Q-1 - 46831993

Phosphoenol pyruvate (PEP) is the primary CO_2 acceptor in

(A) C_3-plants

(B) C_4-plants

(C) C_2-plants

(D) C_3 and C_4-plants

CORRECT ANSWER: B

SOLUTION:

Phospheonol Pyruvate (PEP) is found in the mesophyll cell, which accepts the atmospheric CO_2 in C_4-plants

and converts it to oxalo acetate -a C_4 compound. It is the first stable compound of C_4-plants

Concept Enchancer C_4-plants possess special adaptation anatomy in their leaves to cope up the photorespiratory losses. There are dimorphic chloroplast present in them-agranal in bundle sheath cells and granal in mesophyll cells.

Q-2 - 46831998

In a chloroplast the highest number of protons are found in

(A) lumen of thylokoids

(B) inter membrane space

(C) antennae complex

(D) stroma

CORRECT ANSWER: A

SOLUTION:

Proton concentration is higher in the lumen of thylokoid due to photolysis of water, H^+ pumping ad NADP reductase activity which occurs in stroma of the chloroplast.

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Q-3 - 46832000

The process which makes major difference between C_3 and C_4 plants is:-

(A) glycolysis

(B) Calvin cycle

(C) Photorespiration

(D) respiration

CORRECT ANSWER: C

SOLUTION:

Photorespiration is the process which makes a difference between the C_3 and C_4-plants. In this process, there is a continuous loss of carbon fixed in the form of CO_2.

It occurs due to the high O_2 content, high temperature conditions in which RuBP carboxylase starts working as RuBP oxygenate and normal photosynthesis does not occur.

Q-4 - 46832004

The correct sequence of cell organelles during photores piration is

(A) Cloroplast-Golgi bodies-mitochondria

(B) chloroplast-rough endoplasmic reticulum-dictyosomes

(C) chloroplast-mitochondria-peroxisome

(D) chloroplast-vacuole-peroxisome

CORRECT ANSWER: C

SOLUTION:

None of the option is correc. Photorespiration required three cell organelles in sequence of chloroplast, peroxisome and mitochondria. Option (c) may be correct if be read as said sequence.

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Q-5 - 46832007

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

(A) bryophyte

(B) gymnosperm

(C) angiosperm

(D) alga

CORRECT ANSWER: D

SOLUTION:

The use of radiactive .^{14}C by Melvin calvin in algal (chlorella) photosynthesis studies led to the discovery that the fist CO_2 fixation product was a 3-carbon organic acid. The first product identified was-phosphoglyceric acid (PGA).

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Q-6 - 46832013

In the leaves of C_4-plants, malic acid formation during CO_2-fixatino occurs in

(A) mesophyll

(B) bundle sheath

(C) phloem

(D) epidermis

CORRECT ANSWER: A

SOLUTION:

The oxalic acid is reduced to malic acid in mesophyll cells, from chloroplast of mesophyll cells the malic acid is transferred to the chloroplast of bundle sheath cells

where, it is decarboxylated to form CO_2 and pyruvic acid.

Q-7 - 46832017

As compared to a C_3 plant, how many additional molecules of ATP are needed for net production of one molecule hexose sugar by C_4 plants

(A) 2

(B) 6

(C) 12

(D) zero

CORRECT ANSWER: C

SOLUTION:

In C_4- plants every CO_2 molecule as to be fixed twice, so these plants are needed more energy for C_3-plants in which CO_2 has to be fixed only once. 18 ATP molecules are required by C_3-plants for the synthesis of one molecule of hyexose sugar while 30 ATP molecules are needed by the C_4-plants for the same. thus, C_4-plants have a need of 12 ATP molecules extra than C_3-plants for the synthesis of one molecule of hexose sugar.

Q-8 - 46832022

In chloroplasts, chlorophyll is presents in the

(A) outer membrane

(B) inner membrane

(C) thylakoids

(D) stroma

CORRECT ANSWER: C

SOLUTION:

The thylakoids of chloroplast are flattened vesicles arranged as a membranous network within the stroma. 50% of chloroplast proteins and various components involved (namely chlorophyll, carotenoids and plastoquinone) in photosynthesis are present in thylakoid membranes.

