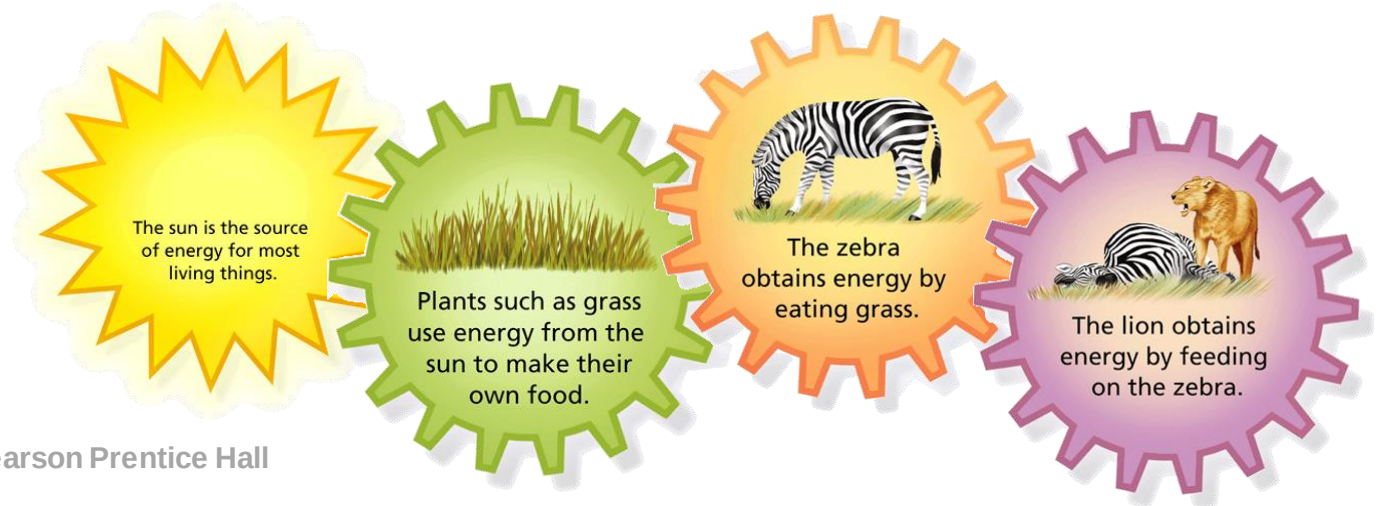
Chapter 8: Energy, Life & Photosynthesis

How do we get energy?

- All living things need energy to survive.
  - This energy comes from food.
  - The energy in most food comes from the sun.
- Where do plants get the energy they need to make food?
  - Plants and some other types of organisms are able to use light energy from the sun to produce food.



Autotrophs & Heterotrophs

Autotrophs

- Organisms that can make their own food.
- Plants

Heterotrophs

- Organisms that can NOT make their own food.
- Animals, fungi

Chemical Energy and ATP

- After organisms make/eat their food, they need to change it into energy their cells can use.
- That energy is ATP.
- **ATP (adenosine triphosphate)**:
  - Used by all types of cells as their basic energy source.
  - Can store and release energy.

