

NEET- 2020- 45 Days Crash Course



Date : 11th August 2020



Chapter Name : Photosynthesis in PLANTS



QUIZ – PHOTOSYNTHESIS

In C_4 plants, the first carbon dioxide acceptor is

1997]

(A) Pyruvate

(B) Phosphoenol pyruvate

— PEP

(C) Ribulose biphosphate

(D) Ribulose 5, phosphate

↓

OAA

Ans [B]

In C₄ plants, the first CO₂ acceptor is 3C compound, phosphoenol pyruvate.

In photosynthesis, splitting of water and release of oxygen occurs during

[1998]

(A) Photolysis

(B) Red drop

(C) Pasteur effect

(D) Calvin cycle

Ans [A]

In photosynthesis, release of oxygen occurs during photolysis of water in light reaction.

Blackman's law of limiting factor is applied to

[2001]

- (A) Respiration (B) Transpiration
(C) Photorespiration ~~(D) Photosynthesis~~

Ans [D]

Blackman's law is applicable to photosynthesis. It states that when a process is conditioned as to its rapidity by number of factors, its rate is limited to the pace of slowest factor. Taking temperature into consideration, rate of photosynthesis is maximum at optimum temperature.

Hill reaction occurs in

[2003]

(A) High altitude plants

(B) Total darkness

(C) Absence of water

(D) Presence of ferricyanide

Ans [A]

Hill reaction or light reaction depends upon light. It involves photolysis of water and production of assimilatory power in the form of NADPH and ATP.

Which one of the following categories of organisms do not evolve oxygen during photosynthesis? [2004]

(A) Red algae

~~(B) Photosynthetic bacteria~~

(C) C_4 plants with Kranz anatomy

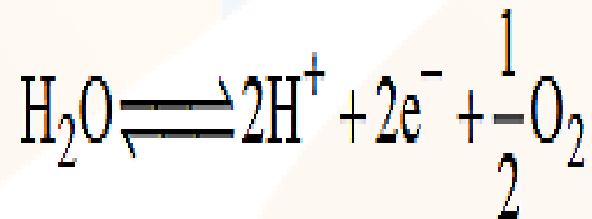
(D) Blue green algae

do not evolve Sulphur

Green S and Purple S

Ans [B]

Photosynthetic bacteria do not use H₂O as electron donor but some other compound like H₂S . In photosynthesis, splitting of water and liberation of O₂ by chlorophyll in presence of light and hydrogen acceptor is called photolysis of water.



[Photolysis of water]

What is PAR range?

[2007]

(A) 200 nm - 800 nm

~~(B) 400 nm - 700 nm~~

→ visible

(C) 350 nm - 550 nm

(D) 600 nm - 100 nm

range

Ans [B]

PAR (Photosynthetically active radiations) ranges between the wavelength 400-700nm.

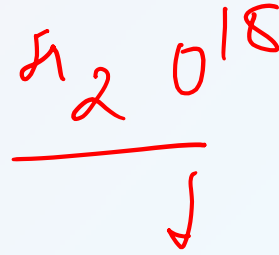
Through the use of oxygen-18 (heavy oxygen), scientists have found that the oxygen released during photosynthesis comes from molecules of **[2009]**

(A) Carbon dioxide

(B) Water

(C) Glucose

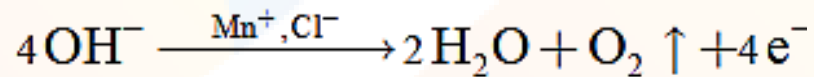
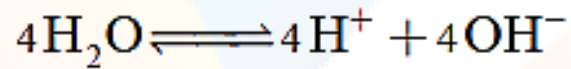
(D) Chlorophyll



Rubens & Kamen

Ans [B]

Oxygen which is liberated during photosynthesis comes from water. In photosynthesis, the light energy is captured by chlorophyll in the chloroplasts in plant leaves. This energy is used to split water apart in a process called photolysis.



