Photosynthesis

8.1 & 8.2 Notes

Chemical Energy and ATP

- Energy is the ability to do work.

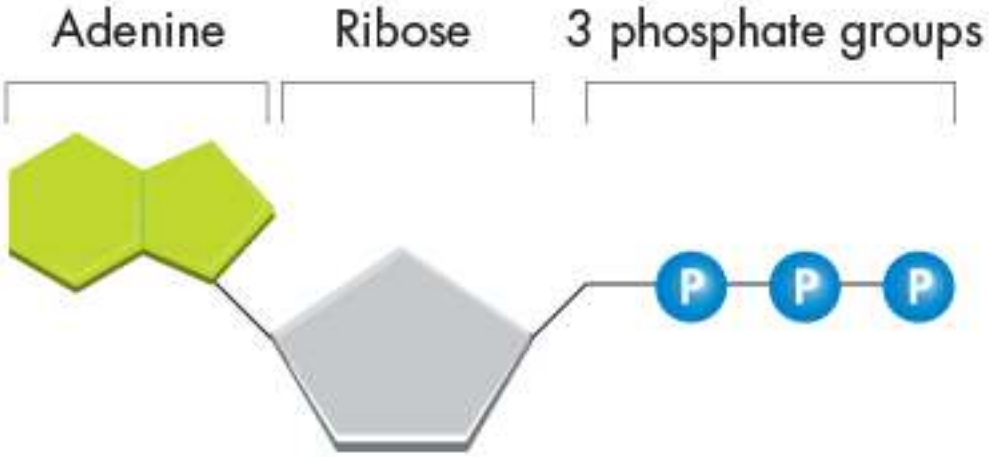
- Your cells are busy using energy to build new molecules, contract muscles, and carry out active transport.

- Without the ability to obtain and use energy, life would cease to exist.

Chemical Energy and ATP

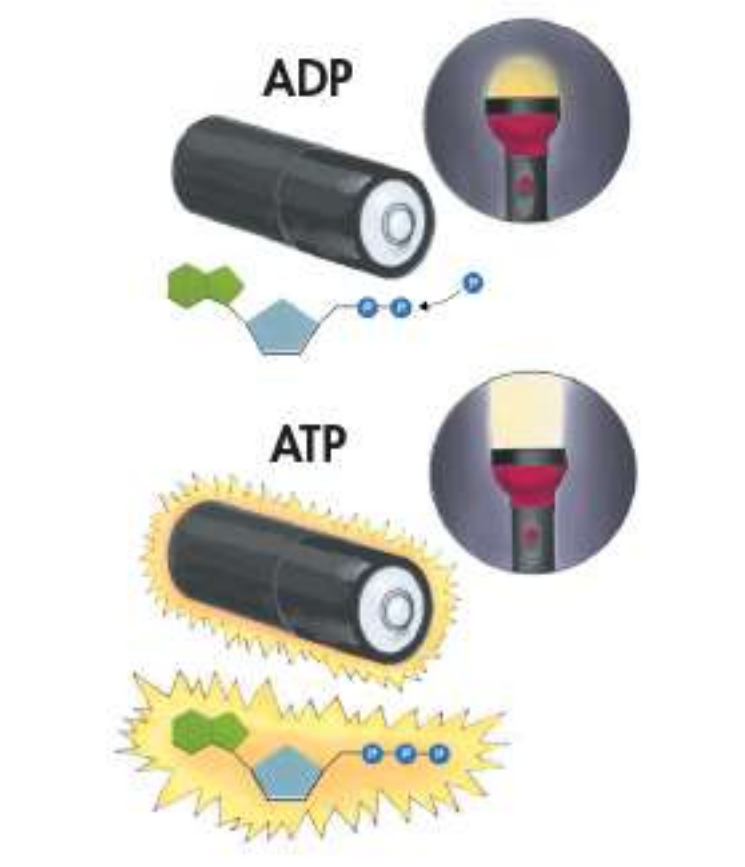
- One of the most important compounds that cells use to store and release energy is **ATP (adenosine triphosphate).**

- ATP consists of adenine, a 5-carbon sugar called ribose, and three phosphate groups.



Storing Energy

- Adenosine diphosphate (ADP) has two phosphate groups instead of three.
- ADP contains some energy, but not as much as ATP..



