effective in photosynthesis

- A. Sun light
- B. Red light
- C. Blue light
- D. Green light

Answer: D



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20. Which light range is most effective in

- A. Blue

B. Green

C. Red

D. Violet

Answer: C



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21. The photosynthetic unit having 250 chlorophyll molecules is called

A. photon

B. quantasome

C. peroxysome

D. oxysome

Answer: B



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22. Maximum O_2 evolution occurs from

A. forests

B. marine phytoplankton

C. crops

D. land mass

Answer: B



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23. Cyclic photophosphorylation is confined to

- A. PS-I
- B. PS-II
- C. Both (a) and (b)
- D. none of these

Answer: A



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24. Products of light reaction in photosynthesis are

A. ATP and $NADPH_2$

B. ADP and glucose

C. ferredoxin and cytochrome - b_6

D. cytochromes

Answer: A



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25. The synthesis of ATP in both photosynthesis

A. electron

B. CO_2

C. cytochromes

D. O_2

Answer: A



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26. Dark reaction in photosynthesis is called so because

- A. it can occur in dark also
- B. it does not directly depend on light energy
- C. it cannot occur during day light
- D. it occurs more rapidly at night

Answer: B



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27. Dark reaction of photosynthesis occurs in

A. matrix

B. grana

C. stroma

D. cytoplasm

Answer: C



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28. Calvin cycle occurs in

A. Mitochondria

B. Chloroplast

C. Cytoplasm

D. Glyoxysomes

Answer: B



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29. The number of carbon atoms present in ribulose biphosphate is

A. 6

B. 5

C. 8

D. 3

Answer: B



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30. Carotenes and xanthophyll pigments absorb radiant energy and

- A. carry out photosynthesis to produce carbohydrates
- B. do not take any part in photosynthesis
- C. lose the energy as heat

D. transfer this energy to chlorophyll -a and b where , it
is transformed into chemical energy

Answer: D



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31. All the reactions from the reduction of CO_2 to the formation of sugars are included in

A. light reaction

B. photolysis

C. dark reaction

D. Hill reaction

Answer: C



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32. Photocentres in higher plants are

A. P_{700}

B. P_{680}

C. Both (a) and (b)

D. chlorophyll -a

Answer: C



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33. PS-II is not concerned with

- A. photolysis of water
- B. non-cyclic phosphorylation
- C. reduction of CO_2
- D. release of energy

Answer: C



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34. The process of photophosphorylation was discovered by

- A. Priestly

B. Calvin

C. Arnon

D. Warburg

Answer: C



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35. The site of photophosphorylation in chloroplast is

A. grana stacks

B. matrix

C. chloroplast surface

D. None of these

Answer: A



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36. Photophosphorylation is a process in which

- A. light energy is converted into chemical energy by production of ATP
- B. glutamic acid is formed
- C. 2 PGA is formed
- D. None of above

Answer: A



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37. The production of energy rich phosphate bonds as in ATP (adenosine triphosphate) in the absence of light is known as

- A. photophosphorylation
- B. photo-respiration
- C. photo-oxidation
- D. oxidative phosphorylation

Answer: D



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38. What is the source of oxygen liberated in photosynthesis ?

A. Carbon dioxide

B. Water

C. Sugars

D. Proteins

Answer: B



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39. Which of the following is a C_4 -plant ?

A. Potato

B. Sugarcane

C. Pea

D. Papaya

Answer: B



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40. Agranal chloroplasts are characteristic of

A. mesophyll of pea leaves

B. bundle sheath of mango leaves

C. mesophyll of maize leaves

D. bundle sheath of sugarcane leaves

Answer: D



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41. Which of the following plants is a better photosynthesiser ?

A. Mango

B. Sugarcane

C. Wheat

D. Rice

Answer: B



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42. Tropical plants like maize show high efficiency of CO_2 fixation because of

- A. TCA cycle
- B. EMP pathway
- C. Hatch-Slack cycle
- D. Calvin cycle

Answer: C



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43. In CAM plants , organic acids are decarboxylated

- A. day

B. night

C. Both (a) and (b)

D. None of these

Answer: A



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44. In a CAM plant the concentration of organic acid

A. decreases during day

B. increases at night

C. Both (a) and (b)

D. remains same always

Answer: C



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45. A wastage process is

- A. respiration
- B. photosynthesis
- C. photorespiration
- D. movement

Answer: C



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46. Photorespiration in C_3 - plants starts from

- A. phosphoglycerate
- B. phosphoglycolate
- C. glycerate
- D. glycine

Answer: B



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47. Photorespiration is favoured by

- A. high oxygen and low carbon dioxide
- B. high carbon dioxide and low oxygen

C. high temperature and low oxygen

D. high humidity and temperature

Answer: A



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48. Experiment to prove essentiality of CO_2 for

A. Van Moll

B. Calvin et al.

C. Arnon

D. R hill

Answer: B



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49. Optimum temperature for photosynthesis is

A. $10 - 15^{\circ}C$

B. $20 - 35^{\circ}C$

C. $25 - 30^{\circ}C$

D. $35 - 40^{\circ}C$

Answer: C



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50. High CO_2 compensation point is found in

A. C_3 -plants

B. C_4 - plants

C. CAM plants

D. algae

Answer: A



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51. For demonstration of photosynthesis experiments, usually aquatic plant Hydrilla is used, not any terrestrial plant, why?

A. it carries out faster photosynthesis

- B. O_2 is released throughout and can accumulate over the water
- C. it respire slowly
- D. None of the above

Answer: B



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52. At high oxygen concentration, the rate of photosynthesis decreases due to

- A. Richmond Lang effect
- B. Warburg effect

C. Emerson effect

D. Pasteur effect

Answer: B



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53. Which products of Hill reaction are used in Blackman's reaction

A. ATP, NAD

B. NAD, ADP

C. ATP, NADP

D. *ATP*, *NADPH*₂

Answer: D



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54. Which "photosynthetic bacteria" possess both *PS I* and *PS II*

- A. Purple sulphur bacteria
- B. Cyanobacteria
- C. Purple non- sulphur bacteria
- D. Green -sulphur bacteria

Answer: B



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55. In blue-green algae , photosystem - II contains important pigment concerned with photolysis of water , it is a

A. phycocyanin

B. cytochrome -c

C. chlorophyll-b

D. β -carotene

Answer: A



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56. A photosynthetic organism which does not release oxygen is

- A. green sulphur bacteria
- B. algal component of lichen
- C. blue - green algae
- D. spirochaete

Answer: A



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57. Photosynthesis is maximum during

- A. intermittent light

B. continuous strong light

C. continuous dimlight

D. None of these

Answer: A



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58. Which of the following statements is correct about C_4 type of photosynthesis ?

