

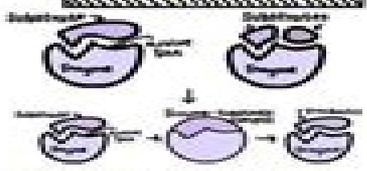
cellular energetics  
enzymes  
cellular respiration

# UNIT 3 REVIEW

## CELLULAR ENERGETICS

enzymes  
photosynthesis  
energy / atp

### ENZYMES



Speeds up chemical reactions  
Changes in shape can stop reaction  
Temperature and pH changes  
Can alter enzymes shape  
pH can disrupt hydrogen bonds  
Higher temp causes more collisions = higher reaction rate

### Enzyme concentration

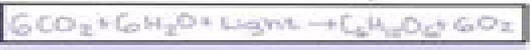
Increase in concentration of substrate and enzymes can increase reaction rate  
Higher product levels = feedback inhibition

### VOCABULARY

photon = particles of light waves  
shorter wavelength = higher energy  
pigment = substances that absorb light  
wavelength distance between waves  
chloroplast = found in stroma, stacked into columns known as grana

### INHIBITION

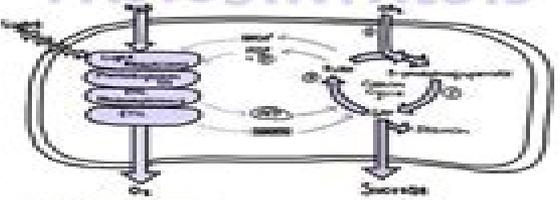
Competitive inhibition: molecules bind to binding site, competing to become substrate  
Non-competitive inhibition: molecules bind to allosteric site and change enzyme shape



Chloroplast - captures light, converts light, releases oxygen  
Chlorophyll a = blue-green color  
Chlorophyll b = yellow-green color  
Granum = photosynthesis / photosynthesis  
Stroma of light green fluid

- 1) Water splits creating  $O_2$  byproduct
  - 2) Light transfers electrons and  $H^+$  ions to NADP<sup>+</sup>
  - 3) NADP<sup>+</sup> reduced to NADPH by adding electrons and one  $H^+$  ion
  - 4) Chemiosmosis generates ATP through photophosphorylation
- PRODUCTS: ATP and NADPH

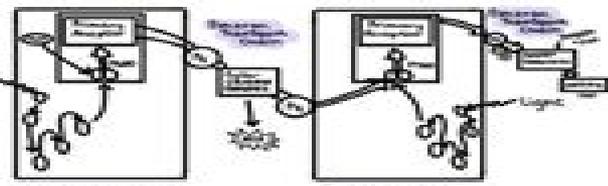
### PHOTOSYNTHESIS



Thylakoid space → site of light dependent reactions  
Stroma → site of light independent reactions

### Light dependent reactions

Reactions capture energy from light to create ATP and NADPH to power Calvin cycle



Photosystem II: Pq Synthase produces ATP w/ added  $H^+$  from photo II

### Calvin cycle

- products: carbohydrates from carbon dioxide
- three phases: carbon fixation, reduction, regeneration of ATP
- Carbon fixation → rubisco catalyzes  $O_2$  attaching to 3-carbon sugar, creates 6-carbon which splits into 2 3's
- Reduction → each molecule gains then loses a phosphate becoming G3P, five G3P are used
- Regeneration → carbon of G3P are arranged to create RuBP
- PRODUCT: G3P (sugar)
- For one G3P, cycle must happen three times

### CELLULAR RESPIRATION

Glycolysis → releases energy in glucose to form ATP from ADP and inorganic phosphate, and NADH from NAD<sup>+</sup> and pyruvate

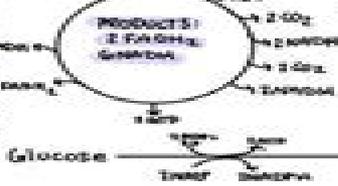
Glucose →  $C_6H_{12}O_6$  →  $2 \text{ Pyruvate}$   
Glycolysis occurs in cytoplasm, requires with or without oxygen

Pyruvate is transported from cytosol to mitochondrion to further oxidize

### KREBS CYCLE

Carbon dioxide is released from organic intermediates, ATP is synthesized and electrons are transferred to coenzymes NADH and FADH<sub>2</sub>

Electrons extracted in glycolysis and Krebs go to ETC in inner mitochondrial membrane



Chemiosmosis: a process through which protons generate ATP. Synthesis, driving ATP from ADP and inorganic phosphate  
Maximum rate occurring from phosphorylation in cellular respiration and photosynthesis in photosynthesis

### FERMENTATION

Follows glycolysis to proceed in the absence of oxygen, produces lactic acid and alcohol

- 2 lactate, using 2 NADH and sending water back to glycolysis
- 2 ethanol, using 2 NADH and sending water back to glycolysis

both types of fermentation contain NAD+ regeneration

# Ap Biology Chapter 18 Notes

**Brendan G. Carr**



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