Chemistry Midterm Study Guide

Atomic Structure = 7 Questions (14%)

- Given protons, neutrons, and electrons, be able to find the element, atomic mass, and ionic charge.
- Given the element, atomic mass, and ionic charge, be able to find the protons, neutrons, and electrons.
- Understand the subatomic particles inside the atom and where they reside, relative mass, and relative charge.
- Know the definition of an isotope.
- Know the maximum amount of electrons inside each sublevel orbitals (s, p, d, and f).
- Given the electron configuration, be able to identify the element.
- Given the element, be able to identify the electron configuration.

Periodic Table = 8 Questions (16%)

- Understand how the modern periodic table is arranged.
- Be able to identify the families of the periodic table.
- Be able to identify the number of valence electrons for groups or families.
- Be able to identify similar elements due to the same number of valence electrons or group.
- Be able to identify metallic or non-metallic properties of elements.
- Be able to identify the largest or smallest atomic radius given elements within a period or group.
- Be able to identify the largest or smallest ionization energy given elements within a period or group.
- Know the definition of ionization energy.

Ionic Compounds = 5 Questions (10%)

- Be able to identify the name given the chemical formula for a binary ionic compound.
- Be able to identify the chemical formula given the name for a binary ionic compound.
- Be able to identify the name given the chemical formula for an ionic compound with a polyatomic ion.
- Be able to identify the chemical formula given the name for an ionic compound with a poly atomic ion.
- Understand the difference between an ionic compound and a covalent molecule.

Covalent Molecules = 8 Questions (16%)

- Be able to identify the name given the chemical formula for a covalent molecule.
- Be able to identify the chemical formula given the name for a covalent molecule.
- Be able to identify the geometric shape given a covalent molecule (linear, trigonal planar, tetrahedral, trigonal pyramidal, or bent)
- Be able to identify the bond angle (tetrahedral = 109.5˚, trigonal pyramidal = 107˚, or bent = 105˚) given a covalent molecule or the geometric shape of a covalent molecule.
- Understand that the bond angle decreases as the number of unshared pairs of electrons increases.
- Be able to identify the number of shared pairs of electrons (bonds) of the diatomic molecules such as H_2, N_2, O_2, and the halogens (F_2, Cl_2, Br_2, and I_2).
- Be able to identify the number of unshared pairs of electrons given a covalent molecule or the geometric shape of a covalent molecule (tetrahedral = 0, trigonal pyramidal = 1, or bent = 2).
- Be able to identify the chemical formula and/or name for acids.

Chemical Reactions = 5 Questions (10%)

- Be able to identify the type of chemical reaction given a chemical reaction.
- Be able to identify the chemical reaction given its type.
- Be able to balance a chemical reaction.
- Understand the requirements for chemical reactions to occur.
- Be able to identify the precipitate and spectator ions given two aqueous ionic compound solutions.

Molar Calculations = 10 Questions (20%)

- Be able to calculate the molar mass of a substance.
- Calculate the number of particles of a substance given moles or grams.
- Calculate the number of grams of a substance given moles or particles.
- Calculate the number of moles of a substance given grams or particles.
- Calculate the percentage composition by mass of a given element in a molecule.
- Understand the difference between empirical and molecular formulas.
- Be able to determine the empirical formula of a molecule given the percentage composition by mass.
- Be able to determine the molecular formula of a given molecule given the molar mass.

Stoichiometry = 7 Questions (14%)

- Calculate the number of moles of a substance given the balanced chemical reaction and moles of a different substance in that reaction.
- Calculate the number of moles of a substance given the balanced chemical reaction and grams of a different substance in that reaction.
- Calculate the number of grams of a substance given the balanced chemical reaction and moles of a different substance in that reaction.
- Calculate the number of grams of a substance given the balanced chemical reaction and grams of a different substance in that reaction.
- Be able to determine the limiting reactant in a chemical reaction given the number of grams of two reactants.