Q-9 - 46832025

Which one of the following is wrong in relation to photorespiration

(A) it is a characteristic of C_3-plants

(B) it occurs in chloroplasts

(C) It occurs in day time only

(D) it is a characteristic of C_4-plants

CORRECT ANSWER: D

SOLUTION:

Dicker and Tio (1959) discovered photorespiration in tobacco plant. It is a light depedent process of oxygenation of Ribulose Bisphoshate (RuBP). During this process CO_2 is liberated and O_2 is consumed. C_4-plants avoid photorespiration by following hatch slack pathway.

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Q-10 - 46832001

In photosynthesis, light independent reactions take place at

(A) thylakoidlumen

(B) photosystem-I

(C) photosystem-II

(D) stromal matrix

CORRECT ANSWER: D

SOLUTION:

The light-independent reactions (or dark reactions) take place in the stromal matrix of the chloroplasts. In light independent reactions, carbon dioxide is reduced to glucose (carbohydrate) by the hydrogen in NADPH by using the chemical energy stored in ATP. This reaction takes place in the presence of a substance called RuDP.

Q-11 - 46832031

how many turns of Calvin cycle yield one molecule of glucose?

(A) 8

(B) 2

(C) 6

(D) 4

CORRECT ANSWER: C

SOLUTION:

Conversion of CO_2 to simple (reduced) organic compounds is called CO_2 assimilation or CO_2 fixation or carbon fixation. This fixation pathway was elucidated in the early 1950s by Melvin calvin and Coworkens and

is often called as calvin cycle. Since, one molecule of carbon is fixed in one turn of the calvin cycle. so, six turns of the cycle are required to fix the glucose molecules containing 6 carbon atoms.

Q-12 - 46832038

Protochlorophyll differs from chlorophyll in lacking

(A) 2 hydrogen atoms in two of its pyrrole rings

(B) 2 hydrogen atoms in two of its pyrrole rings

(C) 4 hydrogen atoms in one of its pyrrole rings

(D) 4 hydrogen atoms in two of its pyrrole rings

CORRECT ANSWER: A

SOLUTION:

Protochlorophyll differs from chlorophyll in lacking 2

hydrogen atoms in one of its pyrrole rings.

Q-13 - 46832041

Which of the following is present in Calvin Cycle.

(A) Reductive carboxylation

(B) Oxidative carboxylation

(C) Photophosphorylation

(D) Oxidative phosphorylation

CORRECT ANSWER: A

SOLUTION:

In dark phase or Calvin cycle, carbon dioxide is

assimilated with the helpof assimilatory power (ATP and $NADPH_2$) to produce organic acid. The cycle involves reduction of carbon involving carboxylation, glycolytic reversal and regeneration of RuBP. C_3 cycle is also known as reductive pentose pathway or photosynthetic carbon Reduction (PCR).

Q-14 - 46832047

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

CORRECT ANSWER: B

SOLUTION:

Cyclic photophosphorylation is that type of light energised ATP synthesis in which electron expelled by excited photocentre does not return to them. It involves two photochemical systems (PS-I and PS-II) and produces assimilatory power (ATP and NADPH). In both, cyclic and non-cyclic photophoshorylation, formation of ATP takes place.

Q-15 - 46832057

The enzyme that catalyses carbon dioxide fixation in C_4 plants is

(A) RuBP carboxylase

(B) PEP carboxylase

(C) carbonic anhydrase

(D) carboxydismutase

CORRECT ANSWER: B

SOLUTION:

In C_4-plants, mesophyll cells fix carbon dioxide with the help of phosphoenol-pyruvate (the first acceptor) in the presence of PEP carboxylase to a compound oxaloacetic acid (first product).

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Q-16 - 46832064

Ferredoxin is a constituent of

(A) PS-I

(B) PS-II

(C) Hill reaction

(D) P_{680}

CORRECT ANSWER: A

SOLUTION:

Ferrodoxin (Fd) is a soluble protein which acts as electron carrier and forms a constituent of PS-I ferredoxin passes electrons to reductase complex which helps in reducing $NADP^+$ to NADPH (a strong reducing agent).

