**CHMG-141**

**General and Analytical Chemistry I**

**Exam 2 Guide**

(Ch. 3, 4, 5, and 6; Lectures 11-20)

**Chapter 3&4: Chemical Bonding, Lewis Theory, Molecular Structure**

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| * Comparing Ionic and Molecular Compounds |

* Naming Molecular Compounds
* Representing Valence electrons with dots; Electron-Dot Structures
* Chemical bond Formation
* The lowering of atoms potential energy
* Octet rule
* Covalent bonding
* Strengths of Covalent Bonds
* Single, double and triple covalent bonds
* Writing Lewis structures for molecular compounds and polyatomic ions
* Formal charge, Charge distribution in covalent bonds and molecules
* Resonance Structures
* Exceptions to the Octet Rule; odd-electron species
* Electronegativity
* Bond Polarity, dipole moment
* VSEPR Theory; The five basic shapes
* The effect of lone pairs; Electron pairs geometry and molecular geometry
* Predicting Electron pairs geometry, bonds angels and Molecular Geometries based on the Lewis structures

**Chapter 5: Stoichiometry**

* Balancing Chemical Equations
* Solving problems based on chemical equations (calculate the relative quantities of reactants and products involved in chemical reactions
* Theoretical and actual yield, percent yield
* Limiting reagent problem
* Atomic weight, formula weight, molecular weight
* Moles of elements and compounds, mass of the mole, how many moles are in the sample
* Avogadro’s number and the mole, how many molecules in the sample (if you are given grams, moles)
* Percentage composition
* Empirical and molecular formulas, using mass data (% or grams) calculate an empirical formula
* Mole ratio of atoms in the compound
* Determining the Formula of a Hydrocarbon by Combustion

**Chapter 6: Reaction in aqueous Solutions**

* Properties of Compounds in Aqueous Solutions; Dissociation
* Solution Concentration, Molarity
* Dilution
* Solution Stoichiometry
* The pH Scale
* Finding the Concentration of a Solution: Titration
* Solubility of Ionic Compounds
* Types of aqueous solutions; Electrolytes and Nonelectrolytes
* Types of Reactions. Exchange reactions (precipitation, gas forming and neutralization) and oxidation-reduction reactions
* Predicting precipitation reactions. Precipitates
* Molecular and complete ionic equations, spectator ions, net ionic equations (be able to distinguish: monatomic and polyatomic ions produced by dissociation of compounds!!!)
* A net ionic equation.
* Common properties of acid and bases, dissociation reactions
* Acidity, pH
* Neutralization reactions (Molecular, Ionic and Net Ionic Equations)
* Titration
* Oxidation numbers of atoms in compounds (you should be able to calculate oxidation numbers for each atom in a compound. Example: CaO –for Ca and O; (NH4)3PO4 – for N, H, P, and O; anion Cr2O72- - for Cr and O
* Oxidation-Reduction Reactions (be able to identify RedOx reactions, oxidizing and reducing agents)
* The Activity series of the Elements
* Balancing Redox Reactions by the Half-Reaction Method
* Combustion Reactions