DPP
DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : BIOLOGY
DPP No. : 3

Topic :- Photosynthesis in Higher Plants

1 **(a)**
Etiolation involves the destruction of chloroplasts and, hence all the chlorophyll when the plants are grown in dark.

2 **(b)**
DCMU (Dichlorophenyl dimethylurea) is a herbicide, which inhibits oxygen evolution and non-cyclic photophosphorylation. Oxygen evolution and non-cyclic photophosphorylation, both are involved in PS-II

3 **(c)**
Pigments are embedded in thylakoids. According to **Emerson**, there are two systems, PS-I lies on outer surface and PS-II in inner surface of thylakoids.

4 **(d)**
The Russian botanist Mikhail Tswett is credited with the original development of a separation technique that we now recognise as a form of chromatography. In 1903, he reported the successful separation of plant pigments by using a column of calcium carbonate

5 **(d)**
Like green plants, some purple and green sulphur bacteria are capable of synthesising their organic food in presence of light, which is known as **bacterial photosynthesis.**

6 **(a)**
In 1845, Liebig proved that organic matter synthesised during photosynthesis is derived from carbon dioxide and water

7 **(d)**
Photophosphorylation is the synthesis of ATP from ADP and inorganic phosphate in the presence of sun-light. When the two photosystems work in series, first PS-II and then the PS-I, a process called non-cyclic Photophosphorylation occurs. The two photosystems are connected through an electron transport chain in the Z-scheme (due to the shape of path of electrons flow). Both ATP and $NADH+H^+$ are synthesized by this kind of electron flow.

8 **(a)**
Melvin Calvin used radioactive ^{14}C in algal photosynthesis, which led to the discovery that the first CO_2 fixation product was a 3-carbon organic acid. He also contributed to working out the complete biosynthetic pathway; hence it was called **Calvin cycle** after him.
The first product identified was **3-phosphoglyceric** acid or **PGA.** For this, he was awarded Nobel Prize

9 **(b)**

Water is oxidised by PS-II, the reaction is

$2H_2O \rightarrow 4H^+ + O_2 + 4e^-$

These electrons goes to the PS-I one by one through ETS (Electron Transport System) on reaching to the PS-I. They reduces $NADP^+$ to $NADPH + H^+$

10 **(d)**

PS-I is present on both the non-appressed part of grana thylakoids as well as on stroma thylakoids

11 **(b)**

Anthocyanin is water soluble pigment. It constitutes a class of natural phenolic product. These provide colour to petals and fruit. Chlorophyll-*a* and *b* are water insoluble pigments. They are soluble in organic solvents

12 **(a)**

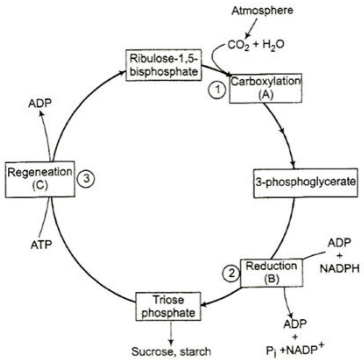
C_4-plants have very little photorespiration because its initial carbon fixation is done by PEP carboxylase not by Rubisco. Beside this, C_4-plant generate their own CO_2 by decarboxylation of C_4 acids in bundle sheath. Due to these reasons, the C_4-plants minimise photorespiration

13 **(b)**

Photolysis is the phenomenon of breaking up of water into hydrogen and oxygen in the illuminated chloroplasts. It is also called, photocatalytic splitting of water. It requires light energy, an oxygen evolving complex and an electron carrier. It also requires the ions, CI^-,M n^{2+}

14 **(c)**

The Calvin cycle proceeds in three stages (1) carboxylation, during which CO_2 combines with ribulose 1, 5-bisphosphate; (2) reduction, during which carbohydrate are formed at the expense of the photochemically made ATP and NADPH; and (3) regeneration during, C O_2 acceptor is ribulose 1, 5-bisphosphate is formed again so that the cycle continues. Regeneration of the CO_2 acceptor molecule, RuBP is crucial if the cycle is to continue uninterrupted. The regeneration steps require one ATP for phosphorylation to form RuBP



15 **(b)**

During Photophosphorylation, ATP is formed.

16 **(a)**

Usually with increase in light intensity the rate of photosynthesis increased. At very high

light intensity the cells exhibit photooxidation by the process of solarization and if continues for few hours, the photosynthetic apparatus is destroyed.

17 **(d)**

Due to the higher value of CO_2 and ATP, the rate of Calvin cycle increases to form carbohydrate (starch). This leads to inhibition of photorespiration (glycolate cycle) and Kreb's cycle

18 **(c)**

During the photosynthesis within chloroplast protons in the stroma decreases in number, while in lumen there is accumulation on protons.

This create a proton gradient across the thylakoid membrane as well as a measurable decrease in pH (acidic) in the lumen

19 **(b)**

Chlorophyll structure was studied by Wilstatler, Stoll and Fisher in 1912. It has a tadpole like structure with head called porphyrin and a tail made up of long chain alcohol called phytol. Porphyrin head is made up of four pyrrole rings, which are linked by methane a bridges ($-$ CH $=$)

20 **(b)**

Members of family-Crassulaceae perform CAM photosynthesis.

ANSWER-KEY										
Q.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
A.	**A**	**B**	**C**	**D**	**D**	**A**	**D**	**A**	**B**	**D**
Q.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A.	**B**	**A**	**B**	**C**	**B**	**A**	**D**	**C**	**B**	**B**