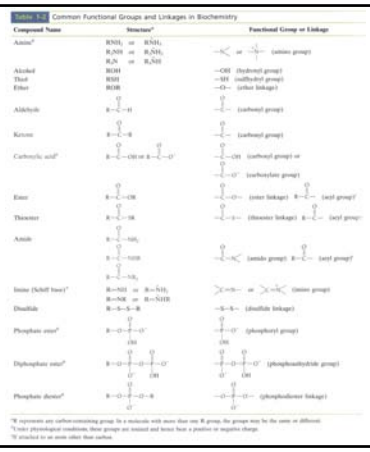
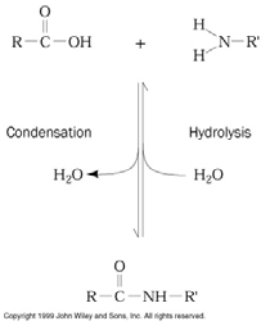
University of Houston
BCHS 3304: General Biochemistry I - Fall 2008
Section 12697
Tuesday/Thursday 11:30 AM – 1:00 PM 102 SW

Exam 1 Overview



Condensation reactions

•Chemical Evolution, simple molecules condense to form more complex forms (polymers)



Reaction of a carboxylic acid with an amine

Replication through complementarity

- Specific pairing of functional groups gives rise to complementarity
- More complex molecules increases chemical versatility
- Complementarity makes it possible for macromolecules to replicate
- Over time natural selection favored molecules that made accurate copies of themselves

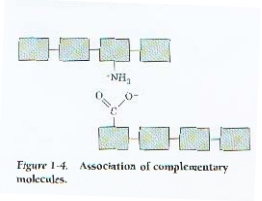


Figure 1-4. Association of complementary molecules.

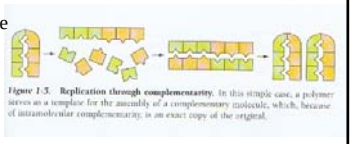


Figure 1-5. **Replication through complementarity.** In this simple case, a polymer serves as a template for the assembly of a complementary molecule, which, because of intramolecular complementarity, is an exact copy of the original.

Gibb's Free Energy

- Is a state function (a property of a system that depends only on the current state of the system *and not its history)*
- Gibb's Free Energy is determined at constant ***T*** and ***P***:

$$G = H - TS$$
$$\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$$

- The **Gibbs free energy (*G*)** of a **system** is defined by an **enthalpy term (*H*)** (change of the total energy with the system), and the **entropy term (*S*)** (change in the disorder) at **temperature** (***T***)

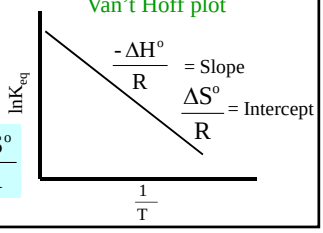
The van't Hoff Relationship

- Methodology of finding ΔH and ΔS from experimental data.

$$\ln K_{eq} = -\frac{\Delta G^\circ}{RT} = -\left(\frac{\Delta H^\circ - T\Delta S^\circ}{RT}\right)$$

$$\ln K_{eq} = \frac{1}{R}\left(\Delta S^\circ - \frac{\Delta H^\circ}{T}\right)$$

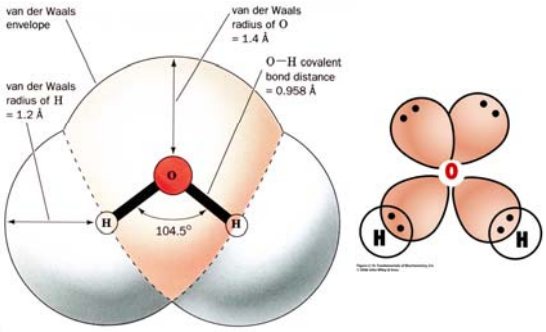
Van't Hoff plot



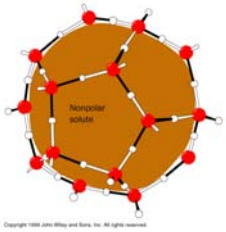
$$\ln K_{eq} = \frac{-\Delta H^\circ}{R}\left(\frac{1}{T}\right) + \frac{\Delta S^\circ}{R}$$

Structure & Properties of Water

Bent geometry, O-H bond length of 0.958Å
Can form Hydrogen bonds



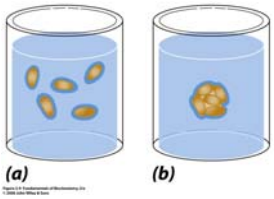
Nonpolar/Polar Interactions and Structured Water



A cage of water molecules (calatherate) surrounding the non-polar molecule. This cage has more structure than the surrounding bulk media.

