Nutrient Acquisition and Energy Transformation in Green Plants

- All the energy on the earth come from the sun
- Photosynthesis is the first step in the flow of energy through most of the living world, capturing the vast majority of the energy that living organism use.
- We depend on plant, algae, and photosynthetic bacteria to

  provide these energy.

Photosynthesis

The sequence of events by which light energy is converted into the stored chemical energy of organic molecules.

Did you know?

Each year photosynthetic organism convert CO_2 into billions of tons of organic molecules.

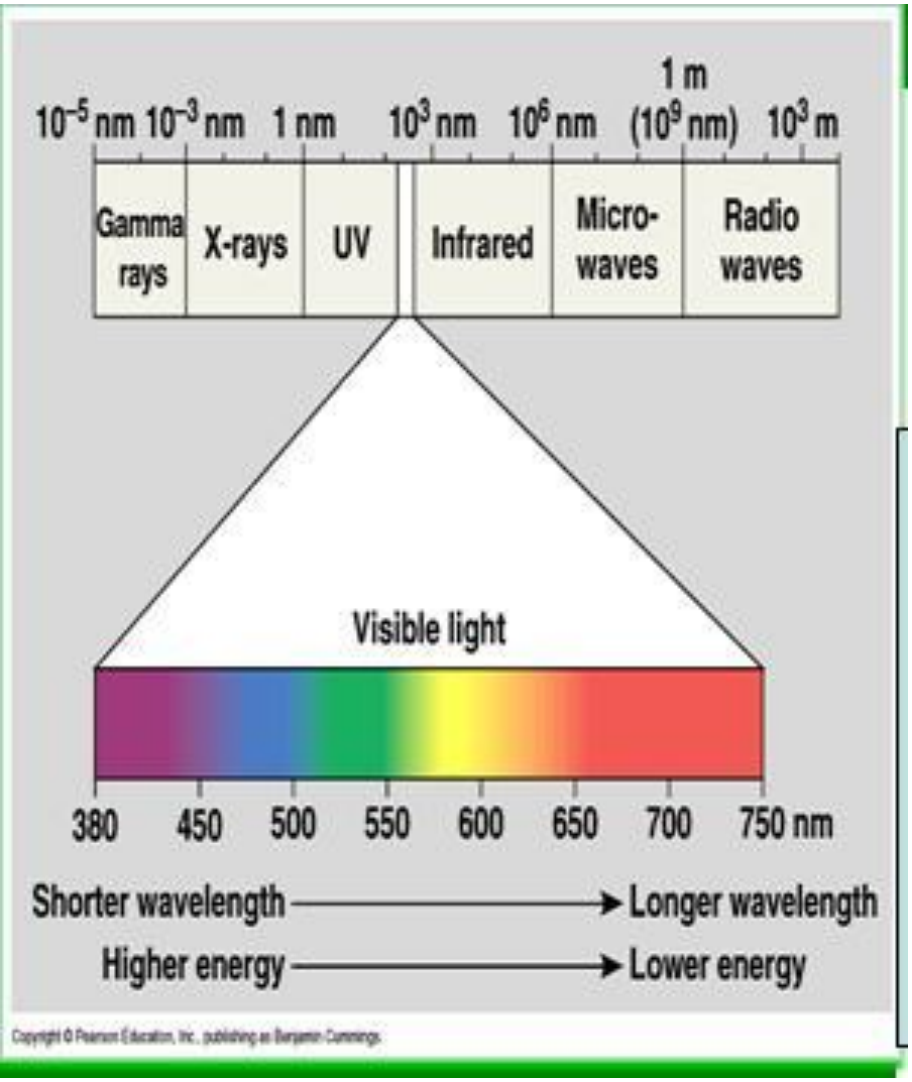
Main Component Involved in Photosynthesis Process