A. C_4 -cycle is an independent cycle

B. C_4 - cycle is adjacent of Calvin cycle

C. RuBP carboxylase has higher affinity for CO_2

D. Carboxylase is present in the bundle sheath cells

Answer: B



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59. The C_4 -plants differ from C_3 - plants in

A. type of pigments involved in photosynthesis

B. number of ATP's evolved in formation of sugar

C. the substance that accepts CO_2 during assimilation

D. type of end products of photosynthesis

Answer: C



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60. Which of the following kinds of plant fixes carbon dioxide by way of crassulacean acid metabolism (CAM)

- A. Oak tree
- B. Grass
- C. Red algae
- D. Cactus (succulents)

Answer: D



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61. The substance for photorespiration is

- A. malic acid
- B. oxaloacetic acid
- C. glycolic acid
- D. PGA

Answer: C



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62. In blue -green algae , photosynthesis occurs in

- A. chromatophores

B. Chloroplast

C. photosynthetic lamellae

D. chromoplast

Answer: C



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63. Liberation of sulphur instead of oxygen by photosynthetic sulphur bacteria was experimentally proved by

A. Calvin

B. Van Neil

C. R Hill

D. Ruben and Kamen

Answer: B



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64. Which wavelength of light carry out photosynthesis in bacteria

A. blur

B. red

C. ultraviolet

D. near infra red or far red

Answer: D



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65. The two enzymes which are used for primary carboxylation in C_3 and C_4 respectively are

- A. RuBP carboxylase and PEP carboxylase
- B. RuBP carboxylase and pyruvate carboxylase
- C. PEP carboxylase and pyruvate carboxylase
- D. PEP carboxylase and RuBP carboxylase

Answer: A



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66. In case of C_4 - plants , whcih enzyme fixes the CO_2 released during decarboxylation of malate

- A. RuBisCO
- B. MDH
- C. PEPase
- D. None of these

Answer: A



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67. The carrier of CO_2 from mesophyll cells to bundle sheath cell is

- A. ATP
- B. NAD
- C. pyruvic acid
- D. malic acid

Answer: D



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68. PEP is primary CO_2 acceptor in

- A. C_4 -plants
- B. C_3 -plants
- C. C_2 -plants

D. Both (a) and (b)

Answer: A



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69. In case of C_4 -pathway, CO_2 combines with

A. MDH

B. PGA

C. RuBP

D. PEP

Answer: D



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70. The first product of CO_2 fixation in C_4 -plants is

- A. 3-phosphoglyceric acid
- B. malic acid
- C. oxaloacetate
- D. Phosphoenol pyruvate

Answer: C



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71. When CO_2 is added to PEP. The first stable product synthesised is

- A. pyruvate
- B. glyceraldehyde-3-phosphate
- C. phosphoglycerate
- D. oxaloacetate

Answer: D



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72. The first carbon fixation in C_4 pathway occurs in chloroplasts of

- A. palisade tissue
- B. spongy mesophyll

C. bundle sheath

D. guard cells

Answer: B



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73. C_4 -plants are found among

A. dicots

B. monocots

C. Both (a) and (b)

D. in family -Poaceae (Gramineae)

Answer: C



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74. Which of the following plants is not a C_4 -plant ?

A. *Saccharum munja*

B. *Amaranthus*

C. *Zea mays*

D. *Zingiber officinale*

Answer: D



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75. Maize is a

A. C_2 -plant

B. C_3 -plant

C. C_4 -plant

D. CAM plant

Answer: C



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76. The enzyme that is not found in a C_3 plant is

A. RuBP carboxylase

B. PEP carboxylase

C. NADP reductase

D. ATP synthase

Answer: B



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77. How many ATP and $NADPH_2$ molecules are used for fixing one molecule of CO_2 ?

- A. Three and two respectively
- B. Three each
- C. Two each
- D. Two and three respectively

Answer: A



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78. How many molecules of inorganic phosphate molecules are generated in Calvin cycle in formation of PGAL ?

A. 12

B. 6

C. 17

D. 18

Answer: A



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79. Through which of the following substances the photosystem-I passes an electron to NADP during light reactions

- A. Cytochrom
- B. plastocyanin
- C. Ferredoxin (FRS)
- D. None of these

Answer: C



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80. During ATP synthesis , electrons pass through

A. CO_2

B. O_2

C. H_2O

D. Cytochromes

Answer: D



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81. The electrons liberated from PS-II first go to

A. carotenoids

B. plastocyanin

C. ferredoxin

D. plastoquinone

Answer: D



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82. NADP is converted into $NADPH_2$ in

A. photosystem -II

B. photosystem- I

C. Calvin cycle

D. non- cyclic photophosphorylation

Answer: D



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83. Synthesis of $ADP + P_i \rightarrow ATP$ in grana/photosynthesis is

- A. phosphorylation
- B. oxidative phosphorylation
- C. photophosphorylation
- D. photolysis

Answer: C



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84. The excess energy of electron is used in the synthesis of

- A. carbohydrates
- B. ATP from ADP and IP
- C. NAD from $NADH_2$
- D. sugars from CO_2

Answer: B



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85. The normal state of an atom or molecule is known as

- A. ground state

- B. single state
- C. Both (a) and (b)
- D. excited state

Answer: C



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86. Where does the primary photochemical reaction occur in the chloroplast ?

- A. Quantasome or thylakoid
- B. Stroma
- C. Grana

D. Inner - membrane of chloroplast

Answer: A



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87. During photosynthesis O_2 is liberated by oxidation of

A. CO_2

B. H_{20}

C. phosphoglyceraldehyde

D. None of these

Answer: B



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88. How many quanta are required in photosynthesis to release one molecule of O_2 ?

A. 12

B. 10

C. 8

D. 20

Answer: C



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89. The number of oxygen molecules produced per quantum of light absorbed is

- A. oxygen yield
- B. photosynthesis yield
- C. quantum yield
- D. organic yield

Answer: C



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90. Energy required for ATP synthesis in PSII comes from

- A. proton gradient

- B. electron gradient
- C. reduction of glucose
- D. oxidation of glucose

Answer: A



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91. Approximate number of chlorophyll molecules required to evolve one molecule of O_2 are

- A. 2480 molecules
- B. 2280 molecules
- C. 2180 molecules

D. 2275 molecules

Answer: A



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92. Photosynthesis consists of essentially two biological reaction systems, One followed by the other, One followed by the other, the second of these systems does which of the following

A. Traps light energy

B. Synthesises starch

C. Fixes CO_2

D. Works only in the presence of light

Answer: C



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93. During formation of 1,3-diphosphoglyceric acid from 3 phosphoglyceric acid , the phosphatic donor is

A. H_3PO_4

B. ATP

C. ADP

D. GTP

Answer: B



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94. During photosynthesis when PGA is changed into phosphoglyceraldehyde, which of the following reaction occur

- A. Oxidation
- B. reduction
- C. electrolysis
- D. hydrolysis

Answer: B



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95. Ribulose diphosphate carboxylase oxygenase is location in

- A. Golgi bodies
- B. peroxysomes
- C. chloroplast
- D. mitochondria

Answer: C



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96. The initial enzyme of Calvin cycle is

- A. cytopchrome oxidase

- B. photo-pertokinase
- C. RuBP carboxylase/oxygenase
- D. triose phosphate dehydrogenasse

Answer: C



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97. Chloroplast contains maximum quanintity of

- A. hexaokinase
- B. RuBisCO enzyme
- C. RuBP
- D. pyruvic carboxylase

Answer: B



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98. The source of hydrogen atoms for the synthesis of glucose is

A. H_2O

B. $FADH_2$

C. $NADPH_2$

D. ATP

Answer: C



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99. Ribulose diphosphate carboxylase enzyme catalyses the carboxylation reaction between

- A. CO_2 and ribulose 1,5-diphosphate
- B. acetyl $Co - A$ and oxaloacetic acid
- C. PGA and dihydroxy acetone phosphate
- D. ribulose , diphosphate phosphoglyceraldehyde

Answer: A



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100. The number of chlorophyll molecules required to fix

- A. 2500

B. 5000

C. 10000

D. 50000

Answer: A



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101. Botanical name of the algae used by Calvin and his coworker in photosynthesis experiments is

A. Chlamydomonas

B. Chlorella

C. Euglena

D. Chara

Answer: B



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102. Carbon dioxide joins the route of photosynthesis during

A. photosystem-I

B. photosystem-II

C. dark reaction

D. light reaction

Answer: C



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103. During photosynthesis , which process releases electrons that return to chlorophyll molecules in their reduced state ?

