Chemistry Quarter 3 Review

- Know your polyatomic ions and charges (some of them are on the back of your periodic table).
- Know your single ions (from the groups on the periodic table).
- Know how to correctly write the formulas of cations and anions in neutral compounds.
- Know what the subscripts in each compound represent and what happens if you change them (for example, what is the difference between H_2O and H_4O_2 molecules).
- Know the types of chemical reactions.
    - Double displacement has two compounds as reactions, yielding two compounds as products.
    - Single displacement has one compound and a single element in the reaction, yielding one compound and a single element as products.
    - Synthesis reactions are reactions that combine to synthesize/create one single product.
    - Decomposition reactions are reactions that decompose/break-down one single reactant into multiple, smaller products.
    - Combustion reactions (can often times also be classified as synthesis reactions) involve adding pure oxygen gas to a compound in a reactant. The product varies, depending on what you are adding pure oxygen gas (or fire) to.
- Know how to balance chemical equations with coefficients, and know what the coefficients represent.
- Know why we balance chemical equations (use a particular law to justify).
- In any balanced chemical equation, you need to know how to calculate the following.
    - Calculate the moles of a substance given the moles of another substance.
    - Calculate the moles of a substance given the grams of another substance.
    - Calculate the grams of a substance given the moles of another substance.
    - Calculate the grams of a substance given the grams of another substance.
- Know how to calculate the percent yield, and be able to identify and explain the difference between actual yield and theoretical yield.
- Know the difference between empirical and molecular formulas of a substance.
    - Given the percent values, calculate the empirical formula of a substance.
    - Given the percent values OR the empirical formula of a substance, plus a given amount in grams, calculate the molecular formula of a substance.
- Know the difference between polar and nonpolar molecules, and how the “like dissolves like” rule applies.
- Know how phase changes affect the density of water and arrangement of water molecules.

1. What's the empirical formula of a molecule containing 65.5% carbon, 5.5% hydrogen, and 29.0% oxygen?

2. If the molar mass of the compound in problem 1 is 110 grams/mole, what's the molecular formula?

3. What's the empirical formula of a molecule containing 18.7% lithium, 16.3% carbon, and 65.0% oxygen?

4. If the molar mass of the compound in problem 3 is 73.8 grams/mole, what's the molecular formula?

5. A compound with an empirical formula of C2OH4 and a molar mass of 88 grams per mole. Write the molecular formula of the compound.

6. A compound with an empirical formula of C4H4O and a molar mass of 136 grams per mole. Write the molecular formula of the compound.

7. A compound with an empirical formula of CFBrO and a molar mass of 254.7 grams per mole. Write the molecular formula of the compound.

8. The percentage composition of acetic acid is found to be 39.9% C, 6.7% H, and 53.4% O. Determine the empirical formula of acetic acid.

9. The molar mass for question #9 was determined by experiment to be 60.0 g/mol. What is the molecular formula?

10. Calculate the mass percent of carbon, nitrogen and oxygen in acetamide, C2H5NO.

11. Given the following reaction: (Always check to see if the equation is balanced before starting.)

$$C_3H_8 + O_2 \text{ -------> } CO_2 + H_2O$$

a) If you start with 14.8 g of C_3H_8 and 3.44 g of O_2, determine the limiting reagent

b) Determine the number of moles of carbon dioxide produced (use the limiting reactant)

c) Determine the number of grams of H_2O produced (use the limiting reactant)

12. Given the following equation: __ K + ___Cl_2 ---> ___ KCl

How many grams of KCl is produced from 2.50 g of K and excess Cl_2. From 1.00 g of Cl_2 and excess K?

13. Given the following equation: __Na_2O + ___H_2O ---> ___ NaOH

How many grams of NaOH is produced from 1.20 x 10^2 grams of Na_2O? How many grams of Na_2O are required to produce 1.60 x 10^2 grams of NaOH?

14. Write and balance the chemical equation that represents solid copper (II) and silver nitrate reacting. Then, determine how many moles of Cu are needed to react with 3.50 moles of $AgNO_3$? If 89.5 grams of Ag were produced, how many grams of Cu reacted?

15. The average human requires 120.0 grams of glucose ($C_6H_{12}O_6$) per day. How many grams of CO_2 (in the photosynthesis reaction) are required for this amount of glucose? The photosynthetic reaction is: ___CO_2 + ___H_2O ---> ___$C_6H_{12}O_6$ + ___O_2

16. Given the reaction: ___NH_3 (g) + ___O_2 (g) ---> ___NO (g) + ___H_2O (l)

When 1.20 mole of ammonia reacts, the total number of moles of NO formed is:

17. Write the chemical equation that represents setting fire to a strip of magnesium metal. Then, balance the chemical equation.

18. Write the chemical equation that represents the reaction between sodium sulfide and copper (II) sulfate. Then, balance the chemical equation.

19. Write the chemical equation that represents the decomposition of hydrogen peroxide. Then, balance the chemical equation.

20. Write and balance the chemical equation that represent solid aluminum reacting with lead (II) nitrate.