Medical College Admission Test (MCAT) Dump sheet

CHEMISTRY

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Gases

Standard Temperature and Pressure (STP)

T = 0 °C = 273 K

P = 1 atm = 760 torr = 760 mm Hg

Ideal Gas Law = $PV = nRT$

Dalton's Law of Partial Pressures = $P_{Total} = P_1 + P_2 + \dots P_n$

Graham's Law = $v_1/v_2 \sqrt{\frac{MW_2}{MW_1}}$

Kinetics

Rate Law = $Rate = k[A]^a[B]^b$

Arrhenius Equation = $k = Ae - \frac{Ea}{RT}$

Atomic Chemistry

Formal Charge

FC = # valence electrons – # bonds – # lone pair electrons

Electrochemistry

F = 96,000 c/mole

$\Delta G = - nFE_{cell}$

Stoichiometry

Moles = $\frac{\text{mass}}{\text{molecular weight (MW)}}$

Mole Fraction = $Xa = \frac{\text{moles of a}}{\text{total moles}}$

Molarity = $M = \frac{\text{moles}}{L}$

Molarity = $M = \frac{\text{moles}}{kg}$

Dilution Equation = $M_1 V_1 = M_2 V_2$

Equilibrium

For the balanced reaction

$aA + bB \leftrightarrow cC + dD$

Equilibrium Constant = $K_{eq} = \frac{[C]^c[D]^d}{[A]^a[B]^b}$

Products and reactants at equilibrium

Reaction Quotient = $Q = \frac{[C]^c[D]^d}{[A]^a[B]^b}$

Thermodynamics

$T_k = T_C + 273$

$q = mc\Delta T$

$q = n\Delta H_{fusion/vaporization}$

$\Delta H°_{rxn} = \Sigma n\Delta H°_{f,\ products} - \Sigma n\Delta H°_{f,\ reactants}$

Gibbs Free Energy

$\Delta G = \Delta H - T\Delta S$

$\Delta G° = -RTlnK$

Acids and Bases

$pH = -log[H^+]$

$pOH = -log[OH^-]$

$pH + pOH = 14$

$K_a = \frac{[H^+][A^-]}{[HA]}$

$pK_a = -logK_a$

$K_b = \frac{[OH^-][HB^+]}{[B]}$

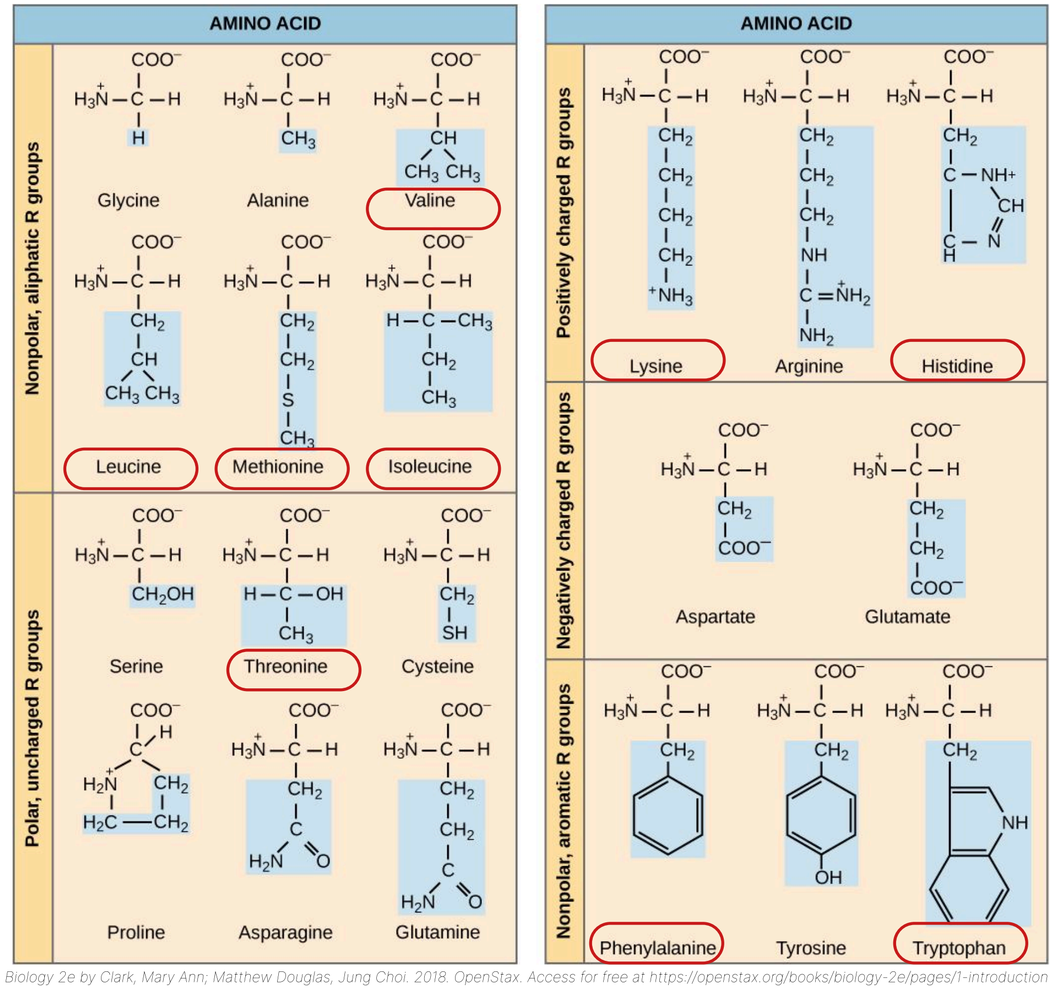
$pK_b = - logK_b$

$K_a \times K_b = K_w = 1 \times 10^{-14}$

$Kw = [H^+][OH^-] = 1 \times 10^{-14}$ at 25 °C

Henderson-Hasselbalch Equation

$pH = \frac{pK_a + log\ [A^-]}{[HA]}$



Biology 2e by Clark, Mary Ann; Matthew Douglas, Jung Choi. 2018. OpenStax. Access for free at https://openstax.org/books/biology-2e/pages/1-introduction

Structures of the 20 amino acids found in proteins are shown. Each amino acid is composed of an amino group (NH_3^+), a carboxyl group (COO^-), and a side chain (blue). The side chain may be nonpolar, polar, or charged, as well as large or small. It is the variety of amino acid side chains that gives rise to the incredible variation of protein structure and function.

( ) = indicates one of the 9 essential amino acids