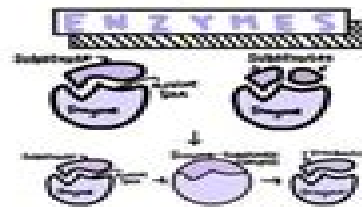


cellular energetics
enzymes
cellular respiration

UNIT 3 REVIEW

CELLULAR ENERGETICS

enzymes
photosynthesis
energy / atp



- Speeds up chemical reactions
- Changes in shape can stop function
- Temperature and pH changes
- Can alter enzyme's 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 achieve change in shape and activity

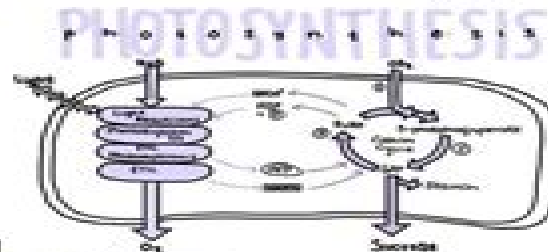
Noncompetitive inhibition: molecules bind to allosteric site and change enzyme shape



- Chloroplast = disc-like vesicles - absorb light, release oxygen
- Chlorophyll a = blue-green color
- Chlorophyll b = yellow-green color
- Carotenoids: photosynthesis / photolysis
- Stroma: site of light-independent reactions

Steps of light-dependent reactions

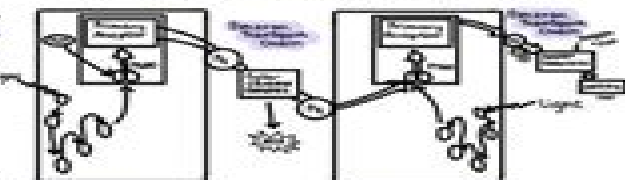
- 1) Water splits creating O_2 byproduct
 - 2) Light transfers electrons and H^+ ions to NADP⁺
 - 3) NADP⁺ reduced to NADPH by adding 2 electrons and one H^+ ion
 - 4) Chemiosmosis generates ATP through photophosphorylation
- PRODUCTS: ATP and NADPH



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

Light-independent reactions

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



Photosystem II: PEP Synthase produces PEP w/ added H^+ from photo II

calvin cycle

- produces carbohydrates from carbon dioxide
- three phases: carbon fixation, reduction, regeneration of ATP

Carbon fixation → rubisco catalyzes CO_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, first G3P are used
Regeneration → carbon of G3P are arranged to create RUBP = PRODUCT: G3P (sugar)
• For one G3P, cycle must happen three times

FERMENTATION

• allows 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 steps of glycolysis

CELLULAR RESPIRATION

• Glycolysis → releases energy in glucose to form ATP from ADP and inorganic phosphate, and NADPH from NADP⁺ and pyruvate

Glucose → $\xrightarrow{\text{ATP}}$ Pyruvate
Glycolysis occurs in cytoplasm, with or without oxygen

• pyruvate is transported from cytosol to mitochondrion to further oxidize



Chemiosmosis: a process through which protons (H⁺) are pumped across a membrane, creating a proton gradient. In cellular respiration, this occurs in the inner mitochondrial membrane and photosynthesis in the thylakoid membrane.

Carbon dioxide is released from organic intermediates, ATP is synthesized and electrons are transferred to electron carriers NADH and FADH₂

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



PRODUCTS: 2 FADH_2 , 2 CO_2 , 2 H_2O

Glucose → $\xrightarrow{\text{ATP}}$ Pyruvate

2 FADH_2 , 2 CO_2 , 2 H_2O

2 FADH_2 , 2 CO_2 , 2 H_2O

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Mark Anestis, Kellie Ploeger Cox



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web pressure testing hydrostatic pneumatic safety guidelines document revision date cs s 9 1 december 10 2018 page 6 of 15 5 7 set up test equipment outside of the safety zone and use caution ribbon to restrict access around the test equipment 5 8 during pressure testing events distinct warning signs such as danger high pressure

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web hydrostatic testing is the most common method employed for testing pipes and pressure vessels using this test helps maintain safety standards and durability of a vessel over time newly manufactured pieces are initially qualified using the hydrostatic test they are then revalidated at regular intervals according to the relevant

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web pressure testing involves subjecting equipment pipelines and systems to controlled pressure levels to assess their structural integrity and functionality the process ensures that the equipment can handle the intended operating pressures preventing hazardous incidents and complying with regulatory standards

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web purpose the purpose of these procedures is to ensure that pressure tests are conducted safely and effectively they cover pressure testing of new and existing pressure systems and components

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web in the pressure testing process the following ppes must be used hardhat safety glasses gloves face shields hearing protection 27 final testing the following sops must be followed during the pressure testing procedure increase the pressure gradually in light of asme standards and sops defined to check the system s response to the test

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web as initially explained pressure tests are performed to ensure pressure systems safety reliability and leak tightness pressure testing is essential especially for a new pressure system before use or an existing one after repair or modification

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web forward mcaa receives frequent requests for information about how to safely perform pressure testing there are several excellent piping standards that address pressure testing with a liquid under pressure hydrostatic testing or air or another inert gas under pressure pneumatic testing

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web may 19 2022 as evidenced by its name proof pressure testing is the process of testing an item such as piping for its proof pressure this type of test is non destructive the point is not to find out at what pressure the item will burst but

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web then cascade pressure testing will be required i e complete the pressure test on the higher pressure system prior to system closure welding and then repeat full pressure test procedure for the test of the combined systems at the lowest pressure 2 heat exchangers pressure vessels and fired heaters may be included in a

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web pressure and procedure the pressure limits and methodology is different for the codes mentioned above asme b3 1 test power piping the pneumatic test pressure shall not be less than 1 2 nor more than 1 5 times the design pressure of the piping system it shall not exceed the maximum allowable test pressure of any non isolated component

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