Select the incorrect statement

[2011]

- (A) C_4 pathway for CO_2 fixation were discovered by Hatch and Slack — T
- (B) CO_2 is essential for photosynthesis — T
- (C) Addition of sodium carbonate in water retards photosynthetic rate in vallisneria F
- (D) Phloem is the principal pathway for translocation of solutes L T

Ans [C]

C₄ pathway for CO₂ fixation were discovered by Hatch and Slack. This pathway has more effective method of CO₂ fixation and is seen in plants like sugarcane. CO₂ is essential for photosynthesis. It is the source of carbon.

The phloem or leptome is the pathway for movement of solutes.

The family in which many plants are C_4 type

[2007]

(A) Malvaceae

(B) Solanaceae

(C) Crucifereae

(D) Graminae

Ans [D]

The Gramineae family has been renamed as Poaceae family - family of true grasses. They are a large and nearly ubiquitous family of monocotyledonous flowering plants. With more than 10,000 domesticated and wild species, the Poaceae represent the fifth-largest plant family. The C4 grasses have a photosynthetic pathway linked to specialized Kranz leaf anatomy that particularly adapts them to hot climates and atmospheres low in carbon dioxide.

In the electron transport chain during terminal oxidation, the cytochrome, which donates electrons to O_2 is [2012]

(A) Cytochrome-b

(B) Cyto-C

(C) Cyto-a₃

(D) Cyto-f

Cyt - a - a₃

Ans [C]

In ETS or respiratory chain, there are five cytochromes cyto-b, cyto-c₁, cyto-c, cyto-a, cyto-a₃. Cytochrome a is last cytochrome of ETS which denotes electrons to O₂ due to this metabolic water is formed.

Which one does not differ between a C_3 and a C_4 plant?

[2013]

I. Initial CO_2 acceptor.

II. Extent of photorespiration.

III. Enzyme catalyzing reaction that fixes CO_2 .

IV. Presence of Calvin cycle.

V. Leaf anatomy.

(A) I and V

(C) II and III

~~(B) IV~~

(D) II

Handwritten notes in red ink:

- Initial CO_2 acceptor: RUBP (for C_3) and PEP (for C_4)
- Extent of photorespiration: C_3 ↑, C_4 ↓, less photorespiration
- Enzyme catalyzing reaction that fixes CO_2 : Both
- Presence of Calvin cycle: Both
- Leaf anatomy: C_4 - Kranz anatomy

Ans [B]

The initial CO_2 receptor is RuBP for C_3 plants whereas phosphoenolpyruvate for C_4 plants. Photorespiration losses are high in C_3 whereas low in C_4 . Calvin cycle is a dark reaction which occurs in both C_3 and C_4 plants. C_4 plants have specialized Kranz anatomy of leaves.

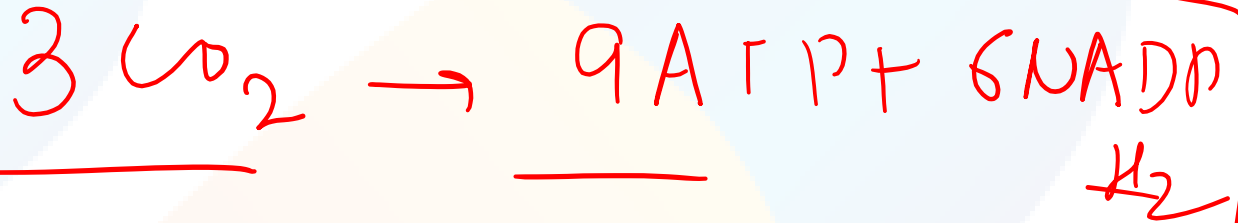
The total requirement of ATP & NADPH for each molecule of CO_2 fixed & reduced in photosynthesis in the Calvin cycle is **[2014]**

(A) 2 ATP & 2 NADPH

(B) 2 ATP & 3 NADPH

(C) 3 ATP & 2 NADPH

(D) 4 ATP & 3 NADPH



learn this plz

Ans [C]

For every CO_2 molecule entering the Calvin cycle, 3 molecules of ATP and 2 molecules of NADPH are required.