Heterotrophs and Autotrophs

- Organisms that obtain food by consuming other living things are known as **heterotrophs.**

- Organisms that make their own food are called **autotrophs** (Plants, algae, and some bacteria)
- **Photosynthesis-** use the energy of sunlight to produce high-energy carbohydrates

Why is Photosynthesis important?

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Photosynthesis-starts the ecological food webs!

The sun is the source of energy for most living things.

The zebra obtains energy by eating grass.

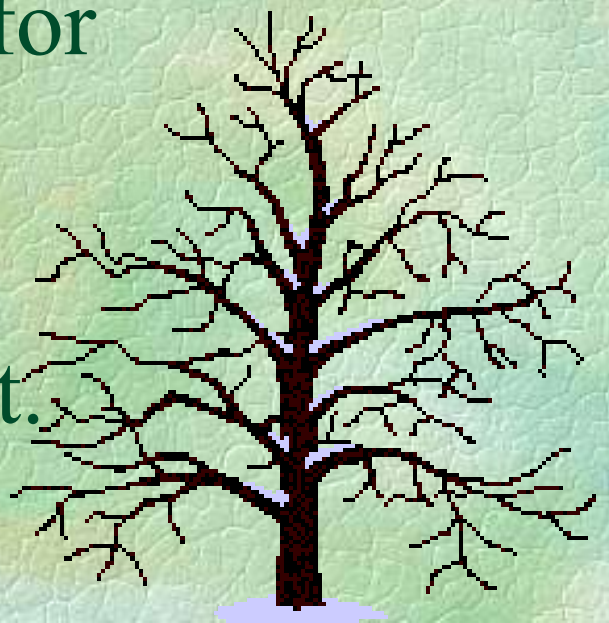
Plants such as grass use energy from the sun to make their own food.

The lion obtains energy by feeding on the zebra.

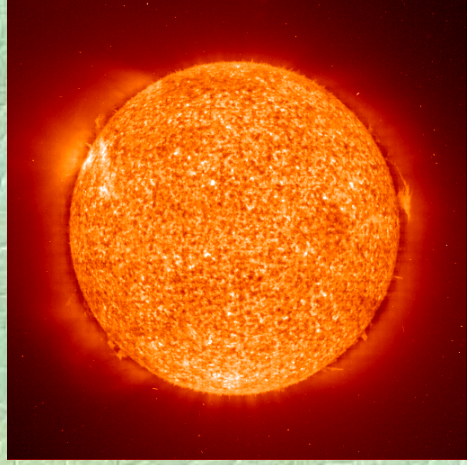
Photo-synthesis

means "putting together with light."

- Plants use sunlight to turn water and carbon dioxide into glucose. Glucose is a kind of sugar.
- Plants use glucose as food for energy and as a building block for growing.
- Autotrophs make glucose and heterotrophs are consumers of it.