- A. Nutrition of photosystem -I
- B. Oxidation of reduced NADP
- C. Phosphorylation of ADP
- D. Photolysis of water

Answer: D



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104. Splitting of water is associated with

- A. photosystem -I
- B. lumen of thlakoid
- C. both photosystem -I and II
- D. inner surface of thylakoid membrane

Answer: D



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105. When light strikes chlorophyll molecule , they lose electron, which are ultimately followed by

- A. splitting of water

- B. breaking down ATP
- C. removing them from NADPH
- D. fixing carbon

Answer: A



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106. During light reaction in photosynthesis the following are formed.

- A. ATP and sugar
- B. hydrogen , O_2 and sugar
- C. ATP, hydrogen donor and O_2

D. ATP, hydrogen and O_2 donor

Answer: C



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107. Primary electron acceptor in cyclic photophosphorylation is

A. NADP

B. FAD

C. CO_2

D. FRS (Iron -sulphur protein)

Answer: D



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108. Dichlorophenyl Dimethyl Urea (DCMU) also called diuron, a potent herbicide stops

- A. O_2 evolution
- B. non-cyclic photophosphorylation
- C. Both (a) and (b)
- D. oxidative photophosphorylation

Answer: C



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109. Paraquat kills plant by inhibiting

- A. respiration
- B. pigment system -II
- C. pigment system -I
- D. dark -reaction

Answer: C



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110. ATP formation in photosynthesis is known as

- A. photophosphorylation

- B. phosphorylation
- C. oxidative phosphorylation
- D. None of the above

Answer: A



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111. The isotopes that have proved useful in reseaches on photosynthesis are

A. O_{15} and O^{14}

B. C^{11} and P^{32}

C. P^{32} and O^{18}

D. C^{14} and O^{18}

Answer: D



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112. The byproduct of photosynthesis is

A. O_2

B. CO_2

C. H_2O

D. ATP

Answer: A



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113. Which range of wavelength (in nm) is called photosynthetically active radiation (PAR)?

A. 100 – 390

B. 390 – 430

C. 400 – 700

D. 760 – 10000

Answer: C



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114. The universal photosynthetic pigment (s) is /are ?

- A. chlorophyll-a
- B. chlorophyll-b
- C. chlorophyll-c
- D. Both (a) and (b)

Answer: A



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115. Basic structure of al chlorophylls compries

- A. cytochrome system
- B. flavoproteins
- C. porphyrin system

D. plastocyanin

Answer: C



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116. In angiosperms , synthesis of chlorophyll occurs in the presence of

- A. phytochrome
- B. cytochrome
- C. light
- D. All of these

Answer: C



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117. The head and tail of chlorophyll are made up of

- A. porphyrin and phytin
- B. pyrrol and tetrapyrrol
- C. porphyrin and phytol
- D. tetraphyrrol and pyrrol

Answer: C



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118. The total number of carbon atoms in phytol chain is

A. 20

B. 22

C. 25

D. 32

Answer: A



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119. The pigment chlorophyll-a is absent in

A. gymnosperms

B. bacteria

C. algae

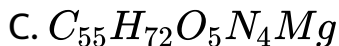
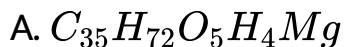
D. bryophyta

Answer: B



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120. the empirical formula for chlorophyll a is



D. None of these

Answer: C



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121. Which pigment acts directly to convert light energy to chemical energy?

A. Chlorophyll -a

B. Chlorophyll -b

C. Xanthophyll

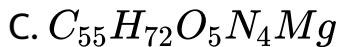
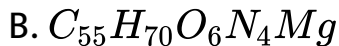
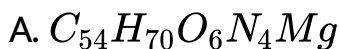
D. Carotenoid

Answer: A



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122. Chlorophyll b is



Answer: B



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123. Which of the following pigment prevents the photo-oxidation of chlorophyll molecules ?

A. Phycobillins

B. Carotenoids

C. anthocyanin

D. None of these

Answer: B



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124. $C_{40}H_{56}$ is the empirical formula of

A. chlorophyll -b

B. carotense

C. anthocyanin

D. xanthophyll

Answer: B



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125. $C_{40}H_{56}$ is the empirical formula of

A. xanthophyll

B. anthocyanin

C. chlorophyll

D. xanthophyll

Answer: A



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126. Which colour of light gives maximum absorption peak of chlorophyll a

- A. Blue light
- B. Green light
- C. Red light
- D. Violet light

Answer: A



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127. Discovery of Emerson effect has already shown in existence of

- A. photorespiration
- B. photophosphorylation
- C. light and dark reaction in photosynthesis
- D. two distinct photochemical reactions or processes

Answer: D



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128. Red drop occurs in wavelengths of

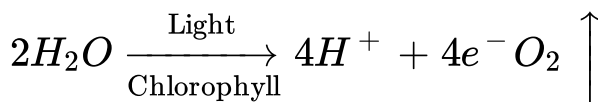
- A. 495 nm
- B. More than 680 nm
- C. less than 680 nm

D. 586 nm

Answer: B

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129. Given below is the reaction of photolysis



How can you justify that photolysis took place ?

- A. with the release of O_2
- B. with the presence of chlorophyll
- C. with the release of electrons
- D. with dissociation of water molecule

Answer: C



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130. Which is the evidence to show that O_2 is released in photosynthesis comes from water

A. Isolated chloroplast in water releases O_2 if supplied potassium ferrocyanide (reducing agent).

B. Photosynthetic bacteria use H_2S and CO_2 to make carbohydrates, H_2O and sulphur.

C. Isotopic O_2 supplied as H_2O appears in O_2 release in photosynthesis.

D. All of the above

Answer: D



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131. The correct sequence of flow of electrons in the light reaction is

- A. PS-II, plastoquinone , cytochromes , PS-I, ferredoxin
- B. PS-1,plastoquinone , cytochromes, PS-II ferredoxin
- C. PS-I,ferredoxin, PS-II
- D. PS-I, plastoquinone, cytochromes , PS-II, ferredoxin

Answer: A



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132. Radioactive carbon dioxide ($^{14}\text{CO}_2$) is added to suspension of a photosynthesising green alga. Which compound will be labelled first with $^{14}\text{CO}_2$?

A. Glucose

B. RuBP

C. GP(PGA)

D. Triose phosphate

Answer: C



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133. What is the outline sequence by which carbon dioxide may be incorporated into starch by photosynthesis ?

A. $PGA + CO_2 \rightarrow RuBP \rightarrow$ Triose Phosphate \rightarrow
Hexose phosphate \rightarrow Starch

B. $PGA + CO_2 \rightarrow RuBP \rightarrow$ Hexose phosphate \rightarrow
Triose phosphate \rightarrow Starch

C. $RuBP + CO_2 \rightarrow PGA \rightarrow$ Hexose phosphate \rightarrow
Triose phosphate \rightarrow Starch

D. $RuBP + CO_2 \rightarrow PGA \rightarrow$ Triose phosphate \rightarrow
Hexose phosphate \rightarrow Starch.

Answer: D



134. The reaction that is responsible for the primary fixation of CO_2 is catalysed by

- A. RuBP carboxylase
- B. PEP carboxylase
- C. RuBP carboxylase and PEP carboxylase
- D. PGA synthase

Answer: C

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135. Enzymes *PEP* carboxylase and *RuBP* carboxylase are located in chloroplasts of

A. CAM

B. C_4

C. Both (a) and (b)

D. C_3

Answer: C



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136. Pick the odd one out from the following option.