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Q-17 - 46832071

The substrate for photorespiration is

(A) phosphoglyceric acid

(B) glycolate

(C) serine

(D) glycine

CORRECT ANSWER: B

SOLUTION:

Photorespiration is the oxidation of photosynthetic intermediate without production of photosynthetic intermediate without production of CO_2. ATP and $NADH_2$. The substrate for photorespiration is a 2-carbon compound glycolic acid (glycolate).

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Q-18 - 36805993

Which of the following is not a product of light reaction of phtosynthesis

(A) NADPH

(B) NADH

(C) ATP

(D) Oxygen

SOLUTION:

During light reaction of photosynthesis NADPH , ATP and oxygen are formed . Oxygen is liberated by the photolysis of water .

$$4H_2O \Leftrightarrow 4H^+ + 4OH^-$$

$$4OH^-$$

$$\xrightarrow[Mn^{2+}, Ca^{2+}, Cl^-]{\text{Oxygen- Evolving complex}} 2H_2O$$

$$+ O_2 \uparrow + 4e^-$$

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Q-19 - 26295544

Which metal ion is a constituent of chlorophyll?

(A) Iron

(B) Copper

(C) Magnesium

(D) Zinc

CORRECT ANSWER: C

SOLUTION:

(c) Magnesium(Mg) is present in the centre of porphyrin ring of the chlorophyll molecule. Other ions, i.e., copper and zinc participate in other metabollic processes which are

Fe is an important part of cytochrome and ferridoxin.

Cu plays an important role in enzyme catalysing redox reactions.

Zn is associated with auxin (a phytohormone) synthesis.

Q-20 - 30688775

17.0 / if one hundred M The sum of the parallelograms of the stripes is 5.5 ... S respectively, with a center on the first (Common Difference) Probably 1,23 ... m, so prove that 5 52 + ... + s .-- (m + 10 (E-1) Omnipresent 5 yes yes sister key

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Q-21 - 30698770

Of the total incident solar radiation the proportion of PAR is:

(A) Less than 50 %

(B) More than 80 %

(C) About 70 %

(D) About 60 %.

CORRECT ANSWER: A

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Q-22 - 46832075

Carbon dioxide joins the photosynthetic pathway in

(A) PS-I

(B) PS-II

(C) light reaction

(D) dark reaction

CORRECT ANSWER: D

SOLUTION:

In dark reaction of photosynthesis, reducing agent (NADPH) and source of energy (ATP) formed during lighht reaction, are utilised in the conversion ofCO_2 to carbohydrates.

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Q-23 - 46832018

Photosynthesis in C_4 plants is relatively less limited by atmospheric

CO_2 levels because

(A) effectve pumping of CO_2 into bundle sheath cells

(B) RuBisCO in C_4-plants has higher affinity for CO_2

(C) Four carbon acids are the primary initial CO_2-fixation products

(D) The primary fixation of CO_2 is mediated via PEP carboxylase

---

CORRECT ANSWER: D

SOLUTION:

The fixation of CO_2 in C_4-plants takes place in two places and by two different organic compounds. Phosphoenol pyruvate (PEP) is found atmospheric CO_2 into oxalo acetic acid (4C). RuBisCO is present in bundle sheath cells where final fixation of CO_2 in hexose

sugars takes place. CO_2 is primarily fixed by PEP carboxylase because this enzyme has greater affinity to CO_2 than RuBisCO.

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Q-24 - 46832053

Formation of ATP in photosynthesis and respiration in an oxidation process which utilises the energy from:-

(A) cytochromes

(B) ferredoxin

(C) electrons

(D) carbon dioxide

CORRECT ANSWER: C

SOLUTION:

Cytochromes (Keilin, 1925) are the electron transport intermediates containing heme (or related prosthetic groups) in which the iron undergoes valancey changes during electron transfer and produces energy (ATP) in both photosynthesis and respiration.

