General Chemistry 1
Study Guide Final Exam

Chapter 1 Chemistry: Matter and Measurement

- Know how to round answers to the correct number of significant figures
- Know how to do unit conversions (dimensional analysis)
- Precision/accuracy
- Density
- The metric system
- The periodic table

Chapter 2 Atoms, Molecules, and Ions

- The Law of Conservation of Matter
- Law of Definite Proportions
- Law of Multiple Proportions as applied to chemical reactions
- Determine the number of protons, neutrons and electrons in an atom of an isotope
- Average molar masses
- Name ionic and molecular compounds
- Know the difference between nanoscale diagrams of ionic and molecular compounds

Chapter 3 Formulas, Equations, and Moles

- Balancing chemical equations
- Avogadro's number
- Mole calculations: grams → moles → number of molecules
- Stoichiometry
  - Mole→ mole, gram → gram, limiting reactant, solution stoichiometry
- Percent yield
- Concentrations of solutions (Molarity)
- Diluting concentrated solutions
- Percent composition
- Determining empirical and molecular formulas

Chapter 4 Reactions in Aqueous Solution

- Electrolytes
- Molecular-Ionic-Net Ionic equations
- Predict products and balance equations for
  - Acid-base reactions
  - Precipitation reactions
  - Redox reactions
- Use activity series to predict products of redox reactions
- Oxidation numbers

Chapter 5 Periodicity and Atomic Structure

- Understand and explain the significance of the following leading to quantum theory
  - Particle properties of light
  - DeBroglie's relationship
  - Line spectra of atoms
  - Heisenberg Uncertainty Principle
  - Schroedinger's wave equations

Pauli Exclusion principle
Determine quantum numbers for the electrons in an atom
Know the shapes of s and p orbitals
Write electron configurations ($1s^2 2s^2$, etc.) and "blanks and arrows" representations
Know and explain periodic variation of atomic radii

Chapter 6 Ionic Bonds and Some Main-Group Chemistry

Write electron configurations of ions
Rank ions and atoms by ionic radii
Know periodic variation of ionization energy and electron affinity
Explain ionic bonds in terms of transfer of atoms, coulombic forces and structure of ionic compounds
Write formulas for ionic compounds.

Chapter 7 Covalent Bonds and Molecular Structure

Describe energy changes during formation of covalent bond (Figure 7.2)
Know periodic variation of electronegativity
For a given molecule
Draw Lewis Dot strucure
Determine electronic and molecular geometry (VSEPR Theory)
Determine if bonds are polar
Determine if molecule is polar
Determine hybridization of an atom

Chapter 8 Thermochemistry: Chemical Energy

Know meaning of thermodynamic standard state
Calculate DH
From calorimetry
From Hess' Law (using equations)
From enthalpies of formation
From bond energies
From sign of DH determine if a reaction is endothermic or exothermic

Chapter 9 Gases: Their Properties and Behavior

Use the ideal gas law to calculate volume, pressure, temperature or number of moles
Describe gases using the kinetic molecular theory
Graham's law of gaseous effusion (diffusion)
Real gases (van der Waals equation)

Chapter 10 Liquids, Solids, and Phase Changes

Intermolecular forces
Dipole moments
Phase changes
Clausius-Clapeyron equation
X-ray crystallography
Phase diagrams
Unit cells and packing of spheres in crystalline solids