A. Tomato : Lycopene

B. Autumn leaves : Lutein

C. Green plants : Chlorophyll

D. Red algae : Phycoerythrin

Answer: D



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137. Which of the following process is called reverse of glycolysis ?

A. CO_2 reduction

B. RUBP carboxylation

C. RUBP regeneration

D. ATP synthesis

Answer: A



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138. Among the products , mentioned below which of the following is product of cyclic phosphorylation ?

A. Only $NADPH_2$

B. $NADPH_2$ and O_2

C. Only ATP

D. None of these

Answer: C



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139. Which of the following statement is incorrect for chemiosmotic hypothesis ?

- A. It explains formation of ATP molecules
- B. It is linked with development of proton gradient
- C. it does not involve photolysis
- D. it was proposed by Peter Mitchell

Answer: C



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140. Choose the correct pair ,

- A. Green sulphur : Chromatium
- B. Purple sulphur : Rhodocyclus sp.
- C. Non-sulphur : Chlorobacter
- D. Green -sulphur :Chlorobium

Answer: D



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141. Chemosynthetic bacteria obtain energy from

- A. sum

- B. infrared rays
- C. organic substances
- D. inorganic chemicals

Answer: D



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142. During dark reaction of photosynthesis

- A. CO_2 is reduced to organic compounds
- B. water splitting
- C. chlorophyll is activated
- D. 6-carbon sugar is broken down to 3-carbon sugar

Answer: A



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143. Which of the following is not required for chemiosmosis ?

- A. A thylakoid membrane
- B. A proton gradient
- C. ATP synthase enzyme
- D. Carboxylase enzyme

Answer: D



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144. Which of the following show dimorphism ?

- A. All C_4 -plants
- B. All plants
- C. Only algae
- D. Chloroplast of C_4 -plant

Answer: D



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Chapter Exercises B Medical Entrances Special Format
Questions Statement Based Quations

1. Which of the following are not correct ?

I. Van Neil showed that photosynthetic bacteria fixed CO_2 in the presence of H_2S .

II. Melvin Calvin discovered C_4 -pathway for fixation of CO_2 .

.

III. Park and Biggins discovered quantasome.

IV. Emerson and Arnold used radioactive ^{18}O and proved that oxygen evolved was part of water.

A. I and II

B. II and IV

C. I, II and III

D. Only IV

Answer: B



2. Carotenoids are

I. yellow to orange pigments, which absorb light strongly in the blue - violet range.

II. Called shield pigments because they protect chlorophyll from photo -oxidation.

III. Magnesium porphyrin compounds.

IV. Red and blue pigments

A. I and II

B. Only I

C. II and IV

D. I, II III and IV

Answer: A



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3. Quantasome

it is a group of pigment molecules required for carrying out a photochemical reaction.

II. Consists of 200-240 chlorophyll molecules, carotenoids, quinone compounds , sulpholipids , phospholipids proteinis , etc.

III.is present on the thylakoid membranes as a small unit.

IV.absorbs only blue and violet wavelength in vitro.

A. II and IV

B. Only I

C. Only III

D. I,II and III

Answer: D



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4. Cytochromes

I. dissolve easily into the lipid component of chloroplast membranes.

II. are small proteins that contain a cofactorf , haem, which holds an iron atom .

III. Are losely associated with chloroplast membrances.

IV. are an intergral part of the chloroplasts thylakoid

membranes and cannot be removed without destroying the membrane.

A. III and IV

B. I, II and IV

C. Only I

D. I and II

Answer: D



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5. Plant families having C_4 species are

I. Amaranthaceae

II. Euphorbiaceae

III. Poaceae

IV. Malvaceae

A. I, II and III

B. I and II

C. III and IV

D. All of these

Answer: A



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6. Crassulacean acid metabolism

I. is an alternative of the C_3 and C_4 - pathway of CO_2 fixation found in plants living in dry hot climate.

II. Pathway resemble C_4 - pathway in that CO_2 is trapped by highly efficient PEP- carboxylase.

III. is a special type of respiration show by many green plants, when why they are exposed to light.

IV. is catalysed by the enzyme serine hydroxymethyl transferase.

A. Only II

B. Only III

C. None of these

D. I and II

Answer: D



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7. Rate of photosynthesis is

I. greater in intense light than in diffused light .

II. Minimum in red light .

III. Greater in intermittent light than in continuous light.

IV. Decreased in the presence of cytokinins and gibberellins.

A. Only I

B. I and III

C. I,II and III

D. Only IV

Answer: B



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8. Chemosynthetic bacteria are

I. Thiobacillus thiooxidans

II. Spirophyllum ferrugineum

III. Bacillus hydrogenes

IV. Rhizobium leguminosarum

A. I and II

B. II and III

C. I,II, and III

D. All of the above

Answer: C



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9. Photolysis of water

A. Only II

B. I and II

C. II and IV

D. Only IV

Answer: B



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10. Which of the following factors affect rate of photosynthesis ?

A. only III

B. I and II

C. Only IV

D. I, II and III

Answer: D



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Chapter Exercises B Medical Entrances Special Format Questions Assertion And Reason

1. Assertion: Photosynthesis is a redox process.

Reason : Oxidation of carbon dioxide and reduction of water takes place in photosynthesis.

- A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion
- B. Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion
- C. Assertion is true , but Reason is false
- D. Assertion is false, but Reason is true

Answer: C



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2. Assertion : Chlorophyll appears green.

Reason : It absorbs light mainly in the region of green part of light spectrum.

Reason : It absorbs light mainly in the region of green part of light spectrum.

A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion

B. Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion

C. Assertion is true , but Reason is false

D. Assertion is false, but Reason is true

Answer: C



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3. Assertion : Red light of visible spectrum contains high energy.

Reason : Green light of visible spectrum contains low energy than red light.

A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion

B. Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion

C. Assertion is true , but Reason is false

D. Both Assertion and Reason are false

Answer: D



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4. Assertion : Carotenoids are accessory pigments.

Reason : Absorbed light energy is transferred to reaction centre by carotenoids.

A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion

B. Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion

C. Assertion is true , but Reason is false

D. Assertion is false, but Reason is true

Answer: A



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5. Assertion : Non - cyclic photophosphorylation occurs in the stroma of chloroplasts.

Reason : There is a continuous flow of electrons in this process.

A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion

B. Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion

C. Assertion is true , but Reason is false

D. Assertion is false, but Reason is true

Answer: D



6. Assertion : Carotenes and xanthophylls are soluble in ether.

Reason : There are accessory pigments of photosynthesis.

A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion

B. Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion

C. Assertion is true , but Reason is false

D. Assertion is false, but Reason is true

Answer: B



7. Assertion : Cyanobacteria perform oxygenic photosynthesis.

Reason : Cyanobacteria possess chloroplasts.

