Chemistry Study Guide (Semester 1)

You will have a periodic table to use, may use a calculator and one page (of standard notebook paper) of any notes you think will be useful.

Student should be able to:

Introduction:

➢ Describe the steps of the scientific method, apply it to solve a particular problem
➢ Define chemistry and give examples as to what topics can be investigated in chemistry and what real-world problems are caused by or can be solved through chemistry

Matter and Change:

➢ Describe states of matter as a result of energy, infer how the energy of particles changes when a substance goes through a change of state
➢ Compare and contrast physical and chemical changes
➢ Compare methods to identify a substance based on the physical properties (density, melting point, color, malleability, etc.)
➢ Compare and contrast metals and non-metals (what are three things most metals have in common)
➢ Compare and contrast a chemical and physical change

Atomic structure

➢ Describe the particles of an atom (protons, neutrons and electrons), the charges and where they are located
➢ Use mass and a periodic table to find the number of protons and calculate the number of neutrons
➢ Use charge to determine the number of electrons
➢ Honors: Identify number of valence electrons in main group elements

Periodic table:

➢ Identify elements based on atomic number
➢ Contrast the following groups as to their general properties:  noble gases, halogens, and metals (honors: include alkali metals and alkaline earth metals)

Ionic compounds

➢ Determine charges for elements based on location on the periodic table
➢ Use criss-cross method or other method to determine the formulas for ionic compounds
    o You will be given the formulas of relevant polyatomic ions
    o

Covalent compounds

➢ Contrast the bonding of covalent compounds with those of ionic
➢ Name binary covalent compounds systematically based on the number of each element
  o Prefixes for numbers 1-10 (mono, di, tri, etc.)
  o Rules for when prefixes are used (always for second element, only for first element if more than one atom)

Chemical calculations:

➢ Calculate molar masses of compounds
➢ Convert from moles to grams of a compound (using molar in grams/mole)
➢ Balance chemical equations for number of each element on both product and reactant sides
➢ Identify types of reactions from 5 main types (combination, decomposition, single replacement, double replacement, combustion)
➢ Honors: Stoichiometry problem relating mass of starting reactant and how much product is made

Gas Laws

➢ Combined gas law: $P_1V_1/T_1 = P_2V_2/T_2$
➢ Ideal Gas Law: $PV = nRT$,
  o R = 8.31 for kPa problems
  o R = 0.082 for atm problems