AP Biology Unit 1 - Biochemistry Cheat Sheet

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most common elements in all living matter

CHONPS

bonds

ionic	transfer of electrons
covalent	sharing of electrons
^polar	unequal sharing
^non polar	equal sharing
hydrogen bonds	weak bonds between hydrogen and negatively charged item
hydrophobic interactions	how non-polar compounds congregate together (lipids)
van der waal	weak forces over short distances bet non polar, elecs end up in one part of mlc

strong vs weak bonds

strong bond	covalent
weak bond	hydrogen, ionic

pH

ranges from 0-14	measures amount of hydrogen ion concentration
acid	0-6, molecule that increases hydronium concentration, more H+ concentration
distilled water / neutral	7
base	8-14, molecule that increases hydroxide concentration, less H+ concen
formula	pH = −log [H+]

pH (cont)

each increment on the pH scale is a tenfold change	-pH 3 = 10^-3 = 1/1000
Blood-7.4, stomach-2, small intestine-8	enzymes are specific to pH
buffer	accepts/donates H+ to stabilize pH

chemical reactions

dehydration synthesis	loss of water, monomers join together to make polymers, water is BYPRODUCT
hydrolysis	input of water, polymers are broken down, water is USED

isomers

organic compounds that have the same molecular formula, but diff structures

structural	differ in arr of atoms
cis-trans	spatial arrangement of double bonds (double not flexible like single)
enantiomers	mirror images of each other, think hands

properties of water

properties are all because of hydrogen bonding	except for high heat of vap and specific heat	
polarity		
cohesion	water mlcs stick to itself	caused by polar mlcs//-surface tension

properties of water (cont)

adhesion	water mlcs sticking to/attracted to other charged compounds	capillary action//water climbs glucose and glass
low density when frozen	most substances become denser as a solid, not water//ice floats//h-ydrogen bonds create a lattice and puts space bet mlcs	ocean doesn't freeze solid/-surface ice insulates below water
versatile solvent	solute - sub you dissolve into a liq (sugar)//-solvent - dissolves other subs (water)//-aqueous solution-solution in which water is the solvent	like dissolves like, water can dissolve other polar mlcs//water's a versatile solvent due to its polarity - it forms H-bonds easily
high heat of fusion/vaporization	the heat a liquid must absorb for 1g to be converted to gas	evaporative cooling:s-urface cools down once water leaves it
high specific heat	Must add lots of heat to increase temp	H2O moderates earths temperature

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carbohydrates

CHO	1:2:1
monomer	monosaccharide
(2 mono)	disaccharide
polymer (3 or more mono)	polysaccharide
Provide cells with quick/short-term energy, source of dietary fiber	Used for energy (cell respiration)
end with suffix -ose	
glycosidic bond/linkages	covalent bond formed by dehydration synthesis formed bet monosaccharides to form di- and polysaccharides
maltose	glucose/glucose
sucrose	glucose/fructose
lactose	glucose/galactose
disaccharide	C12 H22 O11 (double then remove H2O)
glucose	C6 H12 O6

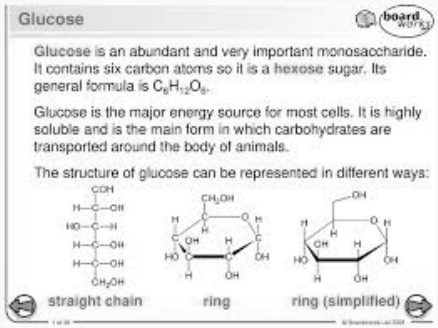
types of carbs

function	animal	plant	
storage	glycogen (stored in liver and skeletal muscle) "animal starch"	starch (two forms are amylose and amylopectin/are both glucose monomers	(starch)joined through alpha glycosidic bonds (CAN be digested by humans)

types of carbs (cont)

structural	chitin (exoskeleton in arthropods and cell wall in fungi)	cellulose used for plant cell walls	both are by beta glycosidic bonds (CANNOT be broken down by animals

glucose



lipids

Provide cells with long-term energy, make up biological membranes	
in all membranes; stored energy, protection, insulation, myelin sheath of nerves	
generally considered hydrophobic	
used for insulation and buoyancy in marine and Artic animals	
monomer	fatty acids and glycerol
CHO (P only in phospholipids)	NOT in 1:2:1 ratio
Phospholipids (glycerol + phosphate + TWO fatty acids)	makeup cell membranes (Hydrophilic head, hydrophobic tail)
amphipathic	having both hydrophilic and hydrophobic parts