Photosynthesis

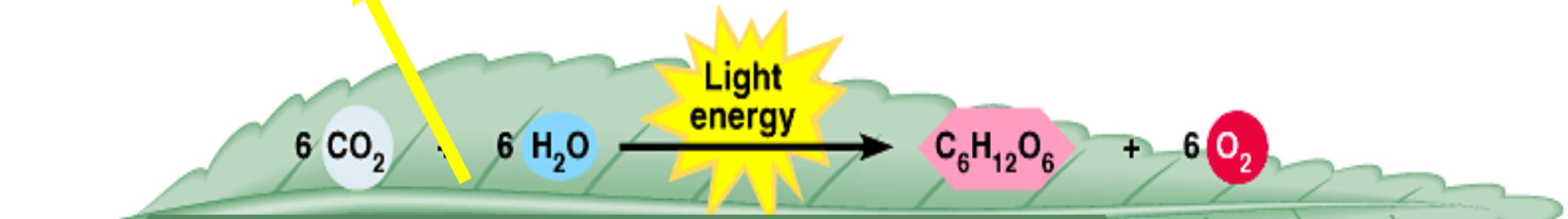


sunlight

Carbon dioxide + water → **glucose + oxygen**

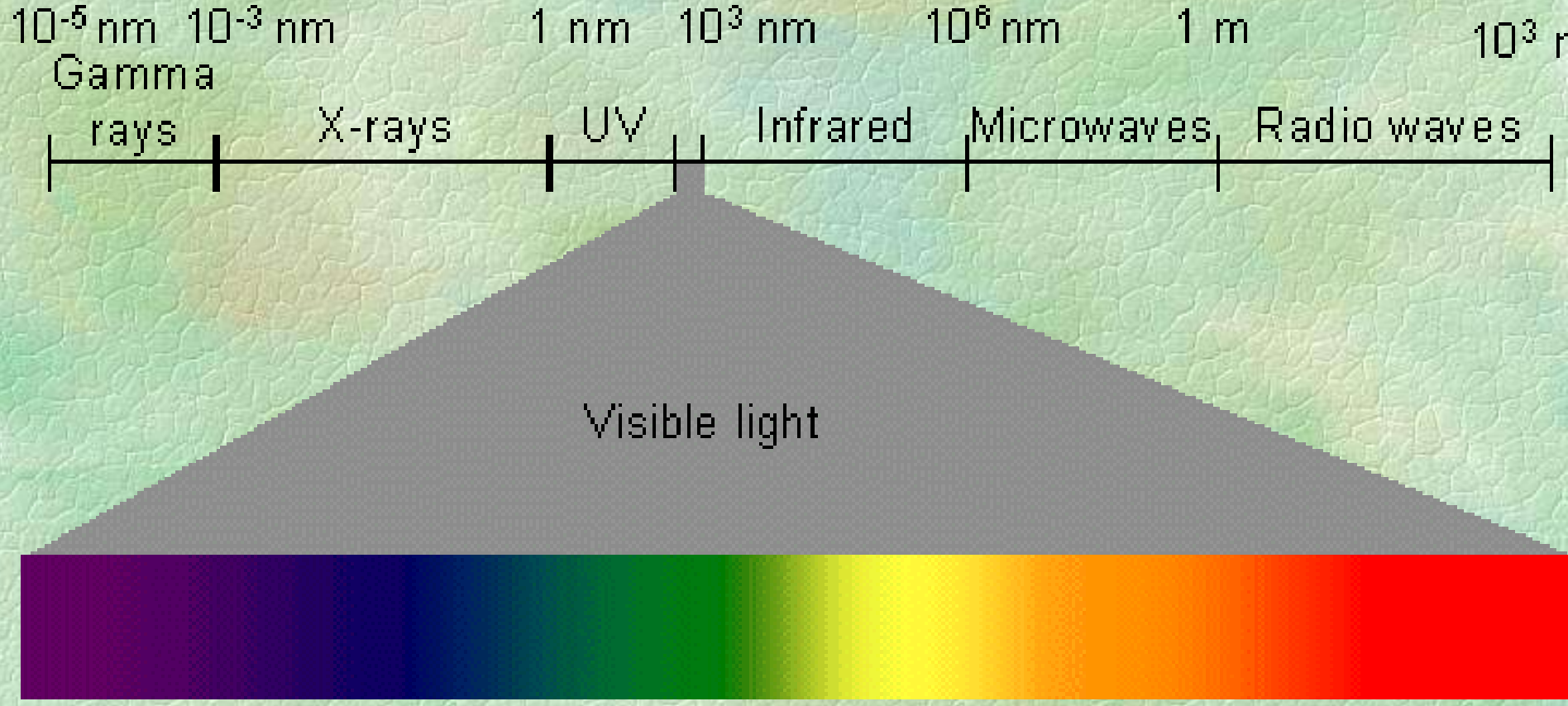
absorbed by chlorophyll

$6CO_2 + 6H_2O + energy \rightarrow C_6H_{12}O_6 + 6O_2$



As can be seen from the equation for photosynthesis, the wood, bark, and root came from ***water and carbon dioxide***.

Visible light is only a small part of the electromagnetic spectrum (all forms of light).