- A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion
- B. Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion
- C. Assertion is true , but Reason is false
- D. Assertion is false, but Reason is true

Answer: C



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Chapter Exercies C Medical Entrances Gallery Collection Of Questions Asked In Neet Various Medical Entrance Exams

1. The process which makes major difference between C_3 and C_4 plants is

- A. glycolysis
- B. Calvin cycle
- C. photorespiration
- D. respiration

Answer: C



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2. Emerson ' s enhancement effect and Red drop have been instrumental in the discovery of

- A. two photosystems operating simultaneously
- B. photosphorylation and cyclic electron transport
- C. oxidative phosphorylation
- D. photophosphorylation and non - cyclic electron transport

Answer: A



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3. In chloroplast, the highest number of protons are found in

- A. lumen of thylakoids
- B. inter membrane space
- C. antennae complexes
- D. stroma

Answer: A



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4. Correct sequence of involvement of the following in noncyclic electron transport

(i) *PC* (ii) *PQ* (iii) *Pheo* (iv) *Fd*

- A. II, I III and IV
- B. III, II , IV and I
- C. IV , I , II nad III
- D. III , II, I and IV

Answer: D



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5. Choose the correct statement.

- A. Stroma lamella membrane lacks PS-II and PS-I.
- B. When PS-I is functional electrons flow in an non -
cyclic way

C. ATPase are enzyme consists of F_1 units

D. NADP reductase is a part of PS- II

Answer: C



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6. The enzyme responsible for primary carboxylation in C_3 - plants is

A. pyruvate carboxylases

B. succinic dehydrogenase

C. hexokinase

D. RuBP carboxylase/ oxygenase

Answer: D



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7. In C_3 -plants the first stable compound formed after CO_2 fixation is

- A. oxaloacetic acid
- B. malic acid
- C. phosphoglyceraldehyde
- D. 3- phosphoglycerate

Answer: D



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8. Which of the elements is found in chlorophyll ?

A. Maganase

B. Potassium

C. Iron

D. Magnesium

Answer: D



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9. What is the quantum yield of photosynthesis

A. 33 %

B. 9 %

C. 12 %

D. 78 %

Answer: C



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10. The structures that are formed by stacking of organized flattered membranes sacs in the chloroplasts are

A. cristae

B. grana

C. stroma lamellae

D. stroma

Answer: B



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11. The oxygen evolved during photosynthesis comes from water molecules . Which one of the following pairs of elements is involved in this reaction ?

A. Manganese and chlorine

B. Manganese and potassium

C. Magnesium and molybdenum

D. Magnesium and chlorine

Answer: A



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12. In photosynthesis, light independent reactions take place at

- A. thylakoid lumen
- B. photosystem -I
- C. photosystem-II
- D. stromal matrix

Answer: D



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13. ATP synthesis in cell requires

- A. H^+ gradient across the membrane
- B. K^+ gradient across the membrane
- C. PO_4^{3-} gradient across the membrane
- D. Ca^{2+} gradient across the membrane

Answer: A



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14. C_4 pathway is advantageous over C_3 pathway in plants as it

- A. occurs in relatively low CO_2 concentration
- B. uses more amount of water f
- C. occurs in relatively low O_2 concentration
- D. is less efficient in energy utilisation

Answer: A



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15. 

In this process which of the following play important role

?

A. Chlorophyll

B. Light energy

C. Ca^{2+} , Mn^{2+} , Cl^{+}

D. All of these

Answer: D



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16. During photorespiration, which compounds are formed having 2C and 3C respectively in Peroxisome

A. Phosphoglycerate and glycolate

B. Glycine and glycerate

C. Serine and glycine

D. Glycolate and glycine

Answer: B



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17. how many molecules of ATP and NADPH are require in formation of two molecules of glucose ? How many calvin cycles are required

A. 24 ATP , 36 NADPH, 12 Calvin cycles

B. 18 ATP, 12 NADPH , 6 Calvin cycles

C. 36 ATP, NADPH, 6 Calvin cycles

D. 36 ATP, 24 NADPH , 12 Calvin cycles

Answer: D



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18. An example of CAM plant is

A. black night shade (*Solanum nigrum*)

B. lemon grass (*Cymbopogon flexuosus*)

C. sugarbeet (*Beta vulgaris*)

D. snake plant (*Sansevieria trifasciata*)

Answer: D



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19. Photorespiration requires this activity by an enzyme

- A. hydrolase
- B. oxygenase
- C. carboxylase
- D. ATPase

Answer: B



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20. This is not a C_3 plant

A. Amaranthus

B. Rice

C. Wheat

D. Potato

Answer: A



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21. The visible prtion of light spectrum useful in photosynthesis is referred to as

A. RFLP

B. PAR

C. VAM

D. VNTR

Answer: B



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22. Cyclic photosphorylation results in the formation of

A. $NADPH + H^+$

B. ATP and $NADPH + H^+$

C. ADP

D. ATP

Answer: D



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23. The strong inhibitor substance for PS II in photosynthesis is

- A. ethylene
- B. chloroform
- C. dichlorophenyl dimethyl urea
- D. yellow light

Answer: C



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24. How many molecules of ATP are required during the formation of one molecule of glucose

- A. 8
- B. 18
- C. 28
- D. 2

Answer: B



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25. Oxygen released in photosynthesis is formed during

- A. oxidative phosphorylation

- B. cyclic photophosphorylation
- C. non - cyclic photophosphorylation
- D. carbon assimilation during dark reactions

Answer: C



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26. Anoxygenic photosynthesis is characteristic of

- A. Rhodospirillum
- B. Spirogyra
- C. Chlamydomonas
- D. Ulva

Answer: A



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27. Identify the incorrect statement(s) in relation to C_4 -photosynthesis .

A. Kranz anatomy is an essential feature for C_4 -plants

B. C_4 -plants have higher water use efficiency than C_3 -plants

C. Photorespiration can be minimised when C_4 - pathway is in operation

D. Conversion of oxaloacetate to malate occurs in the bundle sheath cells

Answer: D



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28. Find out the mismatched pair .

- A. C_4 -plants - Kranz anatomy
- B. Primary CO_2 fixation product of C_4 -plants - OAA
- C. Primary CO_2 acceptor of C_3 -plants - RuBP
- D. C_3 -plants - Maize

Answer: D



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29. C_4 - plants have bundle sheath cells which possess

A. few chloroplasts with thin walls so that gaseous exchange can take place

B. large number of chloroplasts with thick walls impervious to gaseous exchange

C. large number of chloroplasts with thick walls and no intercellular spaces

D. None of the above

Answer: B



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30. Which of the following statements regarding cyclic flow of electrons during light reactions is false ?

- A. This process takes place in the stromal lamellae
- B. ATP synthesis takes place
- C. $NADPH + H^+$ is synthesised
- D. PS-II, is not involved in the process

Answer: D



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31. The products of light reaction are

- A. xanthophyll , NADPH and oxygen.

B. chlorophyll , ATP and NADPH

C. ATP, NADPH and oxygen

D. None of the above

Answer: C



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32. Photosynthetically active radiation (PAR) represents the following range of wavelength

A. 340-450 nm

B. 400-700nm

C. 500-600nm

D. 450-950 nm

Answer: B



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33. Gross primary productivity is the rate of production of _____ during photosynthesis.

A. organic matter

B. oxygen

C. carbon dioxide

D. chlorophyll

Answer: B



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34. Synthesis of one glucose molecule requires- reduced NADP molecules

A. 6

B. 12

C. 18

D. 24

Answer: B



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35. Enzymes required for photophosphorylation are located in Of chloroplast

A. peristromium

B. plastidome

C. stroma

D. quantasome

Answer: D



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36. C_4 -photosynthetic system is present in plants which are formed in

- A. cold region
- B. hot region
- C. Both (a) and (b)
- D. dry tropical region

Answer: D



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37. Which element plays a vital role in splitting of water to liberate oxygen during photosynthesis ?