Consider the following statements regarding photosynthesis.

[2015]

(A) ATP formation during photosynthesis is termed as photophosphorylation. T

(B) Kranz anatomy pertains to leaf. T

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

(D) In a chlorophyll molecule, magnesium is present in phytol tail. Of the above statements F

(A) A and B are correct

(B) C and D are correct

(C) A and C are correct

(D) A and D are correct

Ans [A]

A) In photosynthesis, the phosphorylation of ADP to form ATP using the energy of sunlight is called photophosphorylation. Sp 'a' is correct. Kranz anatomy is the special structure of leaves in C₄ plants like maize where the tissue equivalent to the spongy mesophyll cells is clustered in a ring around the leaf veins, outside the bundle-sheath cells. So, 'b' is correct.

B) NADPH is required in Calvin's cycle. It is not reduced from NADP to NADPH in Calvin's cycle. So, 'c' is wrong. Magnesium occurs in the porphyrin head of chlorophyll. So, 'd' is wrong.

Direction : These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following five responses. **[1998]**

Assertion : C_4 pathway of CO_2 fixation is found in some tropical plants. — T

Reason : In this pathway, CO_2 is fixed by 3C compound. — T

- (A) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- (B) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- (C) If the Assertion is correct but Reason is incorrect.
- (D) If both the Assertion and Reason are incorrect.

Ans [B]

C4 is an adaptation of tropical plants to reduce/avoid the photorespiratory loss. In C4 pathway, first acceptor of CO₂ is a 3 carbon compound – phosphoenol pyruvate.

Direction : These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following five responses. **[1999]**

Assertion : Mitochondria helps in photosynthesis F

Reason : Mitochondria have enzymes for dark reaction F

- (A) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- (B) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- (C) If the Assertion is correct but Reason is incorrect.
- ✓ (D) If both the Assertion and Reason are incorrect.

Ans [D]

Mitochondria helps in cellular respiration by transferring energy from organic compounds to ATP. Chloroplast helps in photosynthesis. Dark reaction takes part in the stroma of the chloroplast.

Direction : These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following five responses. **[2002]**

Assertion : Bacterial photosynthesis occurs by utilizing wavelength longer than 700 nm.

Reason : Here reaction centre is B-890.

- (A) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- (B) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- (C) If the Assertion is correct but Reason is incorrect.
- (D) If both the Assertion and Reason are incorrect.

Ans [B]

In bacteria, photosynthesis utilizes light wavelength more than 700 nm and their reaction centre is B-890.

Direction : These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following five responses. **[2003]**

Assertion : Rhoeo leaves contain anthocyanin pigments in epidermal cells.

Reason : Anthocyanins are accessory photosynthetic pigments.

- (A) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- (B) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- (C) If the Assertion is correct but Reason is incorrect.
- (D) If both the Assertion and Reason are incorrect.

Ans [C]

Anthocyanin pigments only give colouration since the epidermal cells mainly have potential colouring pigments. It is responsible of blue, red, pink and purple colours, observed in different parts of plants such as petals, stamens and fruits etc. Anthocyanin are also important for attracting insects for pollination and seed dispersal. Hence, Anthocyanin pigments are not accessory photosynthetic pigments.

Direction : These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following five responses.

Assertion : Cyclic pathway of photosynthesis first appeared in some eubacterial species. **[2004]**

Reason : Oxygen started accumulating in the atmosphere after the non-cyclic pathway of photosynthesis evolved.

- (A) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- (B) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- (C) If the Assertion is correct but Reason is incorrect.
- (D) If both the Assertion and Reason are incorrect.