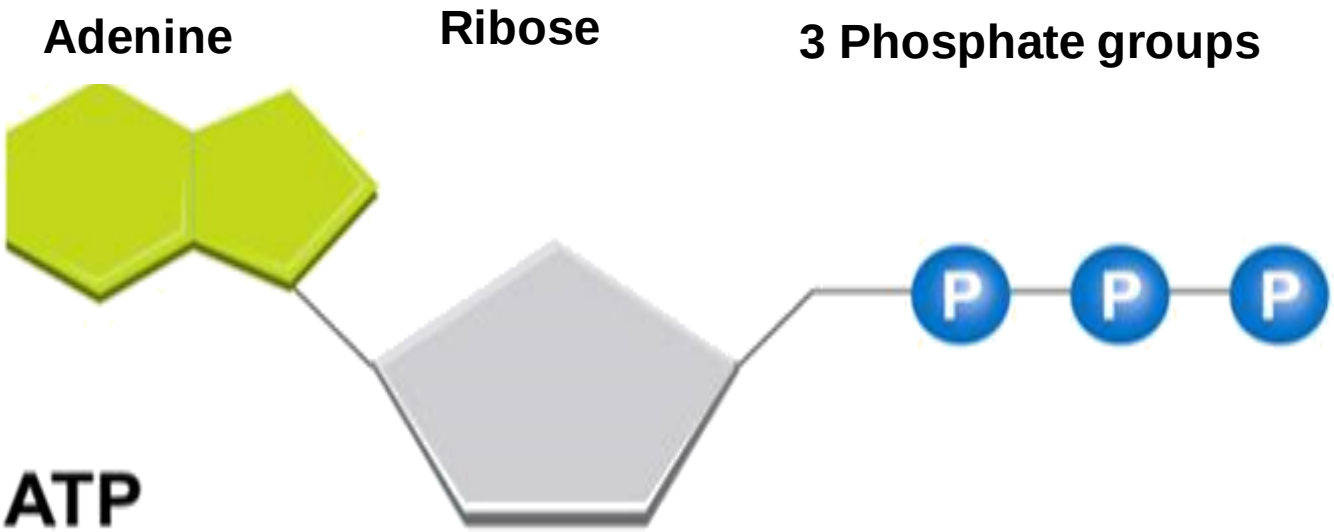
Chemical Energy and ATP

ATP is made of:

a) adenine

b) ribose (a 5-carbon sugar)

c) 3 phosphate groups

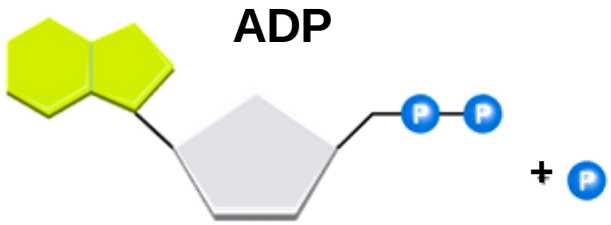


ATP

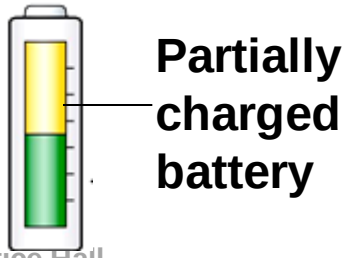
Chemical Energy and ATP

Storing Energy

- ADP has two phosphate groups instead of three.
- A cell can store small amounts of energy by adding a phosphate group to ADP.