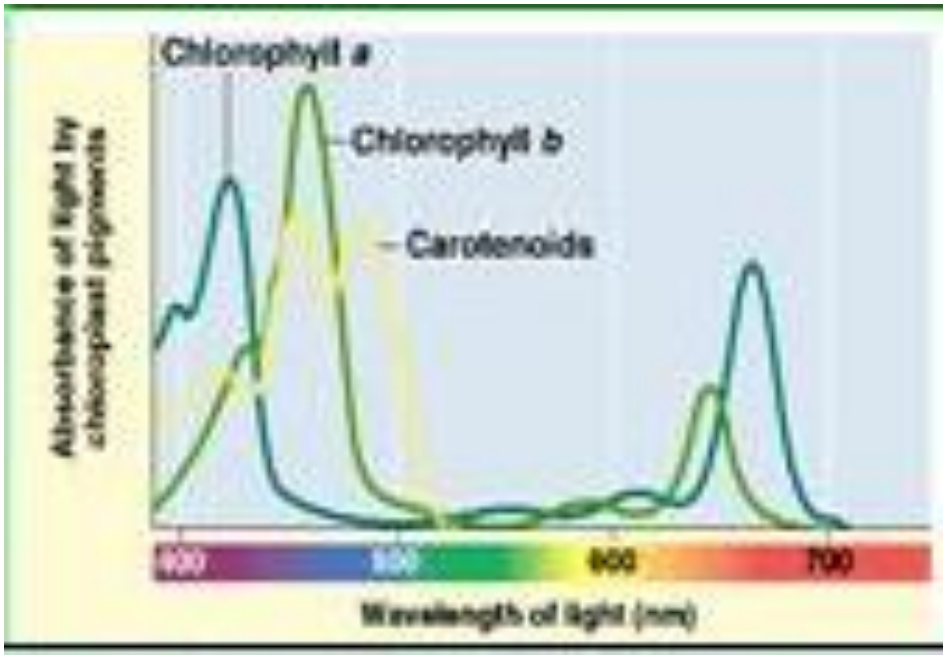
- **Light**
- **Chloroplast**

Light

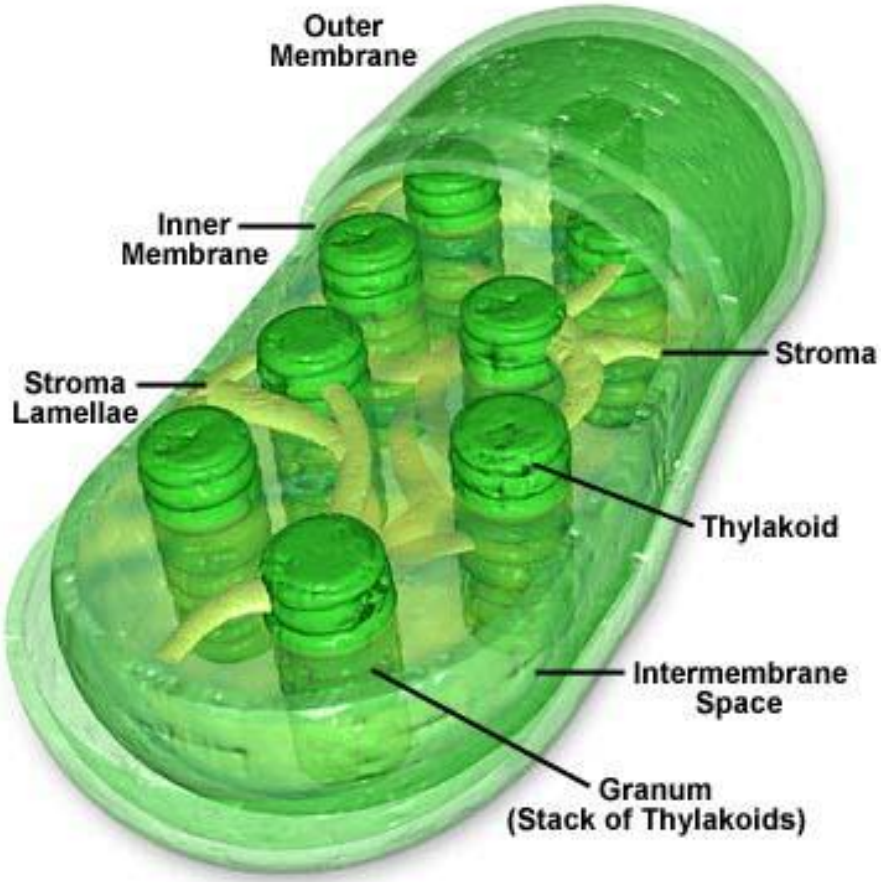
- Light is composed of small particles, or packets, of energy called **photons.**
- Photosynthesis is depend on light detectable by the human eyes (**Visible light**)
- The visible sectrum includes all the colors of the rainbow

