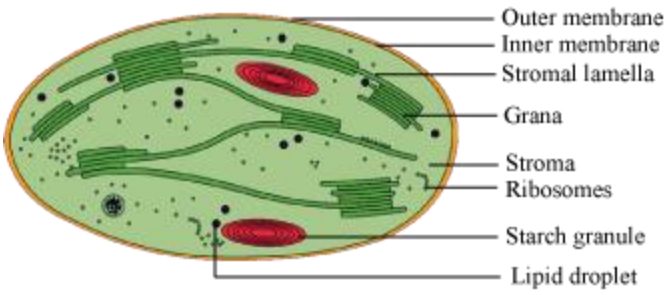
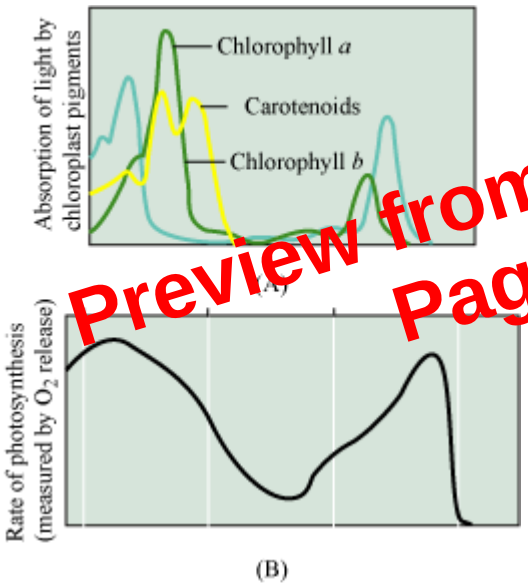
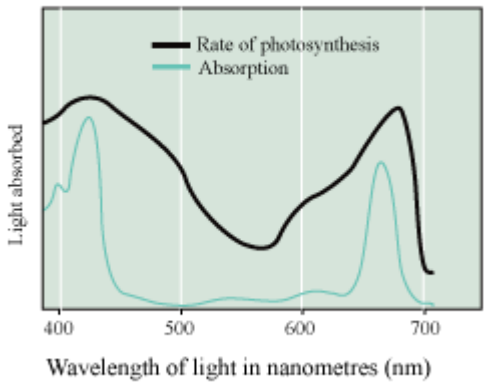


Pigments Involved in Photosynthesis

- An **absorption spectrum** is the graph plotted against the fraction of light absorbed by the pigment.
- An **action spectrum** is the rate of a physiological activity plotted against the wavelength of light.
- The similarity of the action spectrum of photosynthesis and the absorption spectrum of chlorophyll tells us that chlorophylls are the most important pigments in the process.



(B)



(C)

(A) Absorption spectrum of chlorophylls *a*, *b*, and carotenoids

(B) Action spectrum of photosynthesis

(C) Action spectrum superimposed on absorption spectrum of chlorophyll a

- 4 types of pigments may be present in leaves:
- Chlorophyll *a* (blue-green)
- Chlorophyll *b* (yellow-green)
- Xanthophylls (yellow)
- Carotenoids (yellow to yellow-orange)
- Chlorophyll *a* is the main pigment in photosynthesis.
- In VIBGYOR spectra, chlorophyll *a* shows maximum absorption, and hence, the rate of photosynthesis is the highest at the blue and red regions.
- Accessory pigments: Chlorophyll *b*, xanthophylls and carotenoids
- Absorb a wider range of light, and transfer the energy to chlorophyll *a*
- Protect chlorophyll *a* from photo-oxidation

Light Reaction of Photosynthesis and Cyclic and Non-Cyclic Photophosphorylation

Light Reaction (Photochemical Phase)

- This phase directly depends on light. The pigments absorb light energy and produce ATP.
- Includes:
- Light absorption
- Water splitting
- Oxygen release
- Formation of ATP and NADPH, which is then used in the biosynthetic phase
- Pigment molecules bound to the proteins form LHC (light harvesting complexes). LHC are located within two photosystems – PSI and PSII
- Each photosystem has two parts:
- Reaction centre – consisting of chlorophyll *a* molecule
- Antennae – consisting of accessory pigments, which increase the efficiency of photosynthesis by absorbing different wavelengths of light