

## Photosynthesis

- Photo=light
- Synthesis=to build/make
- The process where green plants take light energy and convert it to chemical energy

## Chemical Equation

•  $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

## Stomata

- Microscopic holes on underside of leaves
- Take in  $\text{CO}_2$
- Let  $\text{O}_2$  out

## Chloroplasts

- Structures in plants which absorb light energy
- Contains chlorophyll-photosynthetic pigment

### Plant Cell Chloroplast Structure

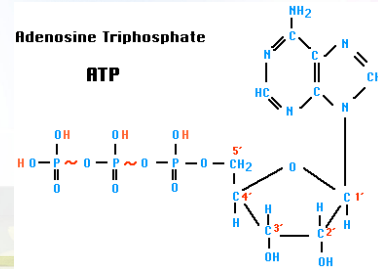
Figure 1

### Chloroplasts

- Converts solar energy to chemical energy that is carried in ATP bonds and NADPH

### ATP

- Universal energy carrying molecule of all cells

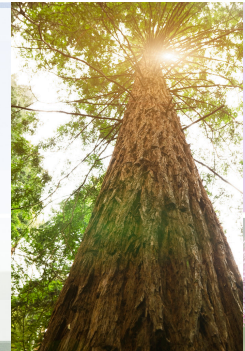


### NADPH

- Nicotinamide adenine dinucleotide phosphate
- Picks up  $e^-$  with their  $H^+$ 's from  $H_2O$ , when  $H_2O$  is broken down by light
- Energy stored in the bonds of this molecule
- Also an energy carrying molecule like ATP

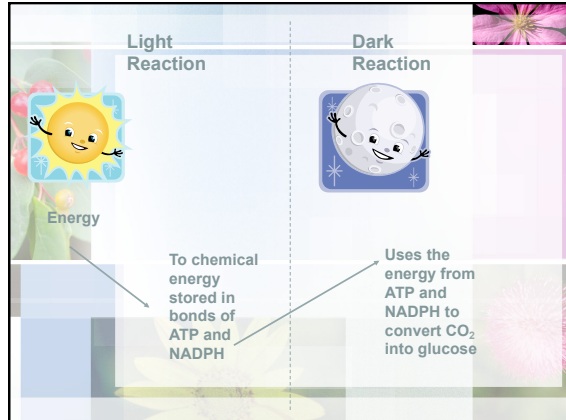
### Light Reactions

- Occurs in light
- Chloroplasts convert sunlight energy into the chemical energy that is stored in ATP and NADPH
- aka light-dependent reactions



### Dark Reactions

- aka light-independent reactions
- Don't require light directly
- Uses the energy from ATP and NADPH to fuel the conversion of  $CO_2$  into sugar
- $CO_2 \rightarrow CHO$



### Calvin Cycle

- Series of reactions where  $\text{CO}_2$  enters a cycle and combines with 5C compound to form a 6C compound
- 6C compound breaks down into 2-3C acids which are converted into a complex sugar or a simple sugar (glucose)
- 3 ATP and 2 NADPH power one  $\text{CO}_2$  through the Calvin cycle

### Calvin Cycle reaction



### Photophosphorylation

- Chloroplasts produce ATP and NADPH using light energy without  $\text{CO}_2$