DPP
DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : BIOLOGY
DPP No. : 9

Topic :- Photosynthesis in Higher Plants

1 **(a)**
Due to the difference in the pH of the two medium (outside and inside), there is development of proton gradient, which leads to the formation of ATP

3 **(d)**
If light becomes unavailable then the biosynthetic phase continues for sometime and then stops.
Product of light reactions are ATP, NADPH and O_2. Of these O_2 diffuse out of the chloroplast, while ATP and NADPH are used to drive the process leading to synthesis of food, sugars. NADPH + H^+, O_2, etc.

4 **(d)**
During photosynthesis, the proton accumulation is towards the inside of the membrane, *i.e.*, in the lumen. In respiration, protons accumulate in the intermembrane space of the mitochondria when electrons move through the ETS

5 **(c)**
The C_4-plants have **dimorphic chloroplasts-granal** and **agranal**. Chloroplasts in mesophyll cells are granal, *i.e.*, they contain thylakoids that are stacked to form grana, as in C_3 — plants. Chloroplasts of **bundle sheath cells** are agranal, *i.e.*, grana are absent and the thylakoids are present only as stroma lamellae.

6 **(d)**
The uses of radioactive ^{14}C by Malvin-Calvin in algal (*Chlorella*) photosynthesis studies, led to the discovery that first carbon dioxide fixation product was 3-carbon organic acid. This first product was identified as 3-Phosphoglyceric Acid (3PGA)

7 **(d)**
Hill's reaction/photochemical/light reaction is initiated when specific light is absorbed by group of chlorophyll molecules primarily concerned with light harvesting.

8 **(a)**
Fixing of one molecule of CO_2 or carbon needs 5 ATP and 2 NADPH in C_4-plants. C_4-plants takes 2 more ATP than C_3-plants. But, the photorespiration is absent in C_4-plants, thus C_4-plants are more economical than C_3-plant

9 **(d)**
CO_2 is required for photosynthesis is demonstrated by half-leaf experiment in which a part of a leaf is enclosed in a test tube containing some KOH soaked cotton (which absorbs CO_2), while the other half is exposed to air. The setup is then placed in light for some time.

On testing for starch later in the two halves of the leaf, the exposed part of the leaf tested positive for starch while the portion that was in the tube, tested negative. This showed that CO_2 is required for photosynthesis

10 **(b)**

Pineapple is a CAM (Crassulacean Acid Metabolic)plant, in this, the process of photosynthesis takes place in two different places, *i.e.*, light and dark

11 **(a)**

For every CO_2 molecule entering the Calvin cycle, 3 molecule of ATP and 2 molecule of NADPH are required. The difference in the number of ATP and NADPH used in dark reaction is overcome by cyclic phosphorylation

12 **(d)**

Proton gradient is important because it is the break down of this gradient that leads to release of energy. The gradient is broken down due to movement of protons across the membrane to the stroma through the transmembrane channel of the F_0 of the ATPase. The energy released during the breaking down of proton gradient is used in formation of ATP

13 **(d)**

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

14 **(a)**

Cytochromes are iron containing pigments. These acts as electron transporter or electron acceptor in respiration and photosynthesis

15 **(a)**

Oxaloacetic acid is a ^4C-compound. In C_4-plants, oxaloacetic acid is the first carbon dioxide fixation product.

16 **(a)**

Action spectrum.

Though chlorophyll-*a* is the major pigment responsible for trapping light, other thylakoid pigments like chlorophyll-*b*, xanthophylls and carotenoids, which are called accessory pigments, also absorb light and transfer the energy to chlorophyll-*a*. Indeed, they not only enable a wider range of wavelength of incoming light to be utilised for photosynthesis but also protect chlorophyll-*a* from photooxidation

17 **(b)**

A-with, B-decrease. Water stages leaves with thus reducing the surface area of leaves and their metabolic activity as well

18 **(c)**

Even after the closing, the stomata of C_4-plants performs photosynthesis because they can produce their own CO_2 by decarboxylation of malic acid, which is used in Calvin cycle like in C_3-plants

19 **(d)**

Photorespiration is the uptake of oxygen and release of carbon dioxide in light that results from the biosynthesis of glycolate in chloroplast and subsequent metabolism of glycolic acid in the same leaf cell through other two cell organelles (*i.e.*, peroxisome and

mitochondria). Conversion of phosphoglycolate to glycolate takes place in **chloroplast.**

20 **(a)**

The chemical formula of starch is $(C_6H_{10}O_5)_n$.

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