

Photosynthesis is divided into two main sets of reactions:

- A. The Light Reactions
- B. The Calvin Cycle

A. The Light Reactions: Process of converting light into chemical energy ('photo' part of photosynthesis)

- No involvement of carbon dioxide
- No sugars produced

1. Light energy is absorbed and converted to chemical energy in the bonds of ATP.

- ☺ Light strikes the thylakoids in the chloroplast
- ☺ Electrons in chlorophyll molecules absorb this energy - get energized
- ☺ Electrons jump to higher energy levels eventually leaving the chlorophyll molecule
- ☺ Through a series of steps, the energy from the excited electrons is used to form ATP molecules
- ☺ Light energy has now become chemical energy stored in the bonds of ATP.
- ☺ Energy from light is now available to do BIOLOGICAL WORK!

2. Water is split into hydrogen ions, oxygen, and electrons

- ☺ Electrons replace those lost by chlorophyll molecule
- ☺ Oxygen is given off as a by-product

3. Hydrogen ions from water are attached to carrier coenzymes for use in later steps of photosynthesis

- ☺ Hydrogen ions attach to NADP and form NADPH

B. The Calvin Cycle: Process of synthesizing sugars

(The 'synthesis' part of photosynthesis)

- Takes place in the stroma of the chloroplast
- Stroma contains enzymes and other molecules
- Enzymes combine carbon dioxide (from air or water) with hydrogen from NADPH and energy from ATP
- 3-carbon simple sugars are formed
- Many of these sugars are used to form 6-carbon sugars
- These 6-carbon sugars make up more complex carbohydrates such as sucrose, starch, and cellulose