

Chemistry 4055 (Spring 2013)
Exam 1 Study Guide

Terms/Equations

Gibb's Free Energy Equation

Thermodynamics

Enthalpy

Entropy

Kinetics

Covalent Bonds

Noncovalent Interactions

Hydrogen Bonds

Types and orientations of hydrogen bonds

Dipoles (Electronegativity differences)

Bond Dissociation Energy

Phase Change

Water solubility

Ionic Interactions

Polar/Nonpolar

Hydrophilic Interactions

Hydrophobic Interactions

Van Der Waals Interactions

London Forces

Colligative Properties

Osmotic Pressure

Osmolarity

Osmosis

Isotonic

Hypertonic

Clathrate

Amphoteric

Ampholytes

Amphipathic

Micelle

Hydronium Ions

pH

pOH

Dissociation Constant

K_a

pK_a

pI

Weak Acid

Conjugate Acid/Base pair

pH Titration

Buffering Region

Buffers and Buffer Systems

Henderson-Hasselbalch Equation
Hydrolysis
Condensation
Absorbance
Amino Acids
D,L system
Chirality
Peptides
Proteins
Disulfide Bonds (Cystine Bonds)
Protein Extraction
Protein Fractionation
Crude Extract
One-dimensional Fractionation
Two-dimensional Fractionation
Dialysis
Ammonium Sulfate Precipitation
Column Chromatography (Ion Exchange, Affinity, Size Exclusion)
Stationary Phase
Mobile Phase
Electrophoresis (SDS PAGE and Isoelectric Focusing)
Specific Activity
Protein Identification
Proteases
Trypsin
Edman Degradation
Amino Acid Analysis
Reduction Alkylation
Tandem Mass Spectrometry
One-dimensional Mass Spectrometry
Primary Structure
Prosthetic Groups
Protein Homology
Secondary Structure
 α Helix
 β Sheet
 β Turns
Random Coil
Ion Pairing
Ramachandran Plot
Circular Dichroism

Must be able to:

1. Calculate ΔG
2. Determine pH, pOH, $[H^+]$, $[OH^-]$

3. Determine relative amounts of weak acids and their conjugate bases based on the Henderson-Hasselbalch Equation
4. Identify the absolute configuration of amino acids by drawing their D,L structures
5. Know all 20 common amino acids, their three and one letter codes
6. Know the five principal classification of amino acids
Nonpolar, aliphatic; Aromatic; Polar, uncharged, Positively/Negatively charged
7. Calculate pI of amino acids. Remember the general equation that I taught in class. Know how to identify the components of a pH titration curve.
8. Calculate protein absorbance and extinction coefficient
9. Draw peptides in 1D and 3D in the correct amino to carboxyl end orientation and the correct orientation of adjacent amino acid R-groups.
10. Name peptides based on the amino acid sequence
11. Identify the cleavage pattern of trypsin
12. Explain the reduction alkylation process
13. Identify the repeat units of α helices
14. Identify amino acids that do not favor α helices and peptide strands that do favor these structures
15. Identify the handedness of α helices
16. Identify how α helices and β sheets are different and what stabilizes these structures
17. Identify parallel and antiparallel orientation of β sheets
18. Identify which amino acids are common in β Turns
19. Identify the bond angles ϕ (phi) and ψ (psi). Also know which angles are common for the secondary structures discussed.