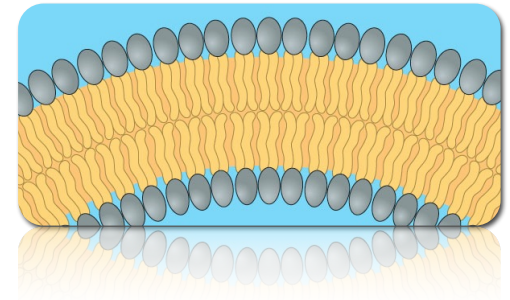


cellular work

ch 5

cell membrane

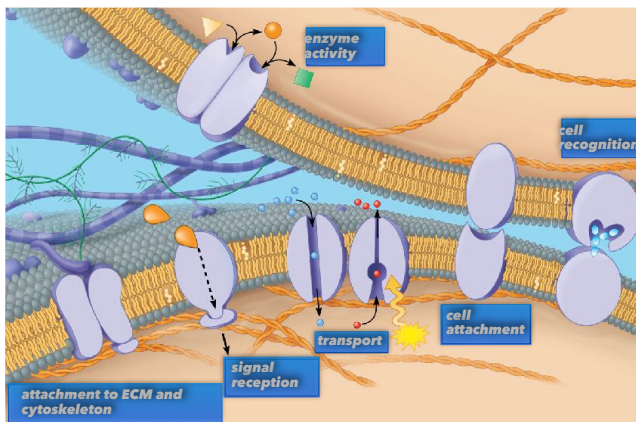
- **lipid components**
 - mostly phospholipids
 - assemble into bilayers in water
- **amphipathic lipids**
 - phosphoglycerides
 - glycolipids
 - cholesterol
 - in animals



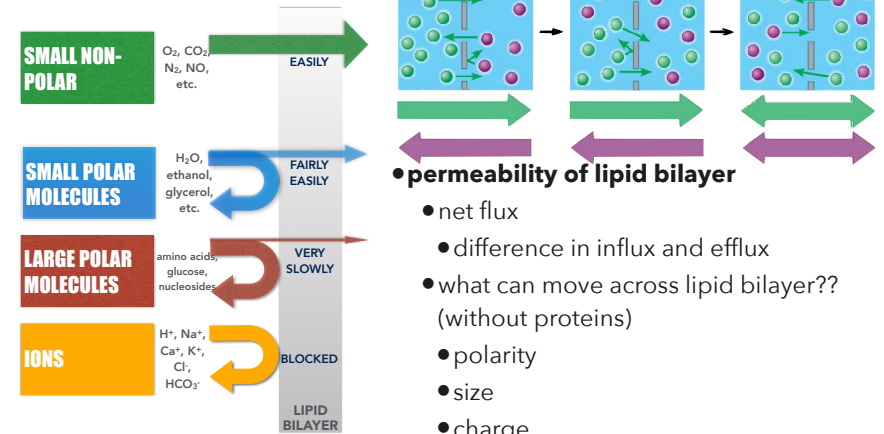
fluid mosaic model

- lipid bilayer
 - phospholipids
 - cholesterol
- proteins
 - transmembrane
 - ECM / cytoskeleton attachment
 - cell recognition
 - cell attachment
 - transport
 - enzyme
 - peripheral proteins

cell membrane



transport / permeability

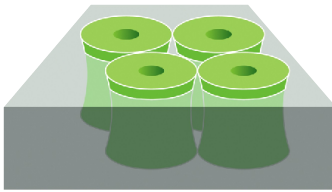


diffusion of water

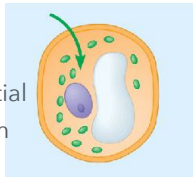
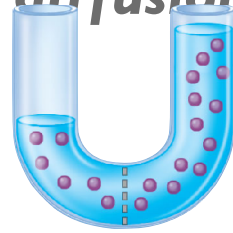
- aquaporins

water potential

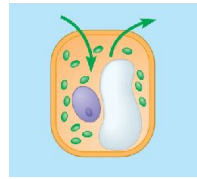
- osmosis
- osmotic potential
 - isotonic
 - hypotonic
 - hypertonic
- pressure potential
- water moves from high to low WP



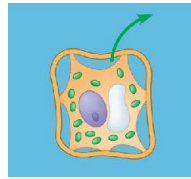
diffusion



hypotonic solution (hypoosmotic condition) (turgid)



isotonic solution (isoosmotic condition)

