## 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:

$$aA + bB \rightleftarrows cC + dD$$

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

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

## pH:

$$M \cdot H \stackrel{K_a}{
ightharpoonup} M + H^+$$

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

$$pH=-log_{10}\left(\left[H^{+}
ight]
ight);\ pK_{a}=-log_{10}\left(K_{a}
ight)$$

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