

CHEMISTRY, NUCLEAR CHEMISTRY FOR A&P

28 September 1993,, rvsd 9/27/94, 28 Sept 99, 25 Sept 00, 29 Sept 03, 24Sept07, 29Sept08, 28Sept09

Marieb, pp 26-61, JFL 22-43, Martini pp31-56, Martini's 7th, pp 27-57, 8th: 53-107

ATOMIC MODEL OF MATTER: Subatomic particles, atomic number, atomic weight (p 29)

Major elements in cells: CHNOPS

RADIOACTIVITY

Isotopes different forms of an element (with differing masses).

Unstable mixture of N + P yields radioactive isotopes.

Radiation	composition	source	penetration	damage to tissues
alpha	2N + 2P	U, Pu, Ra, etc	low	great, epithelium
beta	electron, positron	many: H, C, P	moderate	moderate
gamma	electromagnetic ray	many	high	low

ionizing radiation: ejects orbiting electrons

Chemical Activity:

Orbital model, octet rule for chemical activity, valence shell, electronegativity (p 32)

Bonds: ionic: cations vs anions (p 33)

(p 30) covalent vs polar covalent bonds (p 34)

hydrogen bonds: water as universal solvent (p 36)

Oxidation-reduction reducing agents donate electrons, oxidizing, remove, aging.

Water: solvent in which life's processes take place (solvent + solute = solution) (p 42)

pH: acids vs bases, $\text{pH} = -\log_{10}[\text{H}^+]$ (P 44)

acid donates protons, **base** accepts protons, **buffer** maintains concentration of protons in solution

Chemical reactions: (p 38)

synthesis	dehydration condensation	anabolic
decomposition	hydrolysis	catabolic

ORGANIC COMPOUNDS

carbohydrates: $\text{C}_n\text{H}_{2n}\text{O}_n$ (p 47-48)

monosaccharides: glucose, fructose, galactose

(only monosaccharides can be absorbed, metabolized)

disaccharides: maltose, lactose, sucrose

polysaccharides (glycans): starch, glycogen, cellulose

mucopolysaccharides: in mucus, ground substance, synovial joint fluid

(Proteoglycans)

lipids: fats (triglycerides), fatty acids, phospholipids, steroids (P 49-52)

Proteins: Linear sequence of amino acids, joined by peptide bonds (p 53)

protein structure, primary, secondary, tertiary, quaternary (p 55)

fibrous proteins: collagen, keratin, elastin, actin and myosin

globular proteins: hemoglobin, albumin

transport, buffer (albumin) defense, hormones

most secreted proteins are *glycoproteins*

enzymes protein catalysts (p 56)

catalysis:

enzymes: protein catalysts, active site, substrate, shape critical.

Alter shape, destroy activity

nucleic acids deoxyribonucleic acid, polymer of nucleotides A, T, G, C genetic material

ribonucleic acid, also a polymer, but with A, U, G, C, and ribose in backbone