Constants, Conversion Factors and Equations (Exam IV)

Constants and Conversion Factors:

$h = 6.626 \times 10^{-34}$ J·s

$c = 2.9979 \times 10^{8} \frac{\text{m}}{\text{s}}$

$1\ \text{J} = 1\ \frac{\text{kg}*\text{m}^2}{\text{s}^2}$

$N_A = 6.022 \times 10^{23}$

$R = 0.08206 \frac{L \cdot atm}{mol \cdot K} = 8.31451 \frac{J}{mol \cdot K}$

1 cal = 4.184 J = 1×10^{-3} Cal

1 atm = 760 Torr = 101.3 kPa = 1.013 bar

Equations:

$$d = \frac{m}{\text{V}}$$

$$\nu = \frac{c}{\lambda}$$

$E_{photon} = h\nu$

E_K (ejected electron) = E_{photon} - ϕ

$$E_K = \frac{1}{2}m\text{v}^2$$

$$\Delta E = -2.18 \times 10^{-18}\text{J}\left(\frac{1}{\text{n}_\text{f}^2} - \frac{1}{\text{n}_\text{i}^2}\right)$$

$E_{photon} = |\Delta E|$

$$\lambda_{\text{matter}} = \frac{h}{m\text{v}}$$

$$\text{M}_\text{i}\text{V}_\text{i} = \text{M}_\text{f}\text{V}_\text{f}$$

$PV = nRT$

$PM = dRT$

$P_A = \chi_A P_{total}$

$$\chi_A = \frac{\text{n}_\text{A}}{\text{n}_\text{total}}$$

$$\text{E}_\text{K} = \frac{1}{2}\text{mv}^2$$

$$\overline{\text{E}_\text{K}} = \frac{3}{2}\text{RT}$$

$$\text{v}_\text{rms} = \sqrt{\frac{3\,\text{RT}}{\text{M}}}$$

$q = mC_s\Delta T$

$q_{rxn} = -q_{soln}$

$\Delta H = q_P$

$pH = -\log[H_3O^+]$

$pH + pOH = pK_w$ ($pK_w = 14.00$ at 25 °C)

$K_a \times K_b = K_w$

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

$\Delta S°_{rxn} = \Sigma[nS°_m \text{ (products)}] - \Sigma[nS°_m \text{ (reactants)}]$ (similar for $\Delta G°$, $\Delta H°$)

$\Delta G = \Delta G° + RT(\ln Q)$

$\Delta G° = -RT(\ln K)$