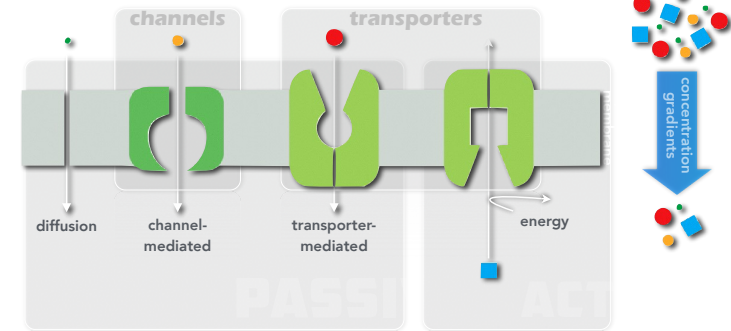


hypertonic solution (hyperosmotic condition) (plasmolysis)

transport / permeability

membrane transport proteins

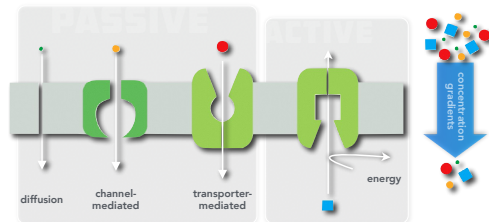
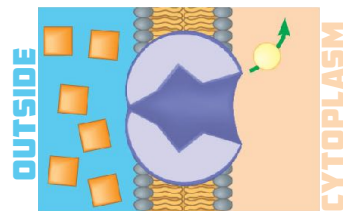
- channels - passive - diffusion
- transporters



transport / permeability

transport mechanisms

- diffusion requires:
 - permeability and gradient
 - ions (charged) -> electrochemical gradient
 - uncharged solutes -> concentration gradient
 - multiple things may be moving at once
- active transport
 - against gradient
 - uses energy/ATP

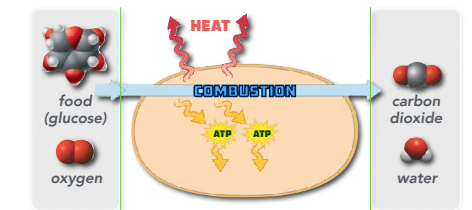
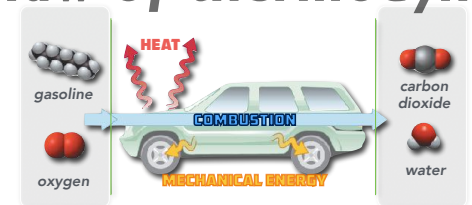


first law of thermodyn.

first law of thermodynamics

second law of thermodynamics

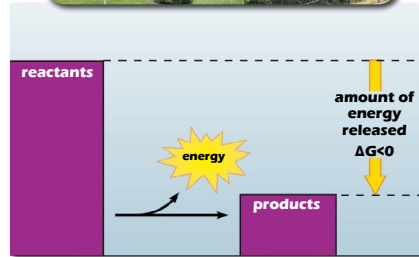
- entropy
- living systems maintain low entropy
- energy transformations accompanied by increase in entropy
- diffusion



spontaneity

•spontaneity

- exergonic / spontaneous
 - spontaneous does not mean that no input of energy is required...
 - energetically favorable
- endergonic / not spontaneous
 - require continuous input of energy



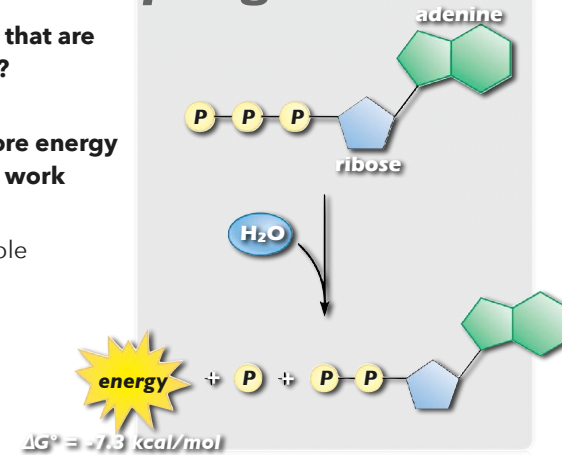
coupling reactions

•so how does a cell do things that are energetically unfavorable???

