

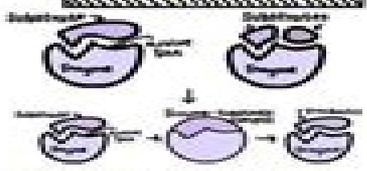
cellular energetics
enzymes
cellular respiration

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

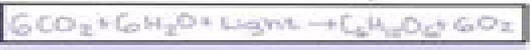
Increase in concentration of substrate and enzymes can increase reaction rate
Higher product levels = feedback inhibition

VOCABULARY

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

INHIBITION

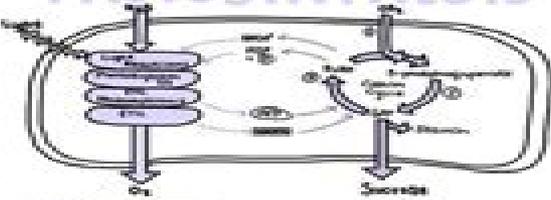
Competitive inhibition: molecules bind to binding site, competing to bind to enzyme
Non-competitive inhibition: molecules bind to allosteric site and change enzyme shape



Chloroplast - captures light energy, releases oxygen
Chlorophyll a = blue-green color
Chlorophyll b = yellow-green color
Granum = photosynthesis / photosynthetic stacks of light-absorbing

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

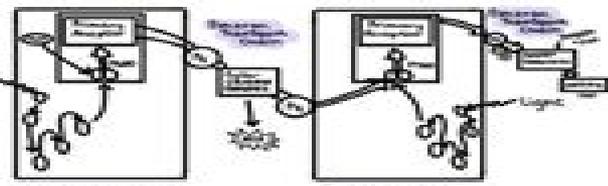
PHOTOSYNTHESIS



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 PEP 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 CO_2 attaching to 5-carbon sugar, creates 6-carbon which splits into 2 3C
- 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⁺ and pyruvate

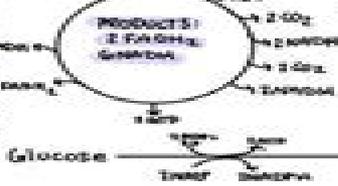
Glucose → $C_6H_{12}O_6$ → 2 Pyruvate
Glycolysis occurs in cytoplasm, requires with or without oxygen

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 FADH₂

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



Chemiosmosis: a process through which proton energy drives 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

R Pring



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