Adenosine Diphosphate (ADP) + Phosphate

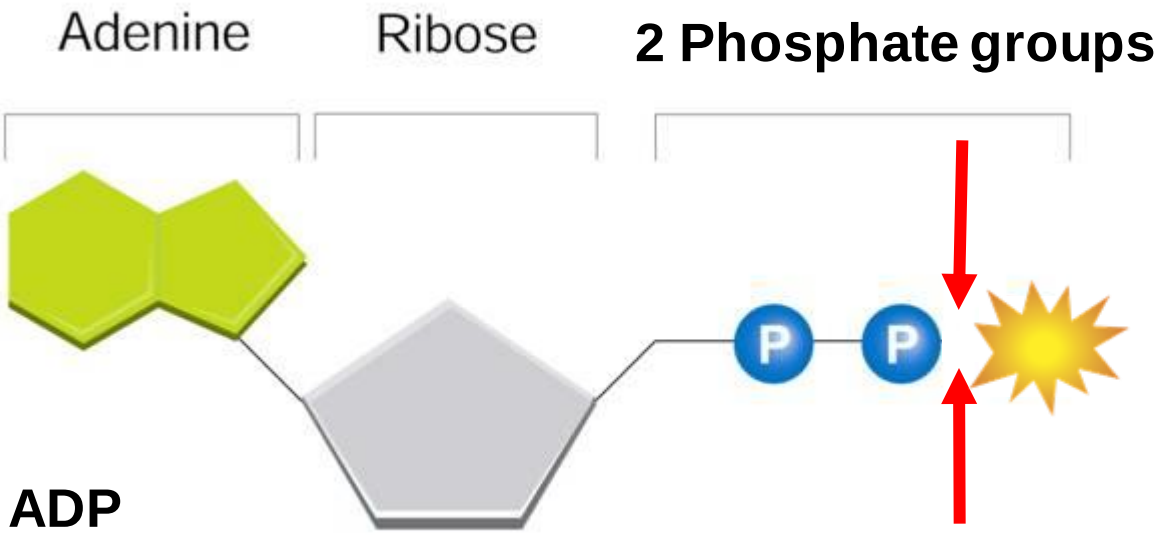


Partially charged battery

Chemical Energy and ATP

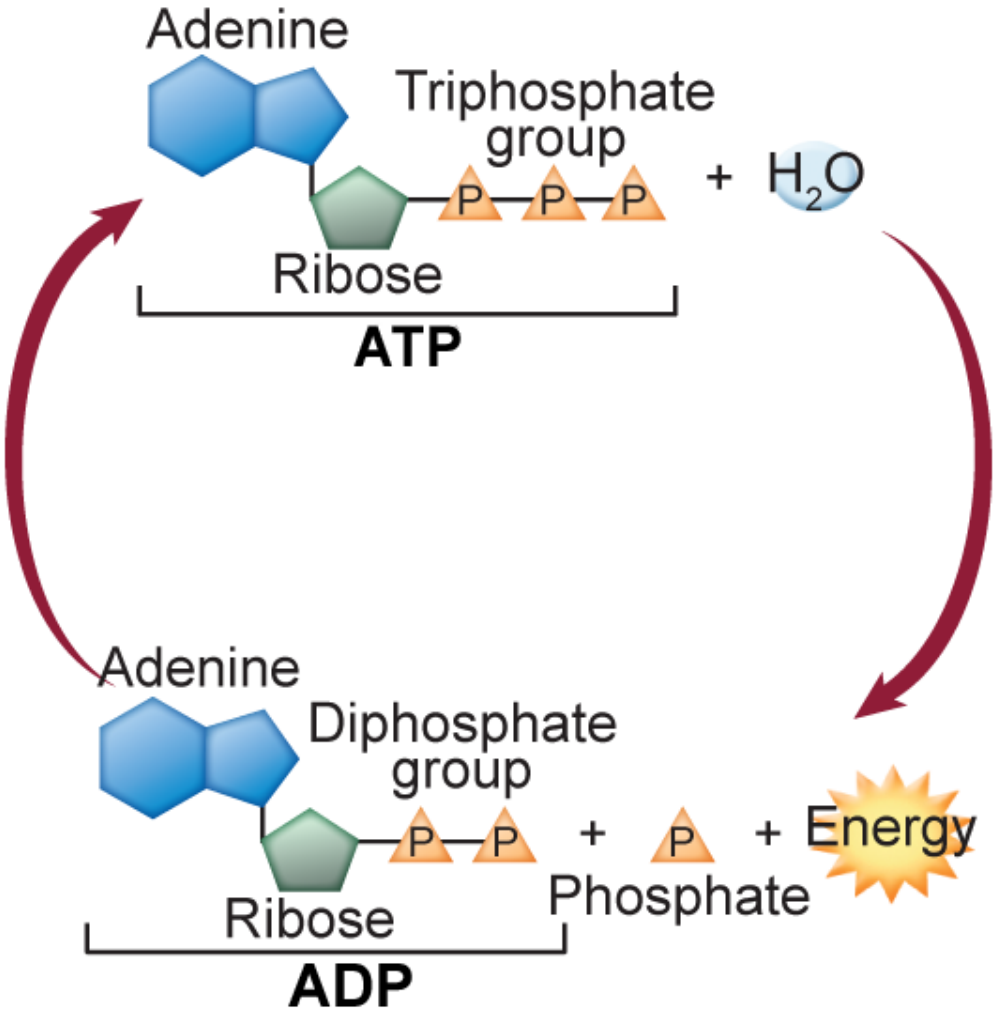
Releasing Energy

- Energy stored in ATP is released by breaking the chemical bond between the second and third phosphates.



