**Chemistry Final Exam Review Packet S20**

**A. Atomic Theory**

**For 1-9 put ALL the letters that apply: P) protons N) neutrons e) electrons**

1. Located in the *nucleus* of an atom.
2. Located in energy levels *outside the nucleus* of an atom.
3. Is **always** the *same as the atomic number* (even in ions).
4. Is equal to the number of protons only if the atom is neutral.
5. Contributes to the atom's mass
6. Causes the difference between isotopes.

**A substance has 6 protons, 8 neutrons, and 6 electrons. Decide if the statement in # 7 & 8 is true or false. If false, explain why.**

1. This substance is nitrogen.
2. This substance is an ion.
3. Compare and contrast the Bohr and Thomson models of the atom.
4. If you could somehow subtract a proton from a beryllium atom, it would become…. ?
5. If you could somehow add another neutron to a beryllium atom, it would become….?
6. What is the difference between an ATOM, an ION, and an ISOTOPE?
7. If you can’t have part of a neutron, why are the atomic masses decimal numbers and not whole numbers?

**B. Periodic Table**

1. Non-metals are located in the \_\_\_\_ corner of the periodic table. Metals are located where?
2. Define electronegativity.
3. Define ionization energy.
4. Why does atomic radius decrease as you go from left to right across a period?
5. Why does atomic radius increase as you go down a group?
6. Write the electron configuration for an atom of gallium.
7. Write the noble gas configuration for gallium.
8. Draw the **orbital-filling diagram** for gallium.
9. How many valence electrons are present in group 14 elements?
10. How many valence electrons are in the p orbital for chlorine?
11. How do electrons emit light? (Describe the process)
12. Draw a Bohr model with correct number of protons and neutrons for…
    1. Carbon b. Silicon

**C. Bonding and Nomenclature**

1. Why do elements form bonds?
2. What is the octet rule?
3. Compare/contrast ionic and covalent bonds.
4. What are the rules for naming covalent compounds?
5. What are the rules for naming acids?
6. What are the rules for naming ionic compounds?
7. Name the following:

a) SiF4 b) N2S3 c) CO d) H2S

1. Write formulas for the following, with the correct subscripts:
   1. Diboron hexahydride
   2. Nitrogen tribromide
   3. Diphosphorus pentoxide
   4. Na and O
   5. Ca and chlorate ions
   6. Sodium fluoride
   7. Copper(II) chloride
   8. Iron(III) sulfide
2. A positive ion is called a(n) \_\_\_\_\_\_ and a negative ion is called a(n) \_\_\_\_\_\_\_\_\_\_.
3. Each of the following formulas or chemical names **contain an error**. Correct each one:
   1. Al3O2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. (OH)3B \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Ca2O2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Which type of bond results from a *transfer of electrons and* which from *sharing electrons*?
5. What is the difference between polar and nonpolar bonds?

**D. Reactions and Balancing**

1. Balance the following equations:
   1. H2 + O2 🡪 H2O
   2. CH4 + O2 🡪 CO2 + H2O
2. Identify the types of reaction below:
   1. H2 + O2 🡪 H2O b. CH4 + O2 🡪 CO2 + H2O c. (NH4)2CO3 🡪 NH3 + H2O + CO2

**F. Moles and Stoichiometry**

1. Define “mole”.
2. Calculate the molar mass of the following:
   1. C6H12O6
   2. Ba(NO­)2
3. In the chemical reaction that follows, if you have 19.4 grams of CO2, how much glucose (C6H12O6) could be made? 6 CO2 + 6 H2O 🡪 C6H12O6 + 6 O2
4. How many grams of chlorine gas should be produced if 84.2 grams of aluminum chloride and 68.4 grams of bromine are combined? 2AlCl3 + 3Br2 🡪 2AlBr3 + 3Cl2
5. How many moles of Cu are needed to react with 5.8 moles of AgNO3?

Cu + 2 AgNO3 🡪 Cu(NO3)2 + 2 Ag

1. Calculate the mass of 3.89 moles of ethanol (C2H5OH).
2. How many liters of O2 do you have if you have 5.8 mols of O2?
3. Vinegar has a percent composition of 40.0% Carbon, 53.3% Oxygen and 6.7% is Hydrogen.

The atomic mass of vinegar is 60 g/mol. What is the molecular formula of vinegar?

1. Define limiting and excess reagent.
2. What is the empirical formula for a compound with a molecular formula of CH3O?
3. Calculate the percent yield of a reaction that produced 15.6 g of product in the lab but was calculated to produce 19 g of product.