Pigments

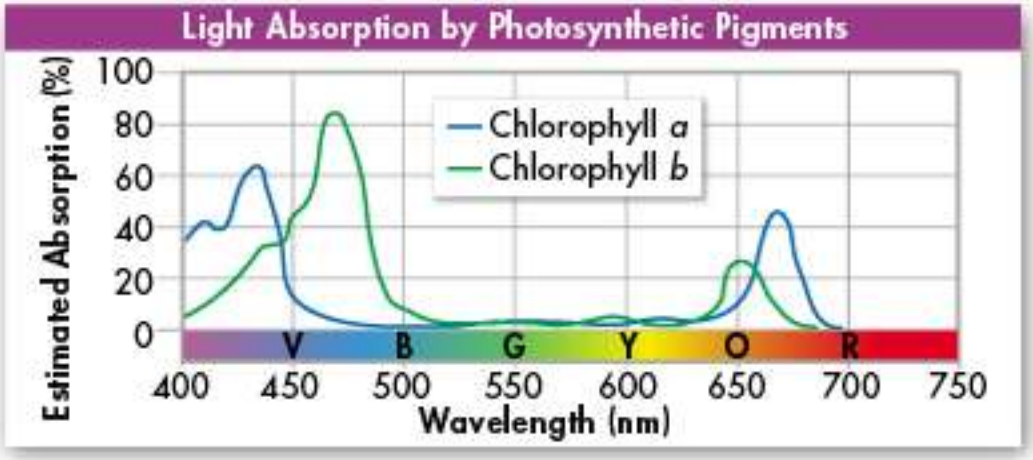
- Plants gather the sun's energy with light-absorbing molecules called **pigments.**