Q-25 - 46832065

During monsoon, the rice crop of eastern states of India shows lesser yield due to limiting factor of

(A) CO_2

(B) light

(C) temperature

(D) water

CORRECT ANSWER: B

SOLUTION:

According to the principle of limiting factor, the rate of theprocess is limited by the pace of the slowest factor. Light intensity varies with latitude, altitude, season, topography, presence or absence of interceptors like cloud, dust, fog, humidity, etc. In eastern states, low light intensity during monsoon result in low photosynthesis and hence, lesser yield.

Q-26 - 46832070

In C_4 plants, Calvin cycle operates in

(A) stroma of bundle sheath chloroplasts

(B) grana of bundle sheath chloroplasts

(C) grana of mesophyll chloroplasts

(D) stroma of mesophyll chloroplats

CORRECT ANSWER: A

SOLUTION:

C_4-plants possess two types of chloroplasts granal in mesophyll cells and agrenal in bundle sheath cells. Mesophyll cells are specialised to perform light reaction and bundle sheath cells possess $RuBisCO$, $here$ CO_(2)` is fixed through calvin cycle.

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Q-27 - 30698772

In kranz anatomy, the bundle sheath cells have

(A) Thick walls, many intercellular spaces and no chloroplasts

(B) Thin walls, no intercellular spaces and large number of chloroplasts

(C) Thick walls, no intercellular spaces and few chloroplasts

(D) Thin walls, many intercellular spaces and several chloroplasts.

CORRECT ANSWER: B

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Q-28 - 30698765

Optimum temperature for photosynthesis is

(A) $35^\circ - 40^\circ C$

(B) $25^{\circ} - 35^{\circ} C$

(C) $20^{\circ} - 25^{\circ} C$

(D) $10^{\circ} - 15^{\circ} C$.

CORRECT ANSWER: C

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Q-29 - 30698763

Formation of phosphoglyceraldehyde from phosphoglyceric acid is

(A) Hydrolysis

(B) Oxidation

(C) Reduction

(D) Electrolysis.

CORRECT ANSWER: C

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Q-30 - 30698755

Plants requiring low light intensity for optimum photosynthesis is called:

(A) Bryophytes

(B) Pteridophytes

(C) Heliophytes

(D) Sciophytes.

CORRECT ANSWER: D

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Q-31 - 30698752

In three Calvin cycles, gross number of PGAL molecules produced

at the cost of ATP and $NADPH_2$

(A)
$3PGAL, 3ATP,$
$3NADPH_2$

(B)
$6PGAL, 6ATP,$
$6NADPH_2$

(C)
$18PGAL, 18ATP,$
$18NADPH_2$

(D)
$9PGA, 9ATP,$
$9NADPH_2$

.

CORRECT ANSWER: B

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Q-32 - 30698758

RuBisCo occurs in high quantity as it is

(A) An oxygenase

(B) Catalysing reversible reaction

(C) Degraded rapidly

(D) Very slow acting enzyme.

CORRECT ANSWER: D

Q-33 - 46832020

In C_3 plants, the first stable product of photosynthesis during dark reaction is

(A) Malic acid

(B) oxaloacetic acid

(C) 3phosphoglyceric acid

(D) phosphoglyceraldehyde

CORRECT ANSWER: C

SOLUTION:

In C_3-plants the first stable product formed during dark reaction is 3-phosphoglyceric acid. Since, it is a 3 carbon compound hence, the pathway is referred as C_3-pathway. Oxalo acetic Acid (OAA) is the first stable compound in C_4-plants. it is a 4C compound.

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Q-34 - 30698764

Rate of photosynthesis is maximum in

(A) Orange light

(B) Yellow light

(C) Blue light

(D) Green light.

CORRECT ANSWER: C

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Q-35 - 30698762

Electron energy is used to drive protons against concentration gradient across thylakoid membrane into

(A) Stroma lamella

(B) Thylakoid lumen

(C) Stroma

(D) Interthylakoid space.

