Chemistry — HSC Reference Sheet

Explained & compiled by Intuition Education · intuitioneducation.com.au

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Constants & Data

Avogadro's constant
$N_A = 6.022 \times 10^{23}$ mol⁻¹

Universal gas constant
$R = 8.314$ J mol⁻¹ K⁻¹

Molar volume of an ideal gas at STP (0 °C, 100 kPa)
$V_m = 22.71$ L mol⁻¹

Molar volume of an ideal gas at 25 °C, 100 kPa
$V_m = 24.79$ L mol⁻¹

Ionic product of water
$K_w = 1.0 \times 10^{-14}$ mol² L⁻²

Specific heat capacity of water
$c = 4.18$ J g⁻¹ K⁻¹

Faraday constant
$F = 96\,485$ C mol⁻¹

Mole & Stoichiometry

Moles from mass

$$n = \frac{m}{M}$$

Moles from number of particles

$$n = \frac{N}{N_A}$$

Moles from volume (solutions)

$$n = cV$$

Gases

Ideal gas law

$$PV = nRT$$

Molar volume (gas volume)

$$V = nV_m$$

Solutions & Concentration

Molar concentration

$$c = \frac{n}{V}$$

Dilution formula

$$c_1V_1 = c_2V_2$$

Parts per million (mass/mass)

$$\text{ppm} = \frac{m_{\text{solute}}}{m_{\text{solution}}} \times 10^6$$

Energetics & Calorimetry

Heat transferred (calorimetry)

$$q = mc\Delta T$$

Molar enthalpy of reaction

$$\Delta H = -\frac{q}{n}$$

Hess's Law

$$\Delta H_{\text{rxn}} = \sum \Delta H_{\text{products}} - \sum \Delta H_{\text{reactants}}$$

Equilibrium & Acids/Bases

Equilibrium constant expression

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

Reaction quotient

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

pH definition

$$\text{pH} = -\log_{10}[\text{H}^+]$$

pOH and the water relationship

$$\text{pH} + \text{pOH} = 14$$

Ionic product of water

$$K_w = [\text{H}^+][\text{OH}^-] = 1.0 \times 10^{-14}$$

Acid dissociation constant

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

pKa

$$\text{p}K_a = -\log_{10} K_a$$

Electrochemistry

Charge transferred in electrolysis

$$Q = It$$

Moles of electrons (Faraday's law)

$$n_e = \frac{Q}{F}$$

Mass deposited in electrolysis

$$m = nM$$