Visible Light





Chloroplast

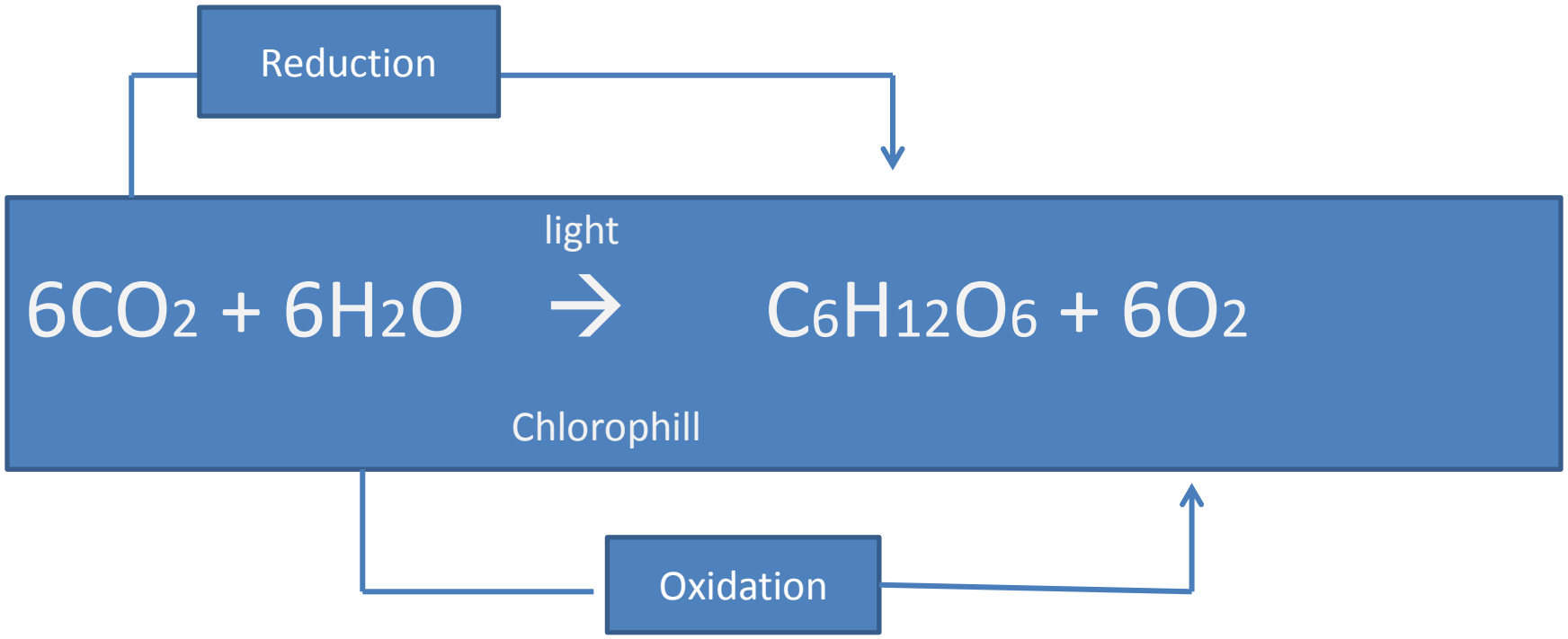


Photosynthesis Process

During photosynthesis, a cell uses light energy captured by chlorophyll to power the synthesis of carbohydrate.

