Study Guide for Exam #1, Ch.1-3

Chem1A, General Chemistry I

MEMORIZE:

- Metric Handout: 10 metric prefixes (G, M, k, d, c, m, μ, n, p, f), conversions
- K = °C + 273.15
- density = mass/volume
- 1 in.= 2.54 cm ; 1 mL = 1 cm^3
- Mass number (A) = # of protons + # of neutrons
- atomic mass = ∑ (natural abundance of isotope)(isotopic mass)
- Group 1A (Alkali Metals); Group 2A (Alkaline Earth Metals); Group 6A (Chalcogens); Group 7A (Halogens); Group 8A (Noble Gases)
- Main group elements (A) v. Transition Metals (B); nonmetals v. metalloids v. metals
- Nomenclature Handout: group charges (Ag^+ & Zn^{2+} & Al^{3+}), polyatomic ions, molecular prefixes, naming conventions for ionic and molecular compounds and acids
- Combustion reactions: hydrocarbon ($C_xH_yO_z$) (g) + O_2(g) → CO_2(g) + H_2O(g)
- Percent Composition: (mass of component/total mass of mixture) x 100%
- Avogadro's Number: 6.022×10^{23} units = 1 mole (mol)
- Percent Yield = (actual yield/theoretical yield) x 100%

Chapter 1: Matter and Measurement

I. Classifications of Matter (1.2): Know how to classify matter as a pure element, pure compound, homogeneous mixture, or heterogeneous mixture based on its composition.
Examples: 1.12-13, 1.59

II. Properties of Matter (1.3): Know how to differentiate between a physical and chemical property, and a physical and chemical change.
Examples: 1.20-22

III. Units of Measurement (1.4): Know the common metric prefixes and how to interconvert units with them. Know the conversion between the Kelvin and Celsius temperature scales. Know the general equation for density and how to use it to convert between density, mass, and/or volume.
Examples: 1.25-32, 34, 62, 77

IV. Significant Figures (1.5): Know how to determine the number of significant figures and round appropriately. Know how to round to proper significant figures in calculations. Know how to differentiate between a measured and a defined conversion factor.
Examples: 1.37-42

V. Dimensional Analysis (1.6): Know how to use dimensional analysis to convert between units in multistep problems, particularly word problems.
Examples: 1.47-58, 67-70, 79-80

Chapter 2: Atoms, Molecules, and Ions

I. Atomic Structure (2.3): Know how to write proper atomic notation for any atom given its makeup, or use atomic notation to determine an atom's subatomic particle composition.
Examples: 2.24-31, 55-56, 92, 100

II. Atomic Weights (2.4): Know how to use the equation for an element's atomic weight to determine atomic mass, natural abundance, and/or isotopic mass.
Examples: 2.35-36, 95-96

III. Periodic Table (2.5): Know how to use an element's location on the periodic table to determine its group, period, metallic character, main group element vs. transition metal, etc.
Examples: 2.41-44, 100

IV. Nomenclature (2.7-8): Know how to balance and/or name any ionic or molecular compound, including acids. Know the metals with predictable charges and the common polyatomic ions.
Examples: 2.61-67, 69-80, 103-105, 109-111

Chapter 3: Stoichiometry

I. Balancing Chemical Equations (3.1-2): Know how to balance and classify any chemical equation as combination/synthesis, decomposition, or combustion.
Examples: 3.11-16, 19-22, 87

II. Molar Mass and Percent Composition (3.3): Know how to calculate the molar mass for any compound. Know how to determine the elemental percent composition from the chemical formula.
Examples: 3.23-26, 97

III. Masses, Moles, and Molecules (3.4): Know how to convert between grams, moles, and molecules/atoms for any compound, including using the chemical formula as a conversion factor.
Examples: 3.35-44

IV. Empirical and Molecular Formulas (3.5): Know how to determine the empirical or molecular formulas of compounds from decomposition, percent composition, or combustion analysis.
Examples: 3.45-60, 93-97, 101-102

V. Stoichiometry, Limiting Reactants and Percent Yields (3.6-7): Know how to do stoichiometric calculations. Know how to determine the limiting reactant and/or theoretical yield for a reaction, given two or more different reactant amounts. Know how to use the percent yield equation to determine percent yield, theoretical yield, and/or actual yield.
Examples: 3.63-70, 77-86, 104-105