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

To minimize the structure of water the hydrophobic molecules cluster together minimizing the surface area.



Henderson - Hasselbalch equation

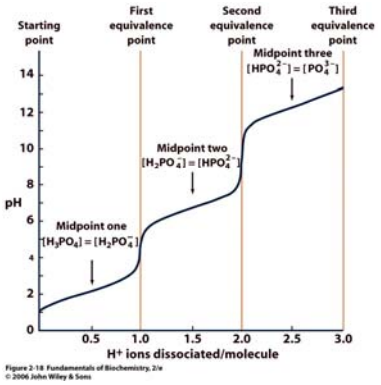
From $K = \dfrac{[H^+][A^-]}{[HA]}$

Rearrange $[H^+] = K\dfrac{[HA]}{[A^-]}$

Take (-)Log of each $pH = -\log K + \log\dfrac{[A^-]}{[HA]}$

$$pH = pK + \log\frac{[A^-]}{[HA]}$$

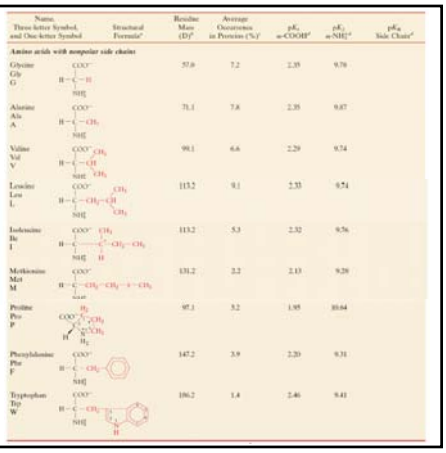
Titration curve for phosphate



Key to structure

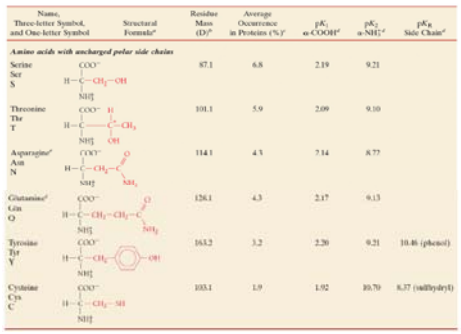
(1)

G
A
V
L
I
M
P
F
W



(2)

S
T
N
Q
Y
C



(3)

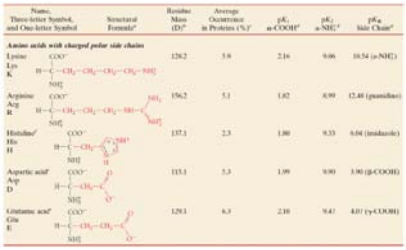
K

R

H

D

E



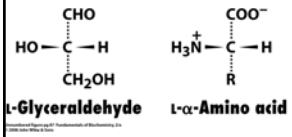
The Fischer Convention

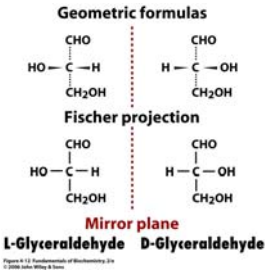
Absolute configuration about an asymmetric carbon

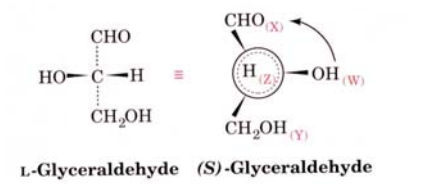
related to glyceraldehyde

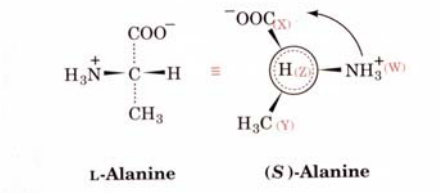
(+) = D-Glyceraldehyde

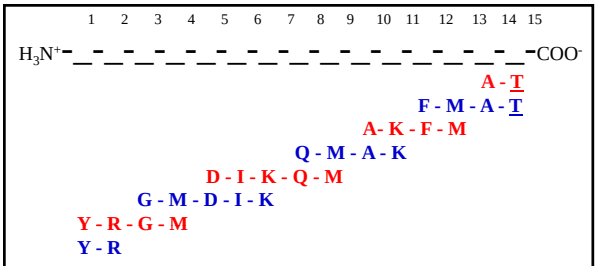
(-) = L-Glyceraldehyde











Cyanogen Bromide (CNBr) Cleaves after Met i.e M - X

D - I - K - Q - M
A - T
A - K - F - M
Y - R - G - M

Trypsin cleaves after K or R (positively charged amino acids)

Q - M - A - K
G - M - D - I - K
F - M - A - T
Y - R