The overall reaction of photosynthesis can be summarized as follows:

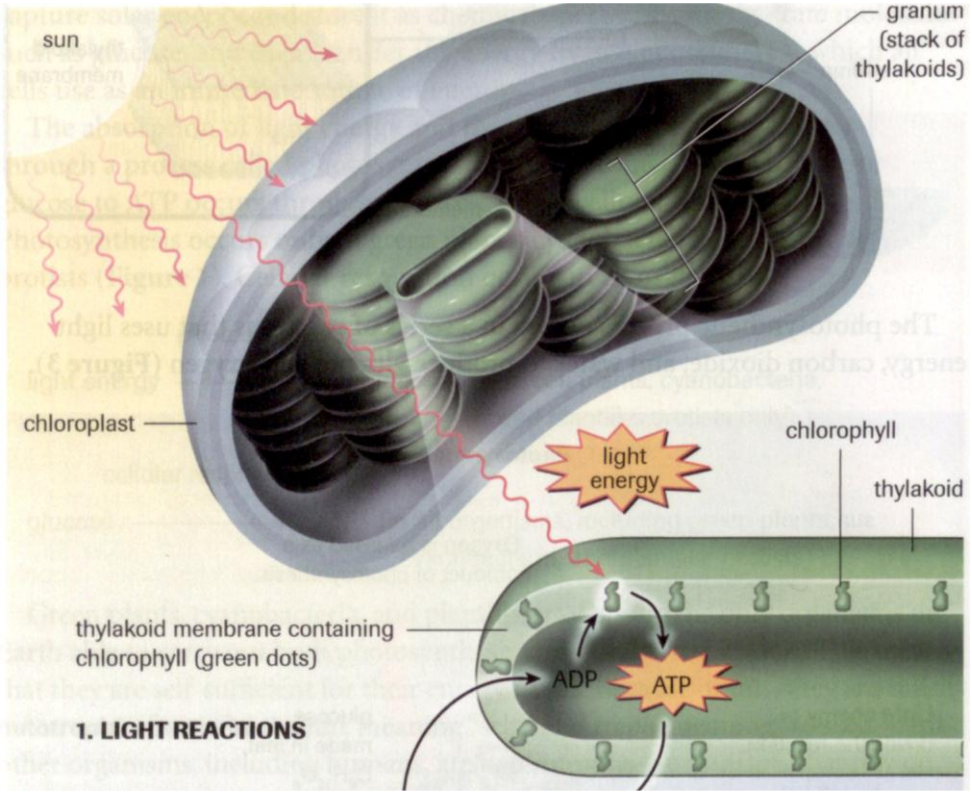
$$6CO_2 + 6H_2O \xrightarrow[\text{Chlorophill}]{\text{light}} C_6H_{12}O_6 + 6O_2$$


Reduction
light
$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$
Chlorophill
Oxidation

The reaction of photosynthesis is devided into two phases:

1. Light-dependent reaction
2. Dark reaction (Carbon fixation)

Light-dependent Reaction



-Happen in thylakoids
-Light energy is captured by chlorophyl molecule
- H2O is split and molecular oxygen is released
- Adenosine Triphosphate (ATP) is formed
- NADPH (nicotinamide adenine dinucleotide phosphate) is formed

Image from: Biology 11: College Preparation. **Pg 74. Nelson, Toronto. 2003.**

Carbon Fixation

- These reaction “fix” carbon atoms from CO2 to existing skeleton of organic molecule.
- It’s also called dark-reaction
- Depend on the product of light-dependent reaction
- Take place in stroma
- Use Calvin cycle
- Carbohydrate is produced

Factors That Influence Photosintesis Process

- Internal Factor
- External Factor

External Factor

The external factors are:

- *Concentration level of* CO_2 *and* O_2.
- *Water availability*
- *Humidity and temperature, and*
- *Light condition (intensity, duration, and color of light)*

Internal Factor

- Plant Phisiology

Pertanyaan

- Septi (011): Siklus calvin?
- Rizky (032) : Fotosintesis pada kaktus?
- Zuhdi (018) : Cahaya matahari bisa diganti dg lampu??