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Class : Deg. II (Subs.)

Topic : Photosynthesis (continued)

Lecture No. - 112

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• Light Phase of Photosynthesis :

Light Phase of photosynthesis is also known as light phase or photochemical reaction or Hill reaction, is differentiated into following two stages :

- (a) Photolysis of Water
- (b) Formation of Assimilatory power.

• (a) Photolysis of Water :

Water molecules present in pigment molecules split into H^+ and OH^- in presence of sunlight, enzyme complex 'Z' and Mn^{+} and Cl^- ions.

- OH^- in presence of specific enzyme complex 'Z' loses its electron and forms O_2 as byproduct in addition to H_2O .
- Electron released during the process enters photocentre P_{680} . Pigment molecule present in P_{680} gets activated and expel electron, which is accepted by quencher molecule 'Q',

- Such 'Q' gets oxidised to donate its electron to plastoquinone. From plastoquinone to cytochrome complex transportation of electron takes place. Here, ATP molecules are formed by chemiosmotic hypothesis (Mitchel et.al., 1968).
- Transportation of electron takes place from cytochrome complex to plastocyanine, which donates its electron to PSI photocentre (P700).
- After activation of pigment molecules present in P700, electrons are released, which are accepted by 'X' (acceptor molecule).
- 'X' - releases its electron to ferredoxin and the latter (ferredoxin) to NADP, which in presence of NADP reductase gets converted into NADPH.H⁺.
- Here H⁺ released by hydrolysis of H₂O, is utilised in the formation of NADPH.H⁺.
- Thus, conversion of photon into electron and electron into chemical energy (i.e., ATP + NADPH) is known as quantum conversion.

(b). Formation of Assimilatory power:

The main objective of light phase is the formation of assimilatory power, i.e., ATP + NADPH. This is formed by non-cyclic photophosphorylation. During the process O₂ is formed as by product.