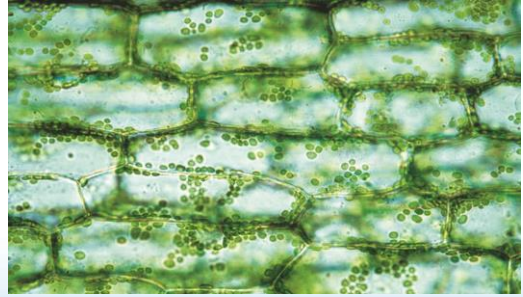


Photosynthesis:

Life from Light and Air



Photosynthesis:



Photosynthesis

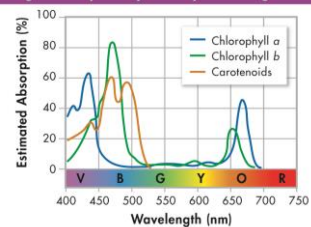
- Process used by photoautotrophs to convert solar energy into carbohydrates (glucose)
 - 2 stages
- $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{Energy} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$



Light

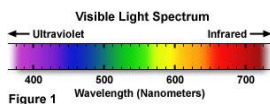
- Light energy must be captured for photosynthesis to occur.
- Sunlight is a mixture of different wavelengths.

Light Absorption by Photosynthetic Pigments



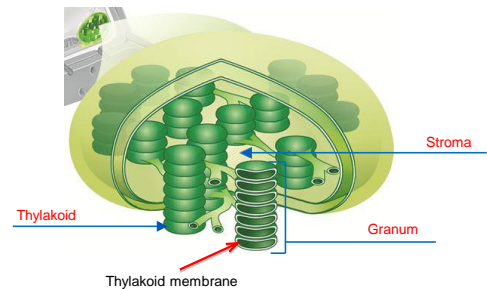
Chloroplasts and Pigments

- Chloroplasts use pigments to trap sunlight
 - Pigments give plants color
 - Chlorophyll is most common pigment
 - Plants are green because chlorophyll reflects green light



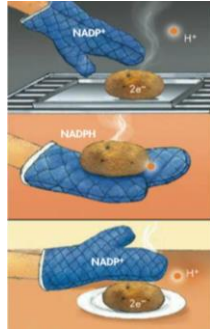
Chloroplast Structure

In plants, photosynthesis takes place inside chloroplasts.



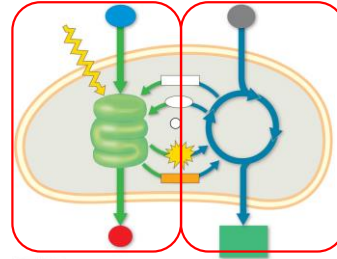
Electron Carriers

1. Chlorophyll absorbs light
2. Absorption of light produces high-energy electrons
3. Electrons are picked up by NADP+ to become NADPH
4. NADPH carries electrons to where they are used



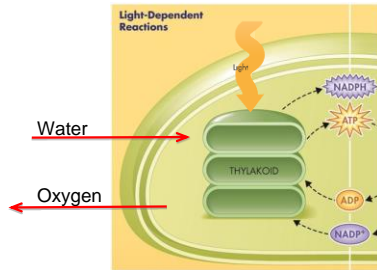
Photosynthesis and Light

- Photosynthesis involves two sets of reactions:
- Light-dependent reactions
 - Light-independent reactions (Calvin Cycle)



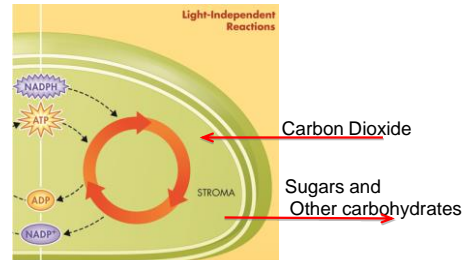
Light-Dependent Reactions

Light-dependent reactions require the direct involvement of light and light-absorbing pigments.

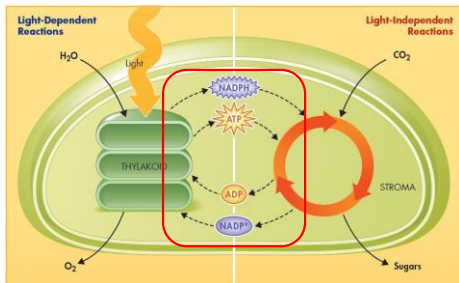


Light-Independent Reactions – Calvin Cycle

Light-independent reactions use ATP and NADPH produced in the light-dependent reactions to produce high-energy sugars from carbon dioxide



Interdependence of Reactions



The light-dependent reactions

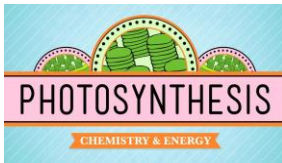
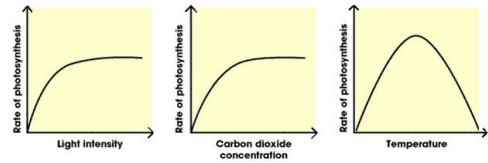
- Energy storing reactions
 - Occur in the thylakoids
 - Split H₂O
 - Release O₂
 - Store electrons in NADPH
 - Generate ATP
- } energy from sunlight

Light-Independent Reactions

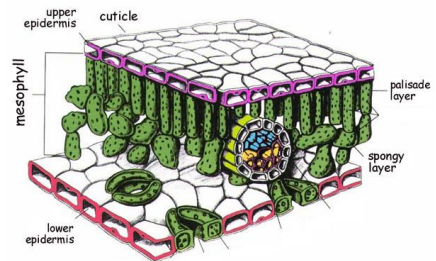
- Carbohydrate builder
- Occur in the stroma
- Use CO_2
- Use ATP
- Use H_2O
- Use electrons in NADPH
- Generate carbohydrate (CH_2O)

Factors that Effect Rates of Photosynthesis

- Light Intensity
 - Carbon dioxide levels
 - Temperature
 - pH
- **Any factor that influences enzymes will influence photosynthesis

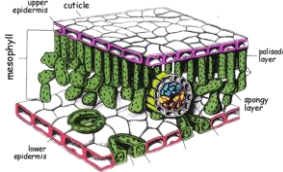


Leaf Structure



Function of Leaf Structures

- Cuticle
 - waxy coating reduces water loss
- Epidermis
 - skin protecting leaf tissues
- Palisade layer
 - High chloroplasts
 - Photosynthesis
- Spongy layer
 - air spaces
 - gas exchange



Stomata & Guard Cells

- Function of stomata
 - CO_2 in
 - O_2 out
 - H_2O out
 - gets to leaves for photosynthesis
- Function of guard cells
 - open & close stomata