- The plants' principal pigment is **chlorophyll.**

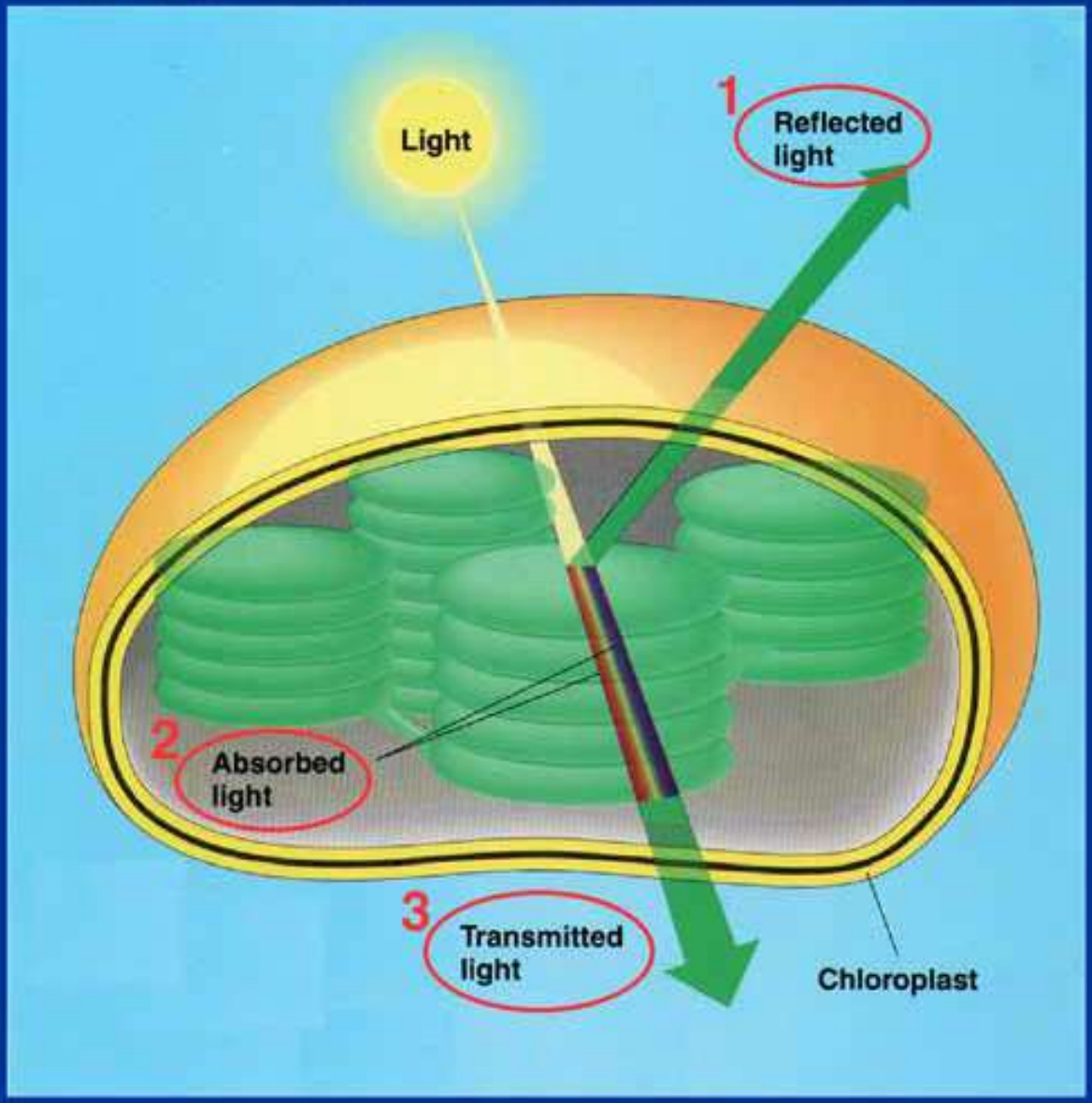
Pigments

- Leaves reflect green light, which is why plants look green.

- Plants also contain red and orange pigments such as carotene that absorb light in other regions of the spectrum.