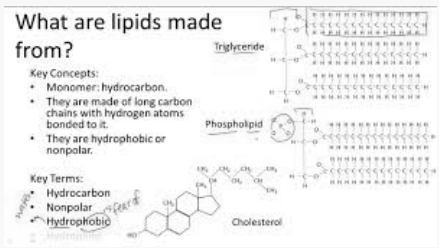
lipids (cont)

steroids	liquids that consist of 4 fused rings; many steroid hormones in animals are produced from cholesterol
saturated	single bonds between carbons
unsaturated	have at least one double bond between carbons (kinky)
plants make polyunsaturated	several double or triple bonds between carbon atoms
animals make monounsaturated	saturated except for one multiple bond

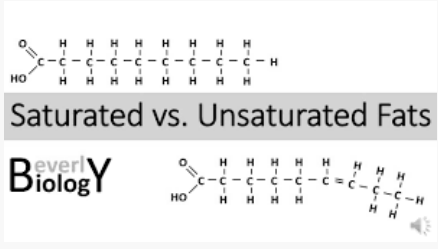
structure of lipids

fat/triglyceride (glycerol + 3 fatty acids)
most energy-rich of biologically important compounds
too much leads to buildup in arteries - atherosclerosis

lipid structure



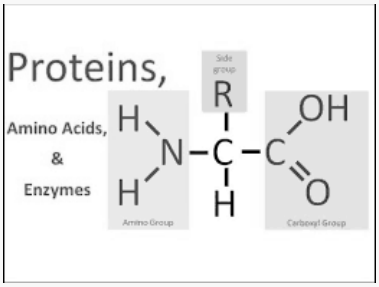
unsaturated vs saturated



proteins

protein carriers in the cell membrane, antibodies, hemoglobin, enzymes, most hormones	
Provide cell structure, send chemical signals, speed up chemical reactions, etc	
perform structural, catalytic, signalling, defense, and transport duties in a cell	
CHON (may have other elements in R group)	
monomer	amino acid (20 types)
	dipeptide
polymer (3 or more)	polypeptide
parts of an amino acid	carboxyl (COOH) group on one end, amino a group on the other end (NH2), the central carbon atom and variable R-group
Protein folding	shape determines function
protein shape	depends on primary, secondary, tertiary and quaternary structure
denaturation	a protein back to an inactive form can take place with changes to pH, salt concentration, temperature, or exposure to toxic compounds

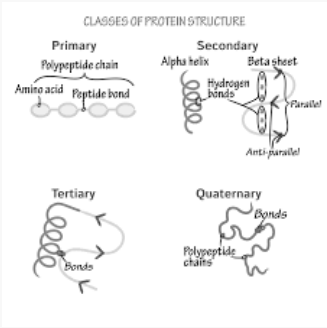
amino acid structure



protein folding

primary	amino acid chain
secondary	beta pleated sheet or alpha helix (hydrogen bonds)
tertiary	globular; folds in on itself (disulfide bridges, hydrogen bonds, hydrophobic interaction; ionic bonding
quaternary	more than one polypeptide.

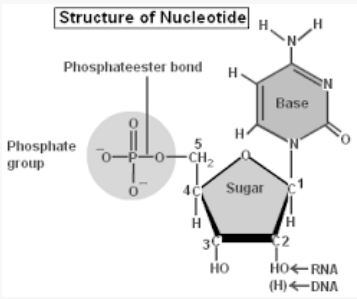
protein folding



nucleic acids

Store and pass on genetic information	
CHONPS	
monomer	nucleotide
	dinucleotide
polymer (3 or more mono)(3 or more)	polynucleotide
nucleotide structure	sugar, phosphate, and base
DNA	double-stranded, has deoxyribose, bases A, G, C, T
RNA	single-stranded, has ribose, bases A, G, C, U

nucleotide structure



deoxyribose vs ribose (these are CARBS)