biochem-formulas

Summary of formulas and constants used in biochemistry

Constants

$R = 0.008314\ kJ \cdot mol^{-1} \cdot K^{-1}$

$T\ in\ K = T\ in\ ^\circ C + 273.15$

Free energy and concentration:

$aA + bB \rightleftarrows cC + dD$

$\Delta G^{\circ\prime} = -RTln\left(K_{eq}\right) = -RTln\left(\frac{[A]_{eq}^{a}[B]_{eq}^{b}}{[C]_{eq}^{c}[D]_{eq}^{d}}\right)$

$\Delta G = \Delta G^{\circ\prime} + RTln\left(\frac{[A]^{a}[B]^{b}}{[C]^{c}[D]^{d}}\right)$

pH:

$M \cdot H \overset{K_a}{\rightleftarrows} M + H^+$

$K_a = \frac{[M][H^+]}{[M \cdot H]}$

$pH = -log_{10}\left([H^+]\right);\ pK_a = -log_{10}\left(K_a\right)$

$\theta = \frac{[M \cdot H]}{[M]+[M \cdot H]} = \frac{1}{1+K_a/[H^+]} = \frac{1}{1+10^{(pH-pK_a)}}$