- A. Copper
- B. Boron

C. Chlorine

D. Manganese

Answer: D



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38. In C_4 -plants , the first stable product of photosynthesis during the , dark reaction is

A. PGAL

B. RuBP

C. PGA

D. OAA

Answer: D



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39. In C_4 -plants, the carbon dioxide fixation occurs in

- A. guard cells
- B. spongy cells
- C. palisade cells
- D. bundle sheath cells

Answer: D



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40. CAM pathway is observed in

- A. pineapple
- B. maize
- C. sunflower
- D. sugarcane

Answer: A



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41. In C_4 pathway, CO_2 fixation in mesophyll cells is carried out by the enzyme

- A. pyruvate dehydrogenase

B. pyruvate decarboxylase

C. PEP carboxylase

D. RuBisCO

Answer: C



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42. Which one of the following statements about the events of non-cyclic photophosphorylation is correct.

A. Photolysis of water takes place

B. Oxygen is released

C. Only one photosystem participates

D. ATP and NADPH are produced

Answer: C



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43. Photosynthesis bacteria have

A. pigment system -I

B. pigment system-II

C. Both (a) and (b)

D. some other kind of pigment , P_{890}

Answer: D



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44. Cyclic photosphorylation links to

- A. PS-II
- B. PS-I
- C. Both (a) and (b)
- D. dark -reaction

Answer: B



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45. The correct sequence of cell organelles during photorespiration is

A. Chloroplast - Golgi bodies - Mitochondria

B. Chloroplast -Rough endoplasmic reticulum-

Dictyosomes

C. Chloroplast - Peroxisome -Mitochondria

D. Chloroplast - Vacuole -Peroxisome

Answer: C



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46. Kranz anatomy is typical of

A. C_4 -plants

B. C_3 -plants

C. C_2 - plants

D. CAM plants

Answer: A



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47. The essential element needed for water splitting in photosynthesis leading to O_2 evolution is

A. Mo

B. Mn

C. Mg

D. K

Answer: B



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48. In overall process of photosynthesis, the number of CO_2 water, sugar and O_2 molecules utilised and produced is

A. 12

B. 13

C. 19

D. 31

Answer: D



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49. During Calvin cycle the total number of CO_2 , ATP and NADPH molecules utilized and glucose, ADP and NADP molecules generated is

A. 31

B. 38

C. 61

D. 67

Answer: A



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50. Which one occurs both during cyclic and non-cyclic modes of photophosphorylation

- A. Involvement of both PS-I and PS-II
- B. Formation of ATP
- C. Release of O_2
- D. Formation of NADPH

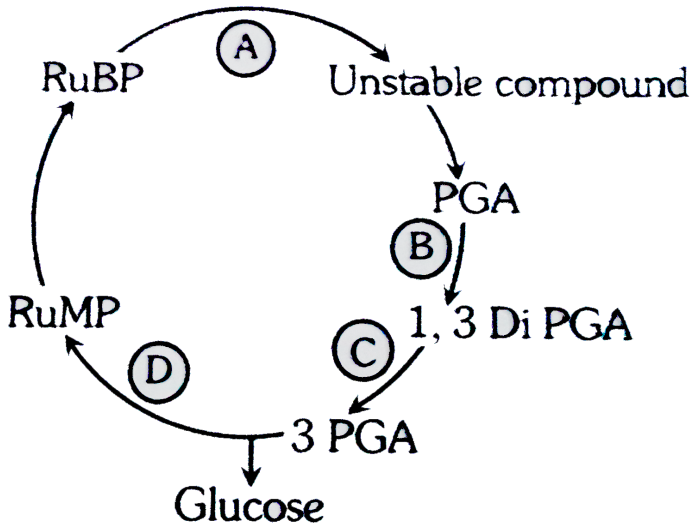
Answer: B



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51. In a condensed schematic representation of dark reaction of photosynthesis given below, steps are

indicated by alphabets. Select the option where the alphabets are correctly identified



A. A- CO_2 fixation , B-Phosphorylation, C-Regeneration ,
D-Reduction

B. A- CO_2 fixation , B-Reduction , C-Phosphorylation , D-
Regeneration

C. A-Regeneration , B- CO_2 fixation , C-Reduction ,D-
Phosphorylation

D. A- CO_2 fixation , B-Phosphorylation , C-Reduction , D-Regeneration

Answer: D



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52. In which cells of leaf, pyruvate is converted to PEP in C_4 pathway

- A. Epidermal cell
- B. Mesophyll cell
- C. Bundle sheath cell
- D. Guard cell

Answer: B



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53. Cyclic photophosphorylation results in the formation of :

A. Cyclic photophosphorylation results in the formation of

B. NADPH

C. ATP and NADPH

D. ATP , NADPH and O_2

Answer: D





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54. CAM helps the plants in

- A. secondary growth
- B. disease resistance
- C. reproduction
- D. conserving water

Answer: D



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55. Presence of bundle sheath is a characteristic of

- A. xerophytic plants
- B. members of grass family
- C. C_4 -plants
- D. C_3 -plants

Answer: C



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56. In C_4 plants, the bundle sheath cells

- A. have thin walls to facilitate gaseous exchange
- B. have large intercellular spaces
- C. are rich in PEP carboxylase

D. have a high density of chloroplasts

Answer: D



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57. Very strong light has a direct inhibiting effect on photosynthesis, which is known as

A. solarisation

B. etiolation

C. chlorosis

D. defoliation

Answer: A



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58. Plastocyanin contains

A. copper

B. iron

C. calcium

D. postassium

Answer: A



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59. Organelles having enzymes involved in photorespiration are

- A. chloroplast , mitochondria , peroxisome
- B. chloroplast , mitochondria , lysosome
- C. mitochondria , peroxisome , centrosome
- D. nuclus , centrosome peroisome

Answer: A



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60. Light reaction of photosynthesis occurs inside

- A. stroma

B. grana

C. endoplasmic reticulum

D. cytoplasm

Answer: B



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61. Sunken stomata are usually found in

A. C_3 - plants

B. CAM plants

C. insectivorous plants

D. phanerogams

Answer: B



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62. A reduction in the quantity of oxygen evolution during photosynthesis may be observed at

- A. light having wavelength more than 680 nm
- B. light having wavelength less than 680 nm
- C. light having wavelength 560 nm
- D. light having wavelength less than 360 nm

Answer: A



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63. Which of the following statements is true with regard to the light reaction of photosynthesis

A. In PS-II the reaction centre chlorophyll -a has an absorption peak at 700 nm and is called P_{700}

B. In PS-I the reaction centre chlorophyll -a has an absorption maxima at 680 nm and is called P_{680}

C. The splitting of water molecule is associated with PS-I

D. Photosystem -I and II are involved in Z-cheme

Answer: D



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64. Select the incorrectly matched pair with regard to C_4 -cycle.

A. Primary CO_2 fixation - PGA product

B. Primary CO_2 acceptor - PEP

C. C_4 -plant - Maize

D. Location of enzyme RuBisCO - Bundle sheath cells

Answer: A



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65. In C_3 -cycle for the fixation of every CO_2 molecules ,
the reduction and regeneration steps required are

A. 3 ATP and $2NADPH_2$

B. 2ATP and $2NADPH_2$

C. 2 ATP and $2NADPH_2$

D. 3 ATP and $1NADPH_2$

Answer: A



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66. Which of the following is formed during photorespirations ?