Ans [B]

Photosynthetic bacteria have a substance called bacteriochlorophyll. The bacteriochlorophyll pigment absorbs light in the extreme UV and infra-red parts of the spectrum which is outside the range used by normal chlorophyll, seen in plants.

Direction : These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following five responses.

[2004]

Assertion : C_4 photosynthetic pathway is more efficient than the C_3 pathway

Reason : Photorespiration is suppressed in C_4 plants.

- (A) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- (B) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- (C) If the Assertion is correct but Reason is incorrect.
- (D) If both the Assertion and Reason are incorrect.

Ans [A]

C4 Pathway/Hatch and Slack pathway ensures the Calvin cycle to be operated only in bundle sheath cell. It is an adaptation to photorespiratory loss. Therefore, C4 plants are adapted to photorespiratory loss.

Direction : These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following five responses.

[2005]

Assertion : The atmospheric concentration of CO_2 at which photosynthesis just compensates for respiration is referred to as CO_2 compensation point.

Reason : The CO_2 compensation point is reached when the amount of CO_2 uptake is less than that generated through respiration because the level of CO_2 in the atmosphere is more than that required for achieving CO_2 compensation point.

- (A) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- (B) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- (C) If the Assertion is correct but Reason is incorrect.
- (D) If both the Assertion and Reason are incorrect.

Ans [C]

Compensation point is that value or point in the light intensity and atmospheric CO_2 concentration when the rate of photosynthesis is just equivalent to the rate of respiration in the photosynthetic organ. So that there is not net gaseous exchange.

Direction : These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following five responses.

[2006]

Assertion : Under conditions of high light intensity and limited CO_2 supply, photorespiration has a useful role in protecting the plants from photo-oxidative damage.

Reason : If enough CO_2 is not available to utilize light energy for carboxylation to proceed, the excess energy may not cause damage to plants. compensation point.

- (A) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- (B) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- (C) If the Assertion is correct but Reason is incorrect.
- (D) If both the Assertion and Reason are incorrect.

Ans [C]

Photorespiration is the uptake of O_2 and release of CO_2 in light and results from the biosynthesis of glycolate in chloroplasts and subsequent metabolism of glycolate acid in the same leaf cell. During photorespiration loss of carbon takes place in the form of C_2 .

Direction : These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following five responses.

[2006]

Assertion : Photosynthetically C_4 plants are less efficient than C_3 plants.

Reason : The operation of C_4 pathway requires the involvement of only bundle-sheath cells.

- (A) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- (B) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- (C) If the Assertion is correct but Reason is incorrect.
- (D) If both the Assertion and Reason are incorrect.

Ans [D]

C4 plants are more efficient in picking up CO_2 even when it is found in low concentration because of its high affinity for PEP. They show Kranz anatomy i.e. vascular bundle is surrounded by bundle sheath and mesophyll cells.

Direction : These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following five responses.

[2007]

Assertion : Dark reaction is purely enzymatic reaction.

Reason : It occurs only in absence of light.

- (A) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- (B) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- (C) If the Assertion is correct but Reason is incorrect.
- (D) If the Assertion is incorrect but the Reason is correct.

Ans [D]

During photosynthesis, assimilatory power ATP and NADPH₂ are produced which require light. This reaction is called light reactions or Hill's reaction. Assimilatory powers are required for the reduction of CO₂. This reaction is enzymatic and independent of light. It is called dark reaction which takes place in stroma of chloroplast. So, dark reaction is independent of presence or absence of light

Direction : Each of these questions contains an Assertion followed by Reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements. **[2009]**

Assertion : Dark reaction occurs only at night in the stroma of chloroplast.

Reason : CO_2 fixation occurs only during C_3 cycle.

- (A) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
- (B) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
- (C) If Assertion is correct but Reason is incorrect.
- (D) If both the Assertion and Reason are incorrect.

