**CHE1031 Lecture 3 Take-home Quiz Key**

**Moles, formulas, equations, stoichiometry & limiting reactants**

Please read questions carefully, answer as completely as possible, and ask for clarification (by email) if needed. Since this is a take-home quiz, use all the resources at your command, including a periodic table. Remember that you’ll be taking exams on your own.

**3.1: Moles and molecular weight**

1. You are given 36.5 g of sodium oxide.

1. What is the formula?
2. What is the molecular weight of this molecule?
3. How many moles are there in this sample?
4. How many molecules?
5. How many atoms of sodium?

**3.2: Molar conversions: percent composition**

2. What is the percent composition, for each element, of Cr(NO3)3?

**3.2: Molar conversions: empirical & molecular formulas**

3. Calculate the empirical formula of a compound with this %mass composition:

 10.4% C

 27.8% S

 61.7% Cl

4. A molecule has the empirical formula C6H12O6. Its molecular weight is approximately 360 g/mol. What is the molecular formula?

**3.3: Stoichiometry: balancing chemical equations**

5. Balance this chemical equation:

 Al4C3 + H2O 🡪 Al(OH)3 + CH4

6. Predict the products and balance this exchange reaction.

 AlCl3 + Ca3N2 🡪

**3.4: Patterns of chemical ceactivity**

7. Identify the type of each chemical reaction shown below:

1. Li + N2 🡪 Li3N
2. (NH4)(NO3) 🡪 N2 + O2 + H2O
3. Ag(NO3) + Na2(SO4) 🡪 Ag2(SO4) + Na(NO3)
4. C8H8 + 10O2 🡪 8CO2 + 4H2O

**3.5: Stoichiometry & conversions**

8. Given the balanced chemical equation shown below, how many grams of aluminum hydroxide are made when 6.75 g of aluminum sulfide are reacted with excess water?

Al2S3 + 6H2O 🡪 2Al(OH)3 + 3H2S

**3.5: Limiting reactants**

9. The reaction below occurs when Alka-Seltzer is dropped into water; carbon dioxide produces the fizz!

 3Na(HCO3) + H3C6H5O7 🡪 3CO2 + 3H2O + Na(C6H5O7)

 84.01 g/mol 192.14 g/mol

 If an Alka-Seltzer tablet has 1.00 g of each of the two reactants, how many grams of CO2 are produced? MW of the reactants are given below the equation.

**3.5: Theoretical & percent yields**

10. A scientist makes 5.85 g of product and her percent yield is 85%. Calculate her theoretical yield.