Chemistry 100
Introduction to General Chemistry
Fall Semester, 2012
Final Exam Review Sheet

Final Exam-The format for the final exam will be a combination of 30 multiple choice questions worth 5 points each and several short answer questions worth a total of 50 points. You will need to bring a standard Scan-tron sheet, calculator, and #2 pencil. You will be provided with a periodic table and the Henderson-Hasselbalch equation.

In order to score well on your Final Exam you will need to be able to:

- Use the metric system prefixes, their values, and how to use this to convert between metric units (Table 1.4)
- Convert numbers to and from scientific notation
- Correctly use significant figures in addition, subtraction, multiplication, and division
- Convert between different units of measurement when given their conversion factors
- Determine the mass percentage of compounds
- Describe atomic structure using the following terms: nucleus, proton, neutron, and electron
- Describe the quantum mechanical description of the atom. Specifically, electrons occupy unique, increasing values of energy as they arrange themselves around an atomic nucleus. The principle quantum number (1, 2, 3) is a "shell". Each shell contains subshells (s, p, d). Subshells have orbitals (1 per s subshell, 3 per p orbital, 5 per d orbital). Each orbital can house two electrons.
- Define ionization energy
- Describe an ionic bond. Give examples and nomenclature of ionic compounds.
- Memorize the names and formulae of the polyatomic anions and cation on the sheet "Polyatomic ions to know for the exam.doc"(Blackboard>Chem100 CX>Course Documents>worksheets>ch 3).
- Describe covalent bonds and name covalent compounds
- Use Lewis dot structure representation to describe the structures of covalent compounds and polyatomic ions

- Define electronegativity and determine whether a molecule is polar or nonpolar
- Use VSEPR theory to predict the shape (linear, bent, trigonal planar, trigonal pyramidal, tetrahedral), bond angles, and polarity of molecules
- Determine the mass of a molecule if given its chemical formula
- Define what a mole of something is and be comfortable measuring large quantities of molecules or atoms in moles
- Determine empirical formulas from mass percentage data
- Balance a simple chemical equation
- Determine the oxidation number (oxidation state) of each atom in a simple redox chemical reaction
- Identify which atoms are oxidized and which are reduced in a redox chemical reaction
- Use the information in a balanced chemical equation to determine stoichiometric conversion factors and use these to determine amounts of reactants consumed or products created in a chemical reaction
- Use the relationship stated in the universal gas law $PV = nRT$ to determine properties of a gas
- Understand and use Dalton's law of partial pressure to determine the partial pressure of a specific gas within a mixture
- Define phase (solid, liquid, gas) changes of a substance using the following terms: melting, freezing, vaporization, condensation, reversibility, boiling point, freezing point, heat of vaporization, and heat of fusion
- Describe secondary attractive forces (Dipole-dipole interactions, London forces, Hydrogen bonds)
- Express concentrations of solutions as either % composition (w/v and v/v) or molar (M)
- Use the concentration of a solution to determine the amount of solute (in g, ml, or moles) present in a given volume or the volume of the solution that will contain a given amount of solute
- Describe quantitatively (with numbers) how to make a dilute solution from a more concentrated solution

- Use a reaction coordinate diagram to describe an equilibrium reaction
- Define a catalyst and explain how it accelerates the rate of a chemical reaction without affecting equilibrium
- Write and use equilibrium constants to describe the relative amounts of reactants and products present in a chemical reaction at equilibrium
- Define and use Le Chatelier's Principle to explain how a reaction will attempt to restore equilibrium after it is perturbed
- Quantitatively (with numbers) and qualitatively (with words) describe the reaction where two water molecules spontaneously react to form one hydronium and one hydroxide ion
- Calculate the concentration of hydroxide ion and hydronium ion present after addition of a strong acid or strong base to water
- Use the pH scale to express the small concentration of hydronium ions on a logarithmic scale
- Define weak acids and weak bases
- Understand the Brønsted/Lowry definition of an acid or a base and recognize conjugate acid/base pairs
- Use the Henderson-Hasselbalch equation to determine the pH of a solution if the concentration of the conjugate acid and base pair is known
- List four types of radioactive decay and their effects on atomic structure
- Define radioactive decay and half-life and calculate how the amount of radiation in a radioactive substance decreases over time