

Lecture Handout

Photosynthesis and Cellular Respiration

Photosynthesis: $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{Light} = \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$

Input:

-
-
-

Output:

-
-
-

Respiration: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 = 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{energy}$

Input:

-
-

Output:

-
-
-

ATP:

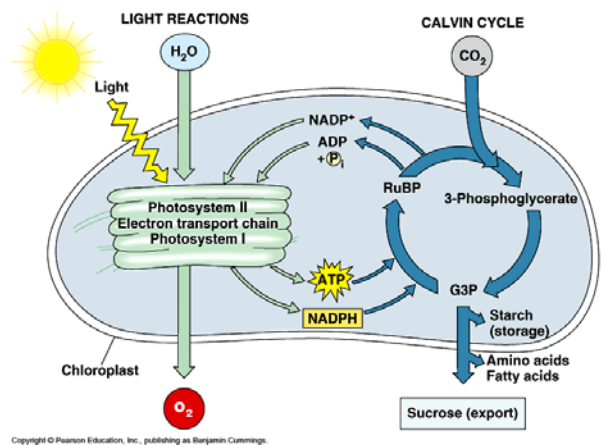
Stages of photosynthesis

1. Light Reaction

- a. Light Harvesting
- b. Water splitting
- c. Electron transport & Photophoralation

2.

3.



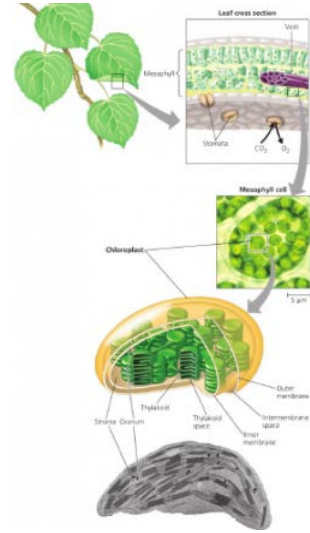
Where does each part of photosynthesis take place?

Mesophyll cells of the Plant

Chloroplast-

- Granum – Light reaction
 - o Lumen- proton accumulation
 - o Thylakoid- light reaction

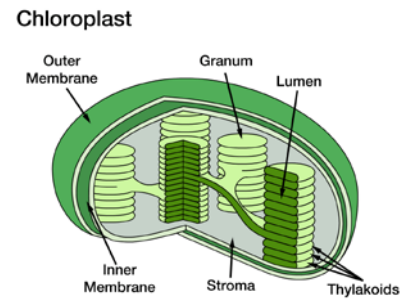
- Stroma:



Carbon Cycle

Where does the Carbon cycle take place?

Which molecules provide the energy for carbon fixation?



What is the main carbon-fixing enzyme? What are two problems associated with this enzyme?

3 stages of the **Calvin Cycle**:

- 1.
- 2.
- 3.

Draw the number of carbon and phosphate elements in **RuBP**:

Draw the number of carbon and phosphate elements in **PGAL**:

What is the main product of the Calvin Cycle?

Climate Change and Photosynthesis

- Climate change is driven by _____
- **Carbon Dioxide** is a key greenhouse gas

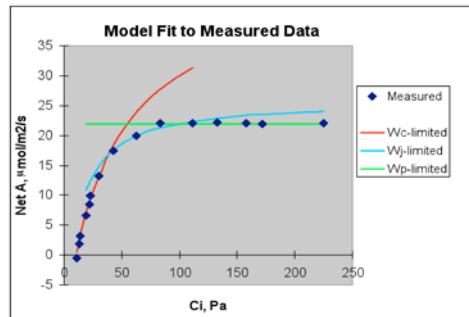
The Affects of Increased Carbon Dioxide on Plants

- Plants can only absorb and process a limited amount of CO₂ due to the limitations of other factors within the Calvin cycle
 - Limiting factors for the demand of CO₂

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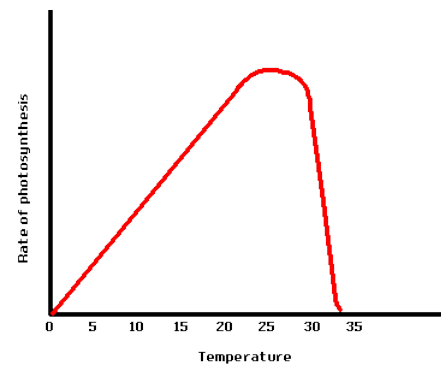
A = photosynthetic rate

C_i = CO₂ inside the leaf



- RuBP regeneration limited
- Sugar accumulation limited
- Rubisco limited

- What happens to the photosynthetic rates as temperature increases?



Climate Change Affects on Photosynthesis

- Change in temperature
 - Effects the rate of enzyme reactions
- Water access

- Change in rainfall
- Seasonal plants
 - Adapted to specific climate cycles