Midterm Exam Study Guide

- Monday, October 30th
- 25% of the term
- Time: 1h20
- Responsible for objectives in **Units 1, 2, 3,** and **4**
- Types of questions **Multiple-choice, Short-Answer,** and **Multi-concept Questions.**
- The Evaluation Information Sheet will be given with the test.
- To obtain full credit for questions involving calculations, you must show the steps and formulas used and express answers to the correct number of significant figures.
- Scientific calculators are allowed. Programmable calculators are not allowed.

- **Objectives:**

  - **Unit 1: Experimentation and Measurement**
    NOTE: The following is needed to solve calculations in general.
    1. Write numbers in scientific notation and use prefixes for multiples of SI units.
    2. Report the answer of a calculation to the correct number of significant figures.
    3. Change a measurement into different units using appropriate conversion factors

  - **Unit 2: Chemical Composition**
    1. Be familiar with the Periodic Table of Elements.
    2. Indicate the atomic number, group number, and period number for an element whose position in the periodic table is given.
    3. Determine the mass number, atomic number, and number of protons, neutrons, and electrons from an isotope symbol.
    4. Identify an element given the mass and number of atoms or moles.
    5. Classify bonds as ionic or covalent.
    6. Determine the number of electrons and protons from chemical symbol and charge.
    7. Convert between name and formula for all types of ionic compounds and covalent compounds.
    8. Calculate formula weight, molecular weight, and molar mass, given a chemical formula or structure.
    9. Convert between mass, moles, and molecules or atoms of a substance.
    10. Percent composition, empirical formulas and molecular formulas
    11. Combustion analysis

- **Unit 3: Mass Relationships in Chemical Reactions**
  1. Balance a chemical reaction.
  2. Relate the amount (moles or mass) of reactants and products in a balanced equation using stoichiometry.
  3. Determine which reactant is limiting and calculate the theoretical yield of the product and the amount of excess reactant.
  4. Calculate the percent yield and percent atom economy.
  5. Compare the percent yield and percent atom economy.
  6. Calculate the percent composition given a chemical formula or structure.
  7. Determine the empirical and molecular formula, given the mass percent composition and molecular weight of a compound.
  8. Determine the empirical and molecular formula, using data from combustion analysis data and molecular weight.

- **Unit 4: Reactions in Aqueous Solutions**
  1. Classify a reaction as precipitation, acid–base neutralization, or oxidation–reduction.
  2. Write complete, balanced molecular equation, complete ionic equation, and net ionic equation by identifying spectator ions in a reaction.
  3. Use solubility guidelines to predict the solubility of an ionic compound in water.
  4. Solve stoichiometry problems with precipitation reactions.
  5. Calculate the molarity of a solution given the mass of solute and total volume.
  6. Calculate the amount of solute in a volume of solution with a known molarity.
  7. Calculate the concentration of ions in a strong electrolyte solution and after a reaction.
  8. Convert between moles and volume using molarity in stoichiometry calculations.
  9. Assign oxidation numbers to each atom in a compound.
  10. Identify redox reactions, reduced species, oxidized species, oxidizing agents, and reducing agents.