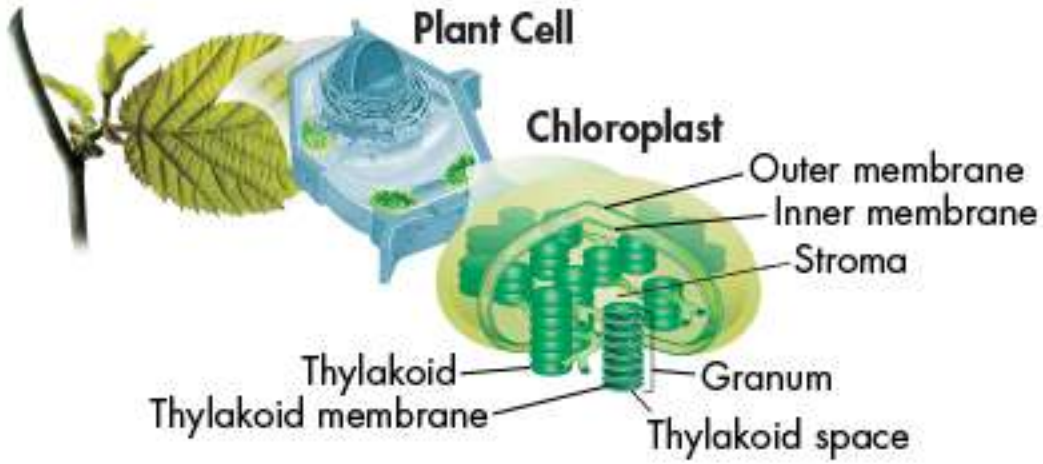
INTERACTION OF LIGHT WITH MATTER IN CHLOROPLAST; LIGHT DIVIDED INTO THREE PARTS



Chloroplasts

- Photosynthesis takes place inside organelles called **chloroplasts.**

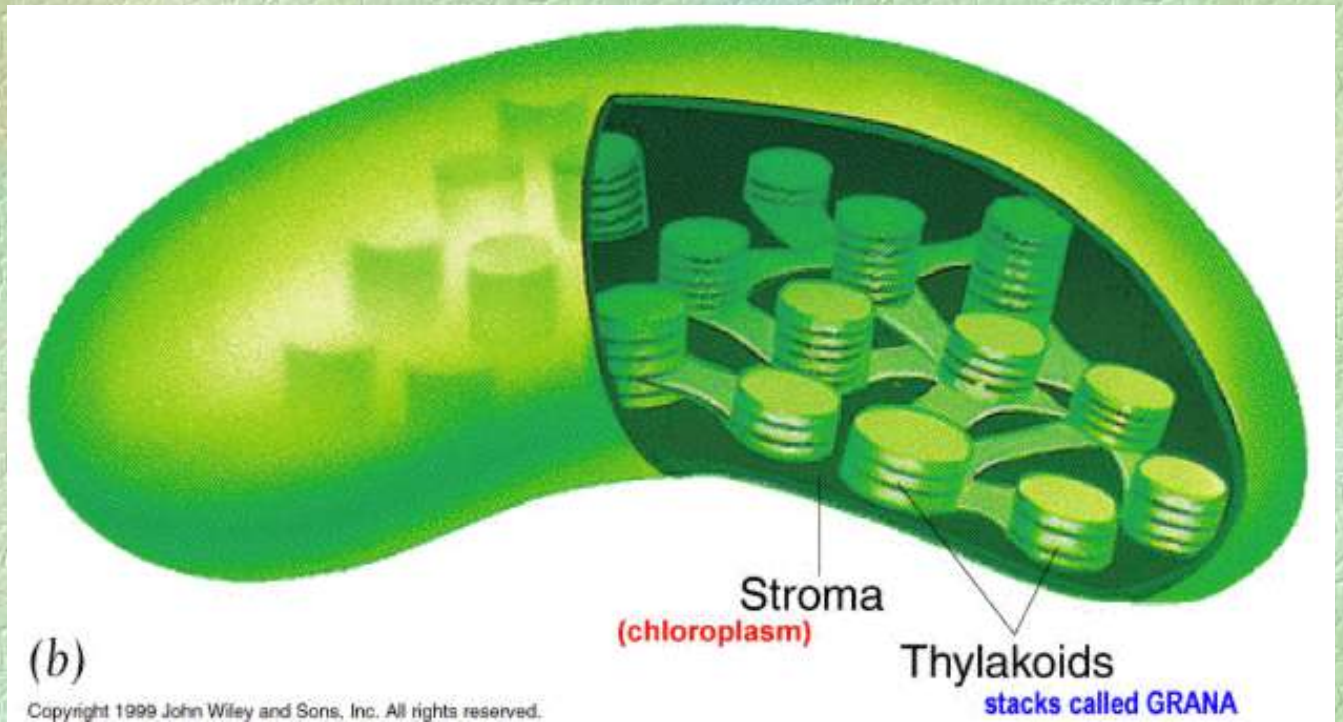
- Chloroplasts contain saclike photosynthetic membranes called **thylakoids**



Chloroplasts

- Pigments are located in the thylakoid membranes.

- The fluid portion outside of the thylakoids is known as the **stroma.**



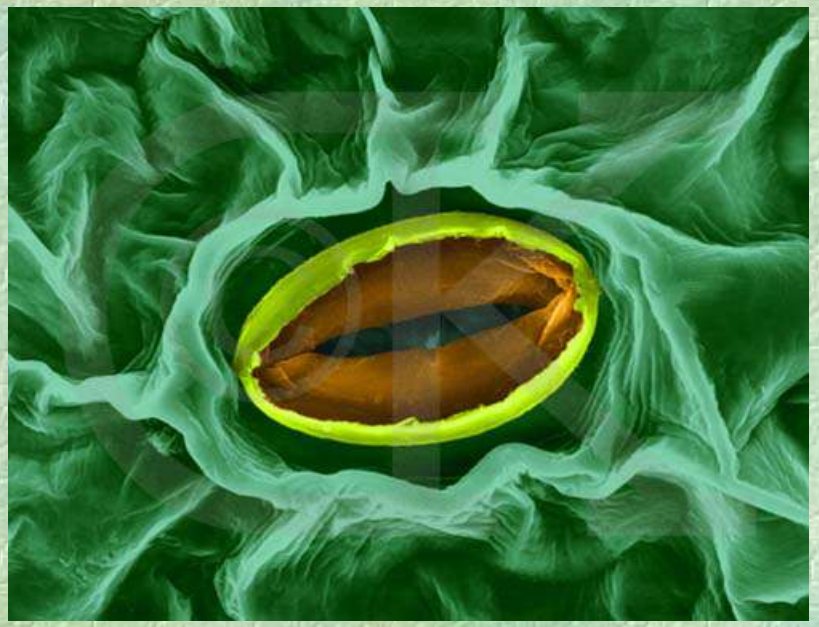
Stomata

This opening how plants exchange gases!

Check it! Can you name the two important gases that go in and out of the leaves?