A. Sugar

B. Phosphoglycolate

C. NADPH

D. ATP

Answer: B



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67. Which of the following is true for photosynthesis ?

A. Reduction of CO_2 and water

B. Oxidation of CO_2 and water

C. Reduction of CO_2 and oxidation of water

D. Oxidation of CO_2 and reduction of water

Answer: C



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68. Which is not related to photorespiration

- A. Lysosome
- B. Chloroplast
- C. Peroxisome
- D. mitochondria

Answer: A



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69. With reference to three Calvin cycle , which of the given options is correct for the following questions ?

I. How many gross PGAL molecules are produced ?

II. Total , how many ATP molecules are required for synthesis of PGAL molecules ?

III. Total , how many $NADPH_2$ molecules are required for the synthesis of obtained PGAL molecules ?

A. I – 3PGL, II – 3ATP, III – 3 $NADPH_2$

B. I – 6PGAL, II – 6ATP, III – 6 $NADPH_2$

C. I – 18PGAL, II – 18APT, III – 18 $NADPH_2$

D. I – 9PGAL, II – ATP, III – 9 $NADPH_2$

Answer: A



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70. C_4 plants are more efficient in photosynthesis than C_3 plants due to

- A. higer plants leaf area
- B. the presence of larger number of chloroplasts in the leaf cells
- C. the presence of thin cuticle
- D. lower rate of photorespiration.

Answer: D



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71. PGA as the first CO_2 fixation product was discovered in photosynthesis of

- A. bryophte
- B. gymnosperm
- C. angiosperm
- D. alga

Answer: D



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72. The end products of light reaction are

- A. ADP and $NADPH_2$

B. ATP and $NADP$

C. ADP and $NADP$

D. ATP and $NADPH_2$

Answer: D



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73. The raw materials for light reaction are

A. ADP and ATP

B. ADP and $NADP$

C. $NADP$ and ATP

D. ATP and $NADPH_2$

Answer: B



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74. In biochemical phase , fixation of carbon dioxide

A. RuBisCO

B. PGA

C. OAA

D. PGAL

Answer: A



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75. What is the source of oxygen liberated in photosynthesis ?

A. Carbon dioxide

B. glucose

C. water

D. energy

Answer: C



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76. Synthesis of one molecule of glucose requires

A. $6CO_2$, $18ATP$ and $12NADPH$

B. $6CO_2$, $12ATP$ and $18NADPH$

C. $6CO_2$, $30ATP$ and $12NADPH$

D. $5CO_2$, $38ATP$ and $12NADPH$

Answer: A



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77. Which of the following is a 4-carbon compound?

A. oxaloacetic acid

B. Phosphoglyceric acid

C. Ribulose biphosphate

D. Phosphoenol pyruvate

Answer: A



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78. Which of the following is incorrectly matched ?

- A. Sargham - Kranz anatomy
- B. PEP - Mesophyll cells
- C. Blackman - Law of limiting factors
- D. PS-II - P_{700}

Answer: D



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79. Which one of the following statements regarding C_4 -plants is false ?

- A. The primary CO_2 acceptor is a 5 carbon molecule
- B. The initial carboxylation reaction occurs in mesophyll
- C. The leaves that fix CO_2 have two cell types
- D. The mesophyll cells lack RuBisCO enzyme

Answer: A



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80. In which type of reactions related to plant

- A. Glycolate cycle
- B. Calvin cycle
- C. Bacterial photosynthesis
- D. Glyoxylate cycle

Answer: A



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81. Chloroplast dimorphism is a characteristic feature of

- A. Plants with Calvin cycle
- B. C_4 -plants
- C. All plants

D. Only in algae

Answer: B



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82. Cyclic photophosphorylation results in the formation of :

A. NADPH

B. ATP and NADPH

C. ATP, NADPH and O_2

D. ATP

Answer: D



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83. Stroma in the chloroplasts of higher plant contains

- A. light independent reaction enzymes
- B. light dependent reaction enzymes
- C. ribosomes
- D. chlorophyll

Answer: A



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84. Oxygenic photosynthesis occurs in

A. Chromatium

B. Oscillatoria

C. Rhodospirillum

D. Chlorobium

Answer: B



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85. Electrons from excited chlorophyll molecule of photosystem II are accepted first by

A. cytochrome -b

B. cytochrome -f

C. quinone

D. ferredoxin

Answer: C



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86. In chloroplasts the chlorophyll is located in

A. grana

B. pyrenoid

C. stroma

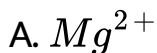
D. Both (a) and (c)

Answer: A



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87. Which of the following elements is an activator for both ribulose biphosphate carboxylase oxygenase and phosphoenol pyruvate carboxylase in photosynthetic carbon fixation ?



Answer: A



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88. Which statement about photosynthesis is false

- A. the electron carriers involved in photophosphorylation are located on the thylakoid membranes
- B. Photosynthesis is a redox process , in which water is oxidised and carbon dioxide is reduced
- C. The enzymes required for carbon fixation are located only in the grana of chloroplasts
- D. In green plants , both PS-I, and PS-II are required for the formation of $NADPH + H^+$

Answer: C



89. In an experiment demonstrating the evolution of oxygen in Hydrilla, sodium bicarbonate is added to water in the experimental set-up. What would happen if all other conditions are favourable.

A. Amount of oxygen evolved decreases as carbon dioxide in water is absorbed by sodium bicarbonate

B. Amount of oxygen evolved increases as the availability of carbon dioxide increases.

C. Amount of oxygen evolved decreases as the availability of carbon dioxide increases.

D. Amount of oxygen evolved increases as carbon dioxide in water is absorbed by sodium bicarbonate

Answer: D



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90. In C_4 plants, the bundle sheath cells

- A. have thin walls to facilitate gaseous exchange
- B. have large intercellular spaces
- C. are rich in PEP carboxylase
- D. have a high density of chloroplasts

Answer: D



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91. The components of PS-I are located on the

A. stroma

B. stroma thylakoid

C. granum thylakoid

D. outer surface of stroma and grana thylakoid

Answer: D



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92. Which does not show *HSK* pathway

A. Jower

B. Maize

C. Sunflower

D. Sugarcane

Answer: C



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93. Which one is essential for the respiration as well as photosynthesis ?

A. RuBisCO

B. Plastocyanin

C. Ubiquinone

D. Cytochrome

Answer: D



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94. Oxygen , which is liberated during photosynthesis , comes from

A. CO_2

B. H_2O

C. chlorophyll

D. phosphoglyceric acid

Answer: B



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95. How many Calvin cycles are required to produce 5 molecules of glucose ?

A. 60

B. 15

C. 30

D. 90

Answer: C



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96. Which of the following is the first compound that accepts carbon dioxide during dark phase of photosynthesis

A. NADP

B. RuBP

C. Ferredoxin (FRS)

D. Cytochrome

Answer: B



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97. Which one of the following is not true about the light reactions of photosynthesis ?