Ans [D]

Dark reaction is also known as light independent phase. Unlike, light reaction, it does not require light as an essential factor. Thus, can take place both in the presence or absence of light. The term dark reaction does not mean that it takes place only in dark period or at night. CO₂ fixation occurs in both C₃ and C₄ cycle. In C₃ cycle, CO₂ is added by the enzyme, RuBisco to a 5 carbon compound RuBP that is converted to 2 molecules of 3-carbon PGA. In C₄ cycle, the first product of CO₂ fixation (takes place in mesophyll) is a 4-carbon compound, oxaloacetic acid. It is seen in some tropical plants.

Direction : Each of these questions contains an Assertion followed by Reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements. [2010]

Assertion : Amaranthus and sugarcane are called as Hatch & Slack plants. — T

Reason : One glucose is formed by fixation of 6CO_2 in the plants. — T but

- (A) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion. not correct
- (B) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion. explanation
- (C) If Assertion is correct but Reason is incorrect.
- (D) If both the Assertion and Reason are incorrect.

Ans [B]

Amaranthus sp and sugarcane are known as Hatch and Slack plants. In Hatch and Slack pathway, one glucose molecule is formed by fixation of 6CO_2 in the plants.

Direction : Each of these questions contains an Assertion followed by Reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements. [2010]

Assertion : D.C.M.U. is a photosynthetic inhibitor. T

Reason : D.C.M.U. inhibits a photolysis of water. - T, inhibits PST

(A) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion. and photo
lysis

(B) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion. water is
dependent

(C) If Assertion is correct but Reason is incorrect. on

(D) If both the Assertion and Reason are incorrect. e⁻

Ans [A]

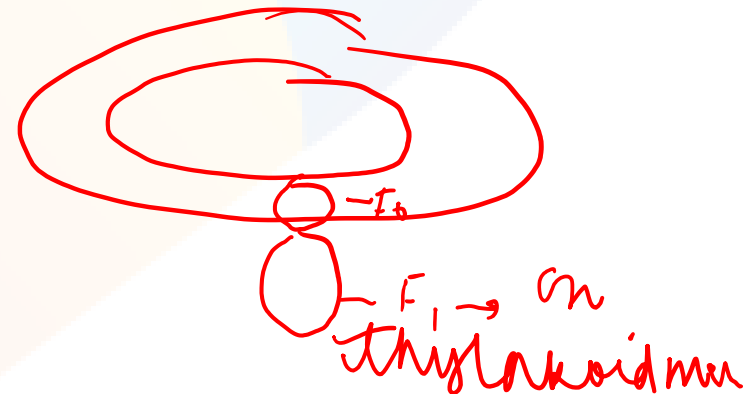
DCMU (Dichlorophenyl dimethyl urea) is a herbicide that can prevent non cyclic photophosphorylation and oxygen production. It inhibits photolysis of water.

Direction : Each of these questions contains an Assertion followed by Reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements. [2011]

Assertion : The stromal thylakoids are rich in both PS I and PS II. — F

Reason : The stroma membranes are rich in ATP synthetase. — F

- (A) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
- (B) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
- (C) If Assertion is correct but Reason is incorrect.
- (D) If both the Assertion and Reason are incorrect.



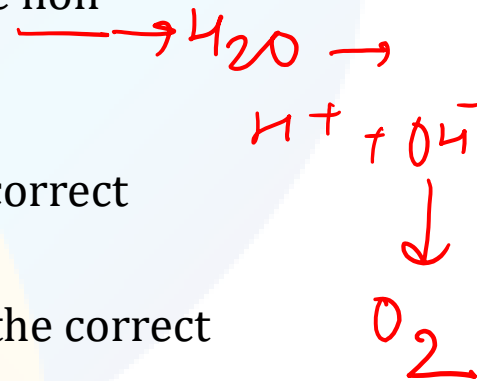
Ans [D]

The grana stacks of membranes are enriched in PS II and LHC (Light harvesting centre), while there is little ATP synthetase. On the other hand, a fraction of stroma thylakoids is rich in PS I and ATPase and poor in PS II and LHC.