Chemical Energy and ATP

- Energy is STORED in ATP.
- Energy is RELEASED from ATP when a PHOSPHATE group is broken off to make ADP.
- ATP is needed for active transport, making proteins and muscle contraction



What is Photosynthesis?

- Photosynthesis is the process that plants use to make food.
- Photo = light; Synthesis = to make
- What happens in photosynthesis?

DO NOW:

THINK: ON YOUR OWN - look at the cartoon and try to write out what happens in photosynthesis.

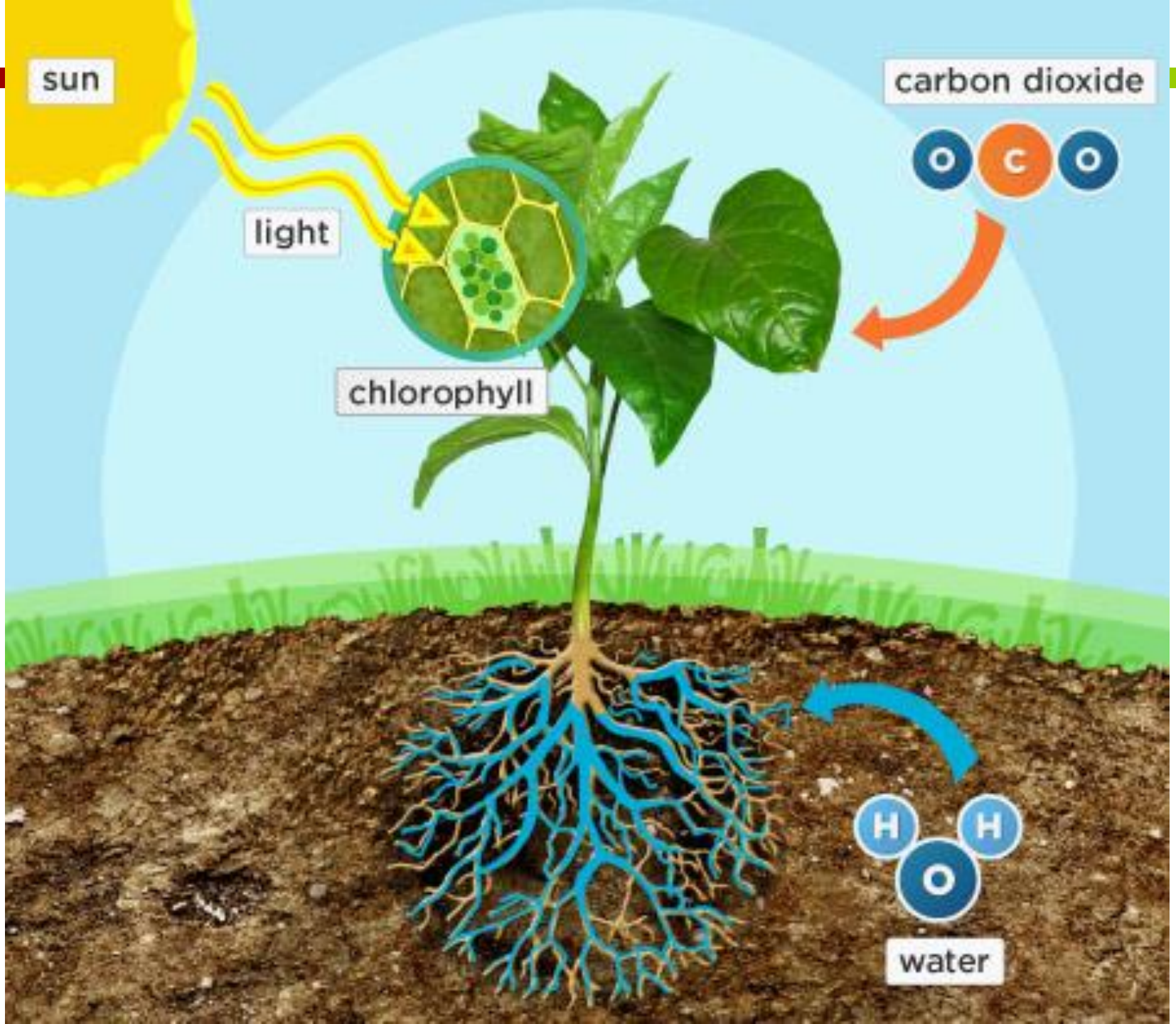
- What are the **reactants** (what is used/what goes IN)?
- What are the **products** (what is made/what comes OUT)

CHEMICAL REACTION: can you write a chemical reaction (just words) for photosynthesis?