- A. Light energy provides energy for the photolysis of water through excitation of the reaction center of PS-II
- B. The flow of electrons from water to NADP in non - cyclic electron transport produces one ATP
- C. Reactions of the two photosynthesis are needed for the reduction of NADP
- D. P_{680} and P_{700} are the reaction centres of PS-I and PS-II respectively

Answer: D



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98. The enzyme responsible for primary carboxylation in C_3 - plants is

- A. hexokinase
- B. succinic dehydrogenase
- C. pyruvate carboxylase
- D. RuBP carboxylase oxygenase

Answer: D



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99. In a CAM plant the concentration of organic acid

- A. increases during the day
- B. decreases or increase during the day
- C. increases during night
- D. decreases during any time

Answer: C



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100. In the leaves of C_4 plants, malic acid formation during CO_2 fixation occurs in the cells of

- A. epidermal cells

B. mesophyll cells

C. bundle sheath

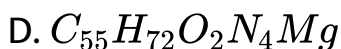
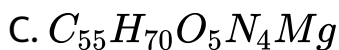
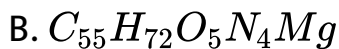
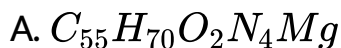
D. guard cells

Answer: B



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101. the empirical formula for chlorophyll a is



Answer: B



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102. The law of limiting factors was given by ___ in the year___

A. Leibig

B. Blackman

C. Calvin

D. Arnon

Answer: B



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103. In which of the following wavelength, photosystem -I is inactive ?

A. 780 nm

B. 680 nm

C. 690 nm

D. 550 nm

Answer: A



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104. RuBisCO stands for

A. Ribulose Biphosphate Carboxylase Oxygenase

B. Ribulose Phosphate Carboxylase Oxygenase

C. Ribulose Phosphate Carboxylic Oxygenase

D. None of the above

Answer: A



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105. DCMU (Dichlorophenyl Dimethyl Urea)

A. inhibits PS-I

B. inhibits PS-II

C. destroy chloroplast

D. inhibits oxidative phosphorylation

Answer: B



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106. NH_3 is released from

- A. photorespiration
- B. dark respiration
- C. CAM
- D. All of these

Answer: A



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107. Photolysis of water by isolated chloroplasts was demonstrated by

- A. Hill
- B. Liebig
- C. Van Neil
- D. Calvin

Answer: A



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108. First reaction in photosynthesis is

- A. photolysis of water

B. excitation of chlorophyll molecules

C. formation of ATP

D. fixation of CO_2

Answer: B



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109. In CAM plants, CO_2 required for photosynthesis enters the plant during

A. day time through the lenticles

B. night through the stomata , which are kept open

C. day time when the stomata are open

D. night when the hydathodes are open

Answer: B



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110. Photosynthesis cannot continue for long if during light reaction , only cyclic photophosphorylation takes place. This is because

A. only ATP is formed $NADPH^+ + H^+$ is not formed

B. photosystem -I stops getting excited at a wavelength of light beyond 680 nm

C. there is unidirectional cyclic movement of the electrons

D. there is no evolution of O_2

Answer: A



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111. Consider the following statements

(A) The portion of the spectrum between 500nm and 800 nm is also referred to as photosynthetically active radiation (PAR)

(B) Magnesium, calcium and chloride ions play prominent roles in the photolysis of water

(C) In cyclic photophosphorylation, oxygen is not

released (as there is no photolysis of water) and NADPH is also not produced

- A. I is true , but II and III is false
- B. I and II are false , but III is true
- C. II is true, but I and III are false
- D. I and II are true , but III is false

Answer: C



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112. Which of the following statements with regards to photosynthesis is/are correct

(A) In C_4 plants, the primary CO_2 acceptor is PEP

(B) In the photosynthetic process PS II absorbs energy at or just below 680nm

(C) The pigment that is present in the pigment system I is

P_{683}

A. only III

B. Only I

C. Only III

D. I and II

Answer: D



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113. Consider the following statements regarding photosynthesis

(A) ATP formation during photosynthesis is termed as photophosphorylation

(B) Kranz anatomy pertains to leaf

(C) Reduction of $NADP^+$ to NADPH occurs during Calvin cycle

(D) In a chlorophyll molecule magnesium is present in phytol tail

A. I and II are correct

B. III and IV are correct

C. I and III are correct

D. I and IV are correct

Answer: A



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114. How many full turns of the Calvin cycle are required to make one molecule of glucose

- A. two times
- B. four times
- C. six times
- D. eight times

Answer: C



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115. Photosynthetically active radiation (PAR) represents the following range of wavelength

A. $400 - 700nm$

B. $450 - 950nm$

C. $340 - 450nm$

D. $500 - 600nm$

Answer: A



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116. The carbon dioxide acceptor in CAM plants is

A. RuBP

B. PEP

C. OAA

D. PGA

Answer: B



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117. Plants adapted to low light intensity have

A. larger photosynthetic unit size than the sun plants

B. higher rate of CO_2 fixation than the sun plants

C. more extended root system

D. leaves modified to spines

Answer: A



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118. Photosynthesis is maximum in

- A. green light
- B. blue followed by red light
- C. red followed by blue light
- D. blue light

Answer: C



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119. PS-I and PS-II , were discovered by

A. Robert Emerson

B. Blackman

C. Robert Mayer

D. Arnon

Answer: A



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120. In photosynthesis , energy from light reaction to dark reaction is transferred in the form of

A. ADP

B. ATP

C. RuBP

D. chlorophyll

Answer: B



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121. C_2 plants differ from C_3 plants with respect to

A. number of ATP used

B. substrate, which accepts the CO_2 molecules

C. the final product

D. number of ATP formed

Answer: B



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122. The absorption spectrum of chlorophyll

A. shows that some colours of light are absorbed more than the others

B. approximates the action spectrum of photosynthesis

C. explains why chlorophyll is a green pigment.

D. has all the above properties.

Answer: B



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123. In grana of chloroplast , the reaction $ADP + \Pi = ATP$ during day shows

- A. oxidative phosphorylation
- B. photophosphorylation
- C. substrate level phosphorylation
- D. dephosphorylation

Answer: B



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124. Photosynthesis in C_4 plants is relatively less limited by atmospheric CO_2 levels because

- A. four carbon acids are the primary initial CO_2 fixation products
- B. the primary fixation of CO_2 is mediated via PEP carboxylase
- C. effective pumping of CO_2 into bundle sheath cells
- D. RuBisCO in C_4 -plants has higher affinity for CO_2 .

Answer: B



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125. photolysis of each water molecule in light reaction will yield

- A. 2 electrons and 4 protons
- B. 4 electrons and 4 protons
- C. 4 electrons and 3 protons
- D. 2 electrons and 2 protons

Answer: D



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126. Which of the following is incorrect in relation to photorespiration ?

- A. It releases CO_2
- B. It is a characteristics of C_3 -plants
- C. It occurs in chloroplasts
- D. It occurs in daytime only

Answer: D



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127. In sugarcane plant $^{14}CO_2$ is fixed in malic acid, in which the enzyme that fixes CO_2 is

- A. ribulose phosphate kinase
- B. fructose phosphatase

C. ribulose biphosphate carboxylase

D. phosphoenol pyruvic acid carboxylase

Answer: D



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128. The primary CO_2 acceptor in CO_2 fixation in C_4 pathway is

A. phosphoglyceric acid

B. glyceraldehyde phosphate

C. phosphoenol pyruvate

D. oxaloacetic acid

Answer: C



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129. During photorespiration, the oxygen consuming reaction (s) occur in

- A. stroma of chloroplasts and mitochondria
- B. stroma of chloroplasts and peroxisomes
- C. grana of chloroplasts and peroxisomes
- D. stroma of chloroplasts

Answer: B



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130. In photosystem-I the first electron acceptor is

- A. ferredoxin
- B. cytochrome
- C. plastocyanin
- D. an iron - sulphur protein

Answer: D



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131. Photosynthetic enhancement with flashing light was first observed by

- A. Benson and Calvin

B. Hill and Calvin

C. Hatch and Slack

D. Emerson and Arnold

Answer: D



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