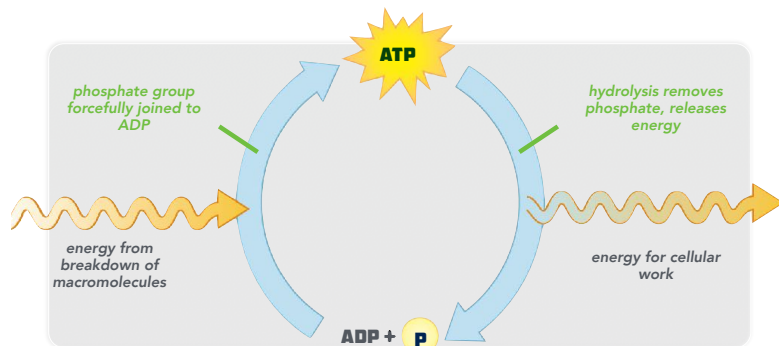
- it has to force them...

•activated carriers used to store energy short-term for use in cellular work

- ATP
 - formed through unfavorable phosphorylation
 - hydrolyzed to ADP
 - releases energy
- NADH, NADPH
 - electron carriers



coupling reactions



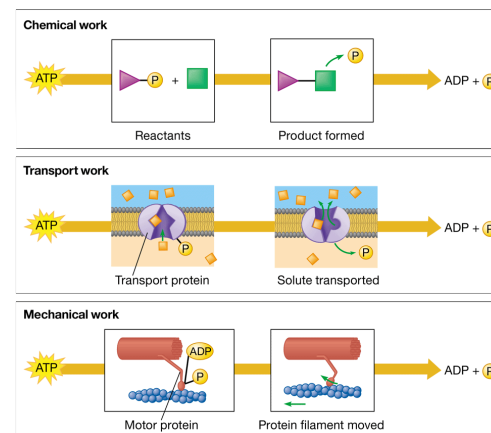
cellular work

•ATP - most used activated carrier

- used to perform cellular work
- synthesis requires energy input

•types of cellular work

- chemical
- transport
- mechanical

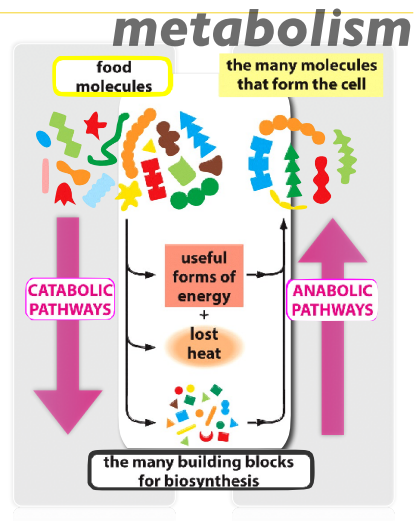


•enzymes as catalysts

- allows control

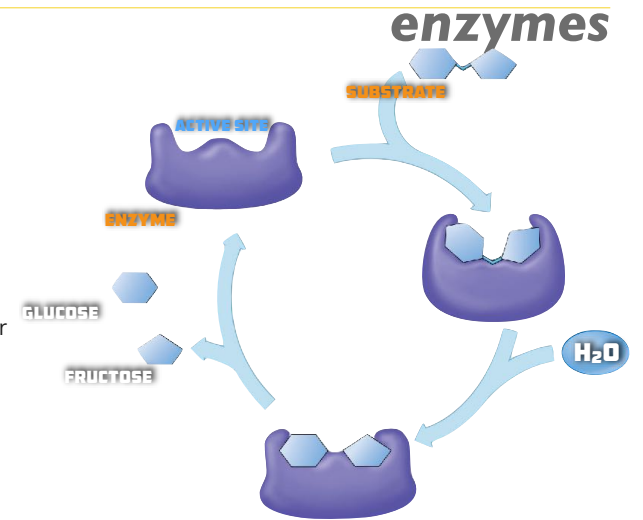
•metabolic pathways

- anabolism
 - building up
- catabolism
 - breaking down



•control of reactions

- enzymes (with cofactors [coenzymes])
- not permanently altered during reactions
- highly specific for reactants (substrates)



enzyme inhibition

•enzyme inhibitors

- irreversible inhibitors
- reversible inhibitors
 - competitive inhibitors
 - noncompetitive inhibitors