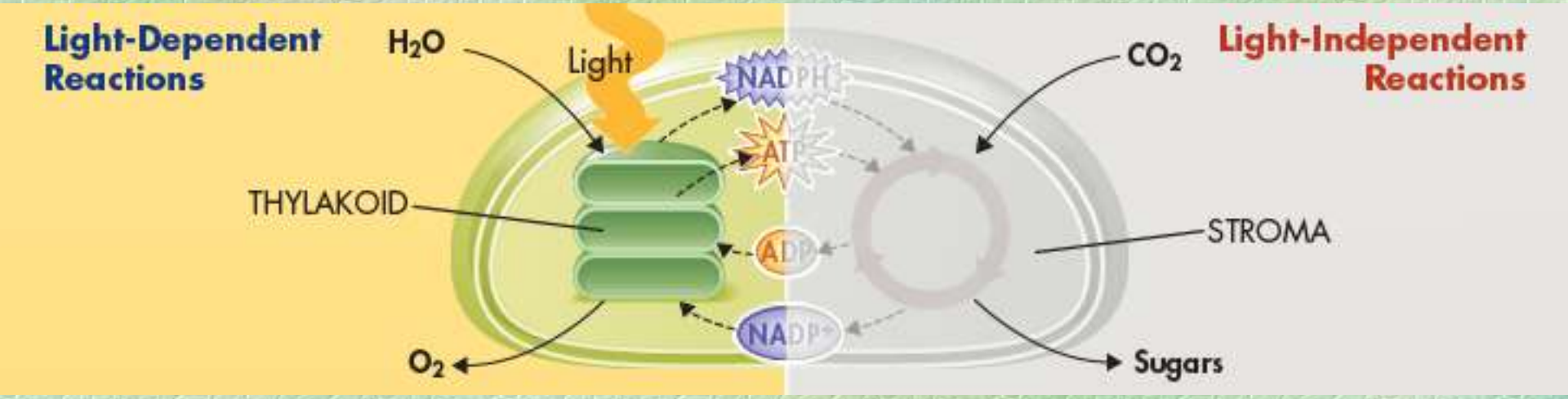
-CO_2

-O_2



Light-Dependent Reactions

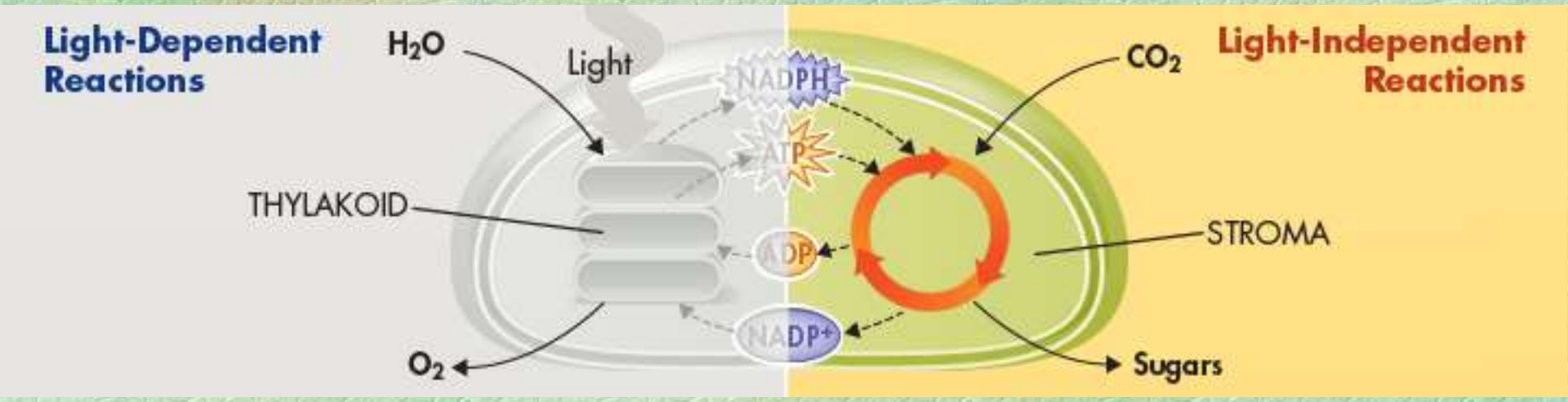
- The light-dependent reactions use energy from sunlight to produce energy (ATP and NADPH.)
- These reactions take place within the thylakoid membranes of the chloroplast.



Light-Independent Reactions

- No light is required to power the light-independent reactions.

- The light-independent reactions take place outside the thylakoids, in the stroma.



What is the main compound used for energy?

- ATP (Adenosine Triphosphate)

What is the general formula for photosynthesis?

- Water + CO2 + Sunlight -→ Glucose + O2

- $6CO_2 + 6H_2O + \text{energy} \rightarrow C_6H_{12}O_6 + 6O_2$

What two reactions make up photosynthesis?

- Light-dependent reactions
- Light-independent reactions