CORRECT ANSWER: B

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Q-36 - 46832076

$NADP^+$ is reduced to NADPH in

(A) PS-I

(B) PS-II

(C) Calvin cycle

(D) Non-cyclic photophosphorylation

CORRECT ANSWER: D

SOLUTION:

In photosynthesis during non-cyclic photophoshorylation

involving both PS-I and PS-II, electrons released during

photolysis of water are transferred to PS-II and then PS-I via a series of electron carriers. P_{700} of PS-I releases electron after absorbing light energy This electron passes through chlorophyll X, Fe-S, ferredoxin and finally to $NADP^+$. $NADP^+$ combines with H^+ (released during photolysis) with the help of NADP reductase to form NADPH.

$$NADP^+ + 2e^- + H^+ \xrightarrow{\text{NADP reductase}} NADPH$$

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Q-37 - 46832054

Translocation of carbohydrate nutrients usually occurs in the form of

(A) glucose

(B) maltose

(C) starch

(D) sucrose

CORRECT ANSWER: D

SOLUTION:

In plants, translocation, i.e. the movement of organic nutrients from the region of supply to the region of sink or utilisation occurs through phloem (sieve tube/sieve cells) tissue. Translocated organic nutrients constitute 10-26% carbohydrates (usually sucrose) and 1% nitrogenous components (mostly amino acids).

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Q-38 - 46832045

Pigment acting as a reaction centre during photosynthesis is

(A) carotene

(B) phytochrome

(C) P_{700}

(D) cytochrome

CORRECT ANSWER: C

SOLUTION:

Photosynthetic pigment molecule (e.g. P_{700}, P_{680}) are able to convert light energy into chemical energy. These pigment molecules which toether forms the photosynthetic units, possess photocentres (reaction centre=trap centre) surrounded by harvesting molecules differentiated into core molecules and antenna molecules.

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Q-39 - 46832029

Which pigment system is inactivated in red drop?

(A) PS-I and PS-II

(B) PS-I

(C) PS-II

(D) None of the above

CORRECT ANSWER: C

SOLUTION:

The fall in photosynthetic yield beyond red region of spectrum (680 nm) is called red drop. Reaction centre of PS-II is P_{680} while that of PS-I is P_{700}. So in the red

drop reaction PS-II is inactivated.

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Q-40 - 46831994

With reference to factors affecting the rate of photosynthesis, which of the following statements is not correct ?

(A) Light saturation for CO_2-fixation occurs at 10% of full sunlight

(B) increasing atmospheric CO_2 concentration upto 0.05% can enchance CO_2-fixation rate

(C) C_3-plants respond to higher temperature with enchanced photosynthesis, while C_4-plants have much lower temperature optimum

(D) Tomato is greenhouse crop, which can be grown in CO_2 enriched atmosphere for higher yield.

CORRECT ANSWER: C

SOLUTION:

In C_4-plants, the initial fixation of CO_2 occurs in mesophyll cells. The primary acceptor of CO_2 in phosphoenol Pyruvate (PEP). It combines with CO_2 in the presence of enzyme PEP carboxylase to form the first stable product, i.e. Oxalo acetic Acid (OAA). Where as C_3-plants lack $PEP_{\text{carboxylase}}$ enzyme. The possess RuBisCO enzyme. This enzyme can work as both carboxylase (fixation of CO_2) and oxygenase (fixation of O_2). RuBisCO has a much greater affinity for CO_2 than for O_2 and the binding is competitive. At higher temperature, its affinity for CO_2 decrease and it works as oxygenase. Therefore, at higher temperature photosynthesis decrease in C_3-plants, while in C_4-plants it increases.

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Q-41 - 46831999

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

(A) Manganese and chlorine

(B) Manganese and potassium

(C) Magnesium and molybdenum

(D) Magnesium and chlorine

CORRECT ANSWER: A

SOLUTION:

Photolysis of water during photosynthesis evolve

nascent oxygen in the presence of manganese, calcium and chloride ions.

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Q-42 - 46832002

Anoxygenic photosynthesis is characteristic of

(A) Rhodospirillum

(B) Spirogyra

(C) Chlamydomonas

(D) Ulva

CORRECT ANSWER: A

SOLUTION:

Anoxygenic photosynthesis (in which O_2 is not released)

is seen in Rrhodospirilllum which is a purple non-sulphur bacteria. It helps an organism to trap light energy and store it as chemical energy. Other than this anoxygenic photosynthesis commonly occurs in purple non-sulphur bacteria green sulphur/non-sulphur bacteria, and heliobacteria, etc.