Reactants:

Products:

Equation:

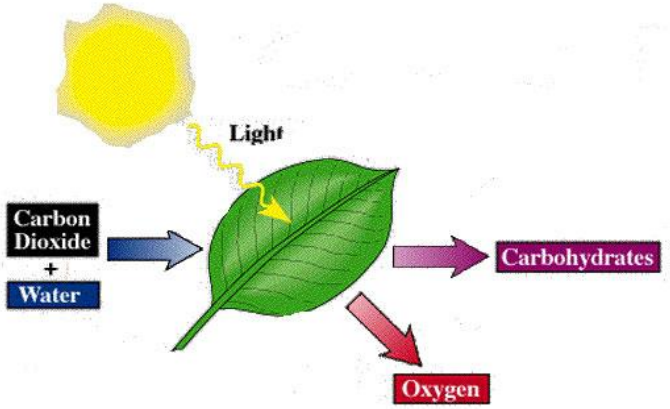

sun
light
chlorophyll
carbon dioxide
O C O
H H O
water

Photosynthesis

- Photosynthesis is the process in which green plants use the energy of sunlight to change water and carbon dioxide into glucose (sugar) and oxygen.

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

carbon dioxide + water → sugars + oxygen

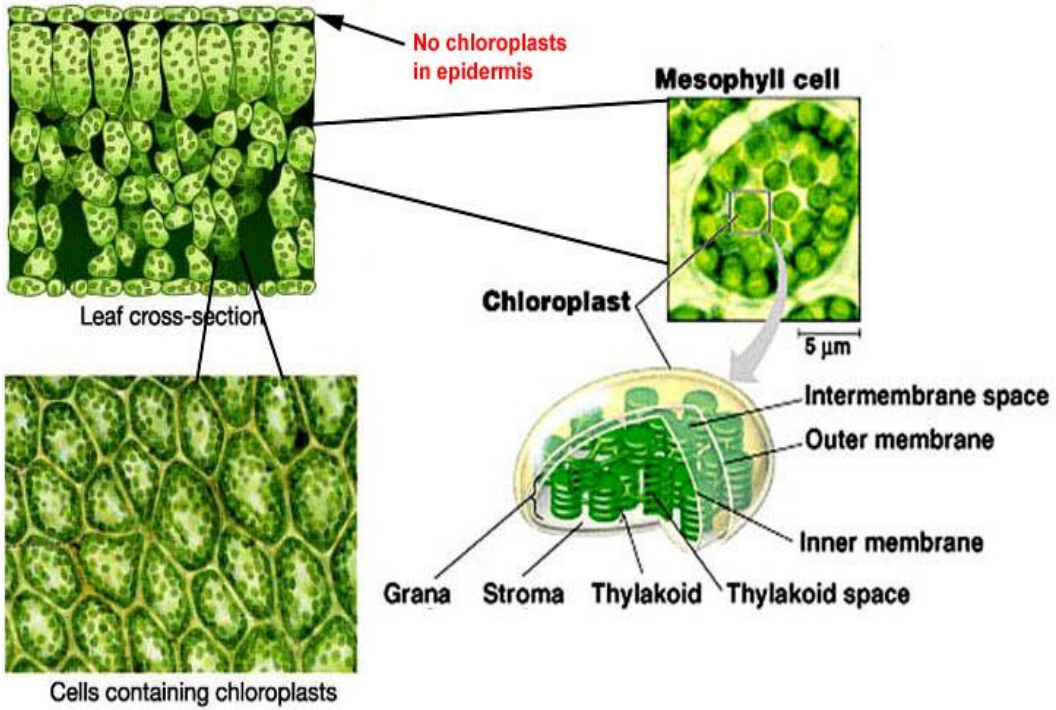