Direction : Each of these questions contains an Assertion followed by Reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements. [2012]

Assertion : Cyclic pathway of photosynthesis first appeared in some eubacterial species. T (daher urg → photosynbakt)

Reason : Oxygen started accumulating in the atmosphere after the non-cyclic pathway of photosynthesis evolved. T



- (A) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
- (B) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
- (C) If Assertion is correct but Reason is incorrect.
- (D) If both the Assertion and Reason are incorrect.

Ans [B]

Cyclic pathway of photosynthesis is appeared first in some eubacterial species. It is supposed to be the first evidence of production of ATP in the presence of light. During non-cyclic photophosphorylation photolysis of water takes place. Under the influence of light energy and the catalytic action of chlorophyll, water is split up into oxygen and hydrogen.

Non-cyclic

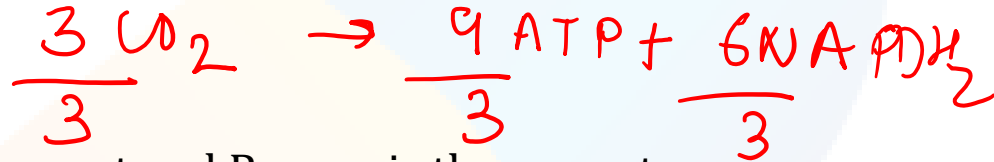
photophosphorylation is the only natural process which adds molecular oxygen to the atmosphere.

Direction : Each of these questions contains an Assertion followed by Reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements. [2012]

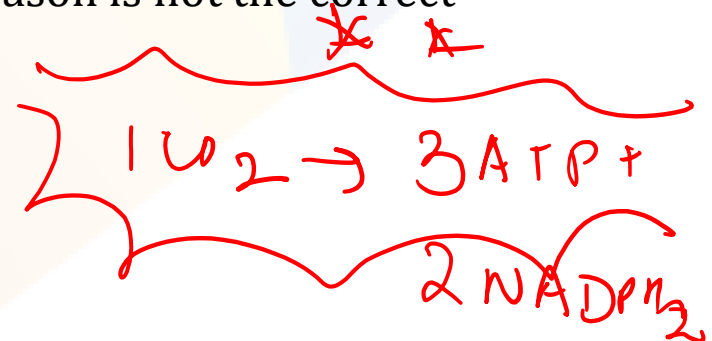
Assertion : Each molecule of ribulose-1, 5-bisphosphate fixes one molecule of CO_2 .



Reason : Three molecules of NADPH and two ATP are required for fixation of one molecule of CO_2 .



- (A) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
- (B) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
- (C) If Assertion is correct but Reason is incorrect.
- (D) If both the Assertion and Reason are incorrect.



Ans [C]

Each molecule of ribulose-1, 5-biphosphate fixes one molecule of carbon dioxide with the addition of water, thereby resulting in the formation of two molecules of 3-phosphoglyceric acid (3-PGA). The fixation and reduction of one molecule of CO_2 requires three molecules of ATP and two of NADPH, coming from the photochemical reactions.

Direction : Each of these questions contains an Assertion followed by Reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements. [2012]

Assertion : Six molecules of CO_2 and twelve molecules of $\text{NADPH}^+ + \text{H}^+$ and 18 ATP are used to form one hexose molecule. — True

Reason : Light reaction results in formation of ATP and NADPH_2 . True

- (A) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
- (B) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
- (C) If Assertion is correct but Reason is incorrect.
- (D) If both the Assertion and Reason are incorrect.

Ans ~~[C]~~ B

Six molecules of CO_2 enter Calvin cycle to produce one hexose molecule whereas 18 ATP, 12 NADPH + H^+ molecule are used up. The light reaction of photosynthesis results in ATP and NADPH₂ formation.