Q-43 - 46832006

Of the total incident solar radiation the proportion of PAR is:

(A) about 60%

(B) less than 50%

(C) more than 80%

(D) about 70%

CORRECT ANSWER: B

SOLUTION:

PAR (photosynthetically active radiation) designates the spectral range of solar radiation from 400-700nm that photosynthetic organisms are able to use in the process of photosynthesis. Of the total incident solar radiation the proportion of PAR is less than 50%.

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Q-44 - 46832015

In photosystem-I the first electron acceptor is

(A) cytochrome

(B) plastocyanin

(C) an iron-sulphur protein

(D) ferredoxin

CORRECT ANSWER: C

SOLUTION:

In photosystem-I, the primary electron acceptor is probable a Fe-S protein. The reduced primary acceptor transfers the electrons to secondary electron acceptor (most probable P_{430}). The sequence of electron transfer is as follows:

$$P_{700} \underset{(chl\ -a^+)}{} \xrightarrow{e^-} A_1 \underset{(\text{Phyloquinone})}{} \xrightarrow{e^-} A_2 \underset{(\text{Fe-S protein})}{} \xrightarrow{e^-} A_3 \underset{(P_{430})}{}$$

The reduced P_{430} passess its electrons to ferredoxin

(Fd) present at outer surface of thylakoid membrane.

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Q-45 - 46832024

In sugarcane plant ˆ $(14)CO_2$ is fixed in malic acid, in which the enzyme that fixes CO_2 is

