CHE112 - Study Guide - Final - S15

The final exam will be broken into two parts. Part I: Chapters 10-14, and Part II: Chapters 15-17, and 22.

General

1. Use of any equation on the cheat sheet. Choosing the proper equation, keeping track of units, math skills.
2. Foundation Concepts - concepts used to explain many things or appearing in multiple chapters.
   i. Intermolecular Forces
   ii. Meaning and Sign Conventions for Thermodynamics (ΔG, ΔH, ΔS, Spontaneous, Non-spontaneous)
   iii. Equilibrium (ICE), quadratics, applications
   iv. Oxidation/Reduction

Chapter 10: Solids

1. Intermoleculear Forces - define, draw, use/apply (LDF, DD, HB, ID, I)
2. Phase changes (Fig 10.9)
3. Heating Curves (Fig 10.10, q=msΔt, q=mΔH) and Phase Diagrams (Fig 10.28, nomenclature/use)
4. Relationship between Evaporation, Vapor Pressure and Boiling Point (Figure 10.12) and Clausius-Clapeyron Equation
5. Types of Solids (Table 10.9)

Chapter 11: Solutions and Their Properties

1. IMF in solutions and interactions between solute, solvent molecules (Figure 11.1)
2. How solvation is related to thermodynamics (ΔH and ΔS (Fig 11.4)
3. Molarity and Molality
4. Effect of temperature and pressure on the solubility of solids and gases in solution
5. 4 Colligative properties - what they are, simple calculations (given formula's)
6. Explain Colligative properties in terms of thermodynamic variables. (Figure 11.12, Fig 11.13, and Fig 11.14)

Chapter 12: Chemical Kinetics

1. Write rate laws given data (Method of Initial Rates (12.3)
2. Use of integrated rate laws to solve for missing values
3. Use of graphing to determine reaction order (Table 12.4)
4. Collision theory (Fig. 12.15 and 12.16)
5. Arrhenius Equation - solve for missing values
6. Catalysts, Activation Energy, Transition State (Fig 12.18)

Chapter 13: Chemical Equilibrium

1. Writing equilibrium constants
2. Le Châtlier's Principle - Predict direction of reaction (heat, pressure, temperature, catalysts)
3. Simple equilibrium problems (ICE) (determine concentrations at equilibrium)
4. Determine the direction a reaction proceeds using Q_c

Chapter 14: Acids and Bases

1. Definitions of Acid and Base
2. Conversions between pH, pOH, $[H^+]$, $[OH^-]$, K_a, pK_a
3. Simple calculations (Initial/Change/Final)
4. Difference between weak and strong

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Chapter 15: Acid-Base Equilibria and Solubility Equilbria

1. Common Ion Effect (Use of Henderson-Hasselbalch equation)
2. Buffers
3. Simple solubility equilibria (K_{sp}

Chapter 16: Thermodynamics: Entropy, Free Energy and Equilibrium

1. Understand conceptually ΔH, ΔS, and ΔG
2. Predict the signs of ΔH, ΔS, and ΔG
3. Determine if a reaction is spontaneous or nonspontaneous (Table 16.2)
4. Use the equation ΔG=ΔH-TΔS
5. Relationship between ΔG and K_{eq}
6. Standard state v.s. Nonstandard state

Chapter 17: Electrochemistry

1. Draw a Galvanic Cell
2. Oxidation Numbers
3. Identify Anode/Cathode (oxid/red) reactions, flow of e^- calculate E_{cell}, predict spontaneous reactions
4. Relationship between ΔG, E_{cell}, and K_{eq}
5. Nearnst Equation
6. General principals of corrosion and batteries.

Chapter 22: Nuclear Chemistry

1. 6 standard nuclear particles and general properties
2. Writing and balancing reactions
3. Conservation of Energy **AND** Mass
4. Nuclear stability and types of decay (decay chains)
5. General principle of nuclear fission (chain reaction, critical, subcritical) and fusion
6. Radioactive decay rates - calculations
7. 3 Types of units

Chapter 23: Organic Chemistry

1. Functional Groups (recognize and name)
2. Name molecules
3. Draw molecules (Line or Lewis)
4. General properties (solubility/boiling point/melting point)
5. Reactions