

Photosynthesis

- The basics
 - Almost all plants are photosynthetic autotrophs, as are some bacteria and protists
 - They generate their own organic matter through photosynthesis
- Chloroplasts: The site of photosynthesis
 - Photosynthesis
 - Occurs in chloroplasts
 - Chloroplasts
 - Are found in the cells of the mesophyll
 - Contain stroma, a thick fluid
 - Contain thylakoids, membranous sacs
- The overall Equation for Photosynthesis
 - $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6$
 - In photosynthesis
 - Energized electrons are added to carbon dioxide to make sugar
 - Sunlight provides the energy
- A photosynthesis road map
 - A 2 step process
 - The light reactions convert solar energy to chemical energy
 - The calvin cycle makes sugar from CO_2
- The light reactions: Converting solar energy to chemical energy
 - Sunlight is a type of energy called radiation, or electromagnetic energy
 - The full range of radiation is called the electromagnetic spectrum
 - Chloroplasts absorb light energy and convert it to chemical energy
 - Chloroplasts contain several pigments
 - Chlorophyll A → Green
 - Chlorophyll B → Green
 - Carotenoids → Orange and browns
- How photosystems Harvest Light Energy
 - Light behaves as photons, discrete packets of energy
 - Chlorophyll molecules absorb photons
 - Electrons in the pigment gain energy
 - As the electrons fall back to their ground state, energy is released as heat or light
 - A **photosystem** is a group of chlorophyll and other molecules that function as a light-gathering antenna
- How the Light Reactions Generate ATP and NADPH
 - Two types of photosystems cooperate in the light reactions:
 - The water-splitting photosystem
 - The NADPH-producing photosystem
 - An electron transport chain
 - Connects the two photosystems