(A) fuctose phosphatase

(B) ribulose bisphosphate carboxylase

(C) phosphoenol pyruvic acid carboxylase

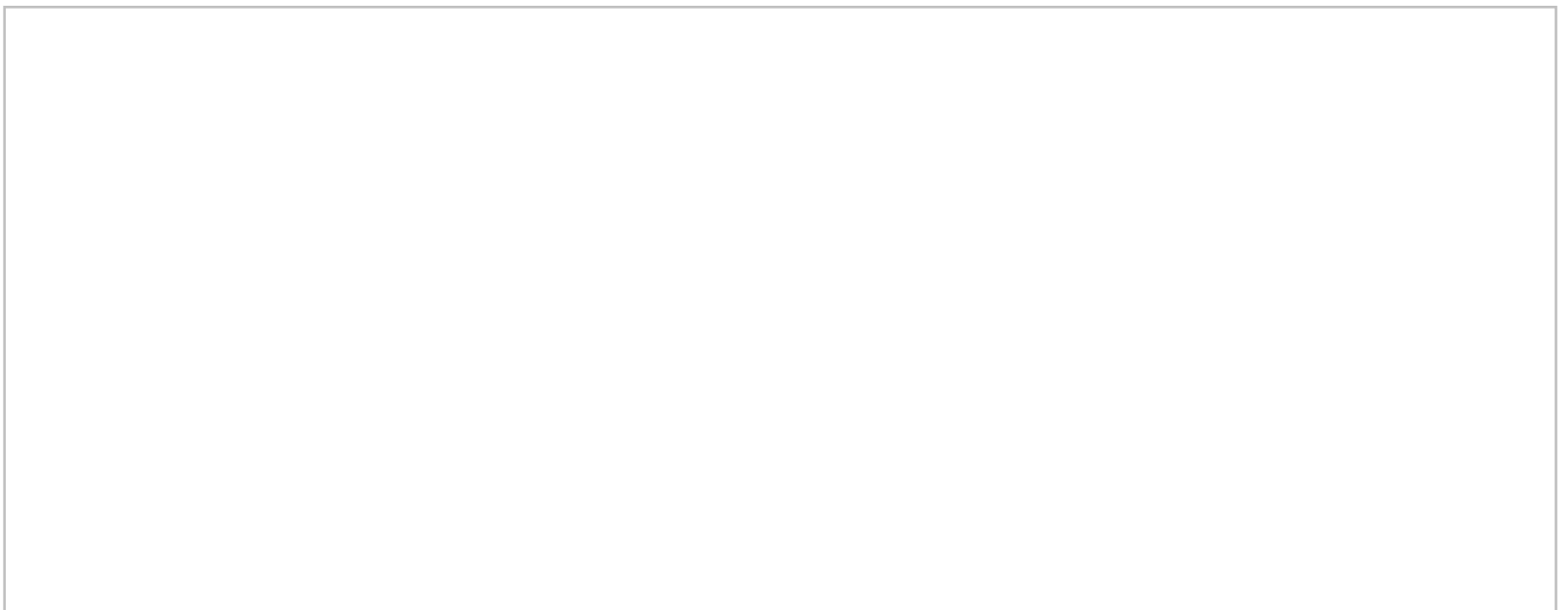
(D) ribulose phosphate kinase

CORRECT ANSWER: C

SOLUTION:

In C_4-plants, CO_2 is take up by Phosphoenol-Pyruavate

(PEP) and the reaction being catalysed by PEP carboxylase.



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Q-46 - 46832028

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

(A) ADP

(B) ATP

(C) RuDP

(D) chlorophyll

CORRECT ANSWER: B

SOLUTION:

As a result of light reaction, oxygen, NADPH at ATP are formed. Oxygen is released into the atmosphere while NADPH and ATP are utilised for reduction of CO_2 to carbohydrate in dark reaction.

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Q-47 - 46832039

NADPH is generated through

(A) photosystem-I

(B) photosystem-II

(C) anaerobic respiration

(D) glycolysis

CORRECT ANSWER: B

SOLUTION:

NADPH is generated through photosystem-II in non-cyclic photophosphorylation (which involves both PS-I and II) protons released from photolysis and electrons emitted from P_{700} are ultimately passed on to $NADP^+$ resulting in the formation of NADPH. In cyclic photophosphorylation (which involves only PS-I) electrons flow in a cyclic manner but there is not net formation of NADPH and O_2.

Q-48 - 46832043

Chorophyll 'a' molecule at its carbon atom 3 of the pyrrole ring II has one of the following

(A) aldehyde group

(B) methyl group

(C) carboxyl group

(D) megnesium

CORRECT ANSWER: A

SOLUTION:

Chlorophyll has a tetrapyrrole porphyrin head and a long chain alcohol called phytol tail. Each pyrrole is a 5 member ring with one nitrogen and four carbon. A non-

ionic Mg atom lies in the centre of porphyrin, attached to nitrogen atoms of pyrrole rings. Chlorophyll-a has methyl group as carbon 3 of pyrrole ring and chlorophyll-b has foormyl (aldehyde) group attached to this atom.

Q-49 - 46832049

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) $C_6H_{12}O_6$ with $.^{18}O$

CORRECT ANSWER: B

SOLUTION:

Ruben, Hassid and Kamen (1941) using heavy isotope of oxygen, O^{18} in water, found that oxygen evolved in photosynthesis comes from water evolution of oxygen does not require carbon dioxide.

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Q-50 - 46832060

Chlorophyll a occurs in

(A) all photosynthetic autotrophs

(B) in all higher plants

(C) all oxygen liberating autotrophs

(D) all plants except fungi

CORRECT ANSWER: B

SOLUTION:

Chlorophyll-a $(C_{55} - H_{72}O_5N_4Mg)$ is a bluish green pigment, it is the primary photosynthetic pigment or universal photosynthetic pigment that occurs in all plants except photoautotrophic bacteria, i.e., found in oxygenic photoautotrops.

