Achievable

MCAT DUMP SHEET

Chemistry: gases, kinetics, equilibrium

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 = $P_{Total} = P_1 + P_2 + ... P_n$

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

ΔG = $- nFE_{cell}$

Stoichiometry

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

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

Dilution equation = $M_1 V_1 = M_2 V_2$

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

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

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 = mcΔT

q = nΔHfusion/vaporization

$\Delta H°_{rxn} = \Sigma n\Delta H°_f$, products − $\Sigma n\Delta H°_f$, reactants

Gibbs free energy

ΔG = ΔH − TΔS

ΔG° = −RTlnK