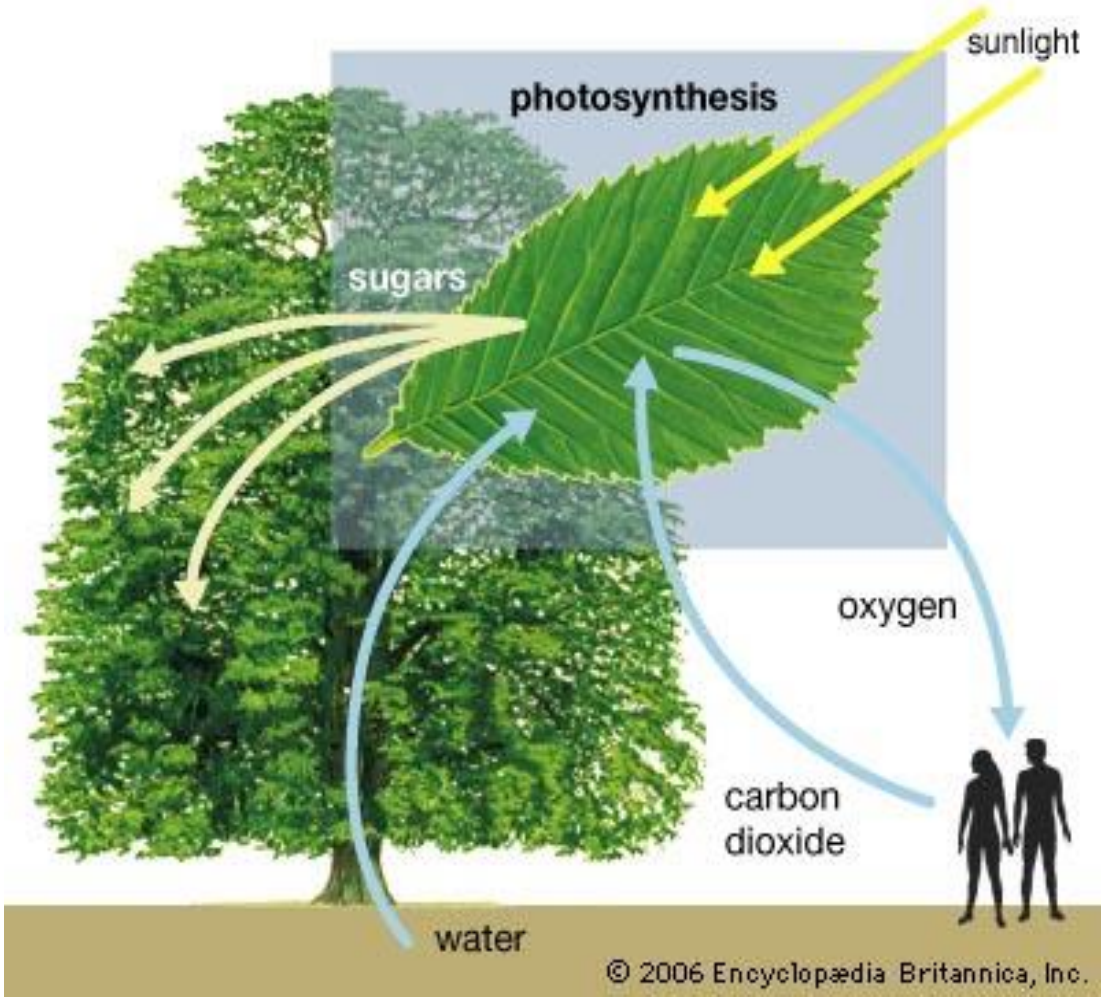
Chlorophyll

•Plants gather sun energy with light-absorbing molecules called **pigments**.

• The main green pigment in plants is **chlorophyll**.

• The **chloroplasts** found within plant cells are filled with **chlorophyll** (which *reflect* green light, making plants look green to us).





In photosynthesis, plants **absorb sunlight and carbon dioxide** (found in the atmosphere from animals) and **release sugars and oxygen.**