

## 0.1 BERG, TYMOCZKO, GATTO, STRYER - Biochemistry 9th ed

- 1.1) *Donors and acceptors.* see Fig 1.6
- 1.2) *Resonance structures.* switch single/double bonds in the ring
- 1.3) *It takes all types.* a) NaCl - Ionic bond, b) Graphite - van der Waals interaction
- 1.4) *Don't break the law.* 2nd Law: reaction happens if  $\Delta S_{tot} = \Delta S_{react} + \Delta S_{ext} = \Delta S_{react} - \Delta H_{react}/T > 0$  meaning  $\Delta G = -T\Delta S_{tot} < 0$  with  $\Delta G = \Delta H_{react} - T\Delta S_{react}$  therefore  $\Delta H_{react} < T\Delta S_{react}$  a.)  $-84 < 125 \cdot 298$  c.)  $+84 < 125 \cdot 298$
- 1.5) *Double-helix-formation entropy.*
- 1.6) *Find the pH.*  $\text{pH} = -\log[c_{H_3O^+}]$ , a.)  $0.1\text{M} = 0.1\text{mol/l}$  of  $\text{H}^+$  meaning  $\text{pH} = -\log_{10}[H^+] = 1$   
b.) equilibrium of dissociation of water  $[H^+][OH^-]/[H_2O] \equiv 1.8 \cdot 10^{-16}$  meaning  $[H^+] = 1.8 \cdot 10^{-16}[H_2O]/[OH^-] = 1.8 \cdot 10^{-16} \frac{1000}{2+16} \frac{1}{0.1}$ ,  $\text{pH}=13$  c.)  $\text{pH}=1.3$  d.)  $\text{pH}=12.7$
- 1.7) *A weak acid.*  $10^{-pK_a} = \frac{[CH_3COO^-][H^+]}{[CH_3COOH]_{init}-[H^+]}$   $\rightarrow \text{pH} = -\log_{10}[H^+] = 2.875$
- 1.8) *Substituent effects.*  $\text{pH}=1.93$
- 1.9) *Water in water.*  $\text{H}_2\text{O}$ :  $18 \text{ g/mol}$  with  $1\text{l}=1000\text{g}$ ,  $1000\text{g}/(18\text{g/mol})=55.5\text{mol}$  so  $[H_2O] = 55.5\text{mol/l}$
- 1.10) *Basic fact.*  $\text{pH}=10.85$