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Q-51 - 46832011

Cyclic-photophosphorylation results in the formation of

(A) NADPH

(B) ATP and NADPH

(C) ATP,NADPH and O_2

(D) ATP

CORRECT ANSWER: D

SOLUTION:

Cyclic-photophosphorylation involves only pigment system-I and result in the formation of ATP only. When the photons activate PS-I, a pair of electrons are raised to a higher energy level. They are captured by primary acceptor which passes them on to ferredoxin, plastoquinone, cytochrome complex, plastocynin and finally back to reaction centre of PS-I, i.e., P_{700} At each step of electron transfer, the electrons lose potential energy. their trip down hill is caused by the transport chain to pump H^+ across the thylokoid membrane. The proton gradient thus established is responsible for forming ATP (2 molecules). No reduction of NADP to NADPH+H^+

Q-52 - 46832034

Fixation of one CO_2 molecule through calvin cycle requires

(A) 1 ATP and 2NADPH_2

(B) 2 ATP and $2NADPH_2$

(C) 3 ATP and $2NADPH_2$

(D) 2 ATP and $1NADPH_2$

CORRECT ANSWER: C

SOLUTION:

2 ATP are required during conversion of PGA to 1,3 diphosphoglyceric acid and 1 ATP during conversion of glyceraldehyde phosphate to ribulose biphosphate. 2 $NADPH_2$ molecules are utilised for converting 1,3 diphosphoglyceric acid to glyceraldehyde phosphate.

Q-53 - 46832062

Photosynthetic pigments found in the chloroplasts occur in

(A) thylakoid membranes

(B) plastoglobules

(C) matrix

(D) chloroplast envelope

CORRECT ANSWER: A

SOLUTION:

Photosynthetic pigments are those pigments which occur on photosynthetic thylakoids of chloroplast and absorb light energy for the purpose of photosynthesis. These are mainly of two types-chlorophylls and

carotenoids.

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Q-54 - 46832066

Which technique has helped in inverstigation of calvin cycle ?

(A) X-ray crystallography

(B) X-ray technique

(C) Radioactive isotope technique

(D) Intermittent light

CORRECT ANSWER: C

SOLUTION:

Calvin, benson and basshan utilised C^{14} (with long life)

to trace the path of carbon in photosynthesis. Calvin was

awarded nobel prize in 1961 in recomgnition to his work with C^{14} isotope. He discovered the cycleinvolved in carbon assimilation, known as calvin cycle or C_3-cycle.

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Q-55 - 46832051

The carbon dioxide acceptor in Calvin cycle/ C_3- plants is

(A) Phosphoenol Pyruvate (PEP)

(B) Ribulose 1,5-Diphosphate (RuDP)

(C) Phosphoglyceric acid (PGA)

(D) Ribulose monophosphate (RMP)

CORRECT ANSWER: B

SOLUTION:

In C_3-plants , CO_2 combines with ribuolose (acceptor molecule) in the presence of RuBisCO (RuBP carboxylase) and form two molecules of 3-phosphoglyceric acid or PGA (first stable product).

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Q-56 - 46832044

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

(A) 340-450 nm

(B) 400-700 nm

(C) 500-600nm

(D) 400-950 nm

CORRECT ANSWER: B

SOLUTION:

Photosynthetically active region (PAR) of solar radiation is visible region. It consists of radiations having wavelength between 400 to 700 nm. Green plants use this wavelength in the process of manufacture of food, i.e., photosynthesis.

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Q-57 - 46832040

The principle of limiting factors was proposed by:-

(A) Blackmann

(B) Hill

(C) Arnon

(D) Liebig

CORRECT ANSWER: A

SOLUTION:

The principle of limiting of factors was given by blackmann, a british plant physiologist in 1905, according to him, light intesity, carbon dioxide concentration and temperature are the limiting factors in photosynthesis. When a process is conditioned as to its rapidity by a number of seprate factors, the rate of the process is limited by the pace of the slowest factor.

Q-58 - 46832026

Which element is located at the centre of the porpyrin ring in chlorophyll?

(A) Manganese and chlorine

(B) Calcium

(C) Magnesium and molybdenum

(D) Potassium

CORRECT ANSWER: C

SOLUTION:

Magnesium is at the centre of the porphyrin ring in chlorophyll. The general structure of chlorophyll was elucidated by hand fischer in 1940.

Q-59 - 46832014

The first acceptor of electrons from an excited chlorophyll molecule of phtosystem II is

(A) cytochrome

(B) iron-sulphur protein

(C) ferredoxin

(D) quinone

CORRECT ANSWER: D

SOLUTION:

Plastoquinone is the first acceptor of electrons from an excited chlorophyll molecule of photosystem-II.