Name: ANSWER KEY #: ____ Class: ____ Date: ____________________

Exam #7 Review – Stoichiometry

1. **1 mole** is equal to ____**MOLAR**____ mass. These units are in ____**GRAMS**____. This mass can be found on the __**PERIODIC**__ ___**TABLE**___!

2. What is a mole ratio? What conversion is the mole ratio used for?
   Mole Ratio is the ratio of coefficients in a balanced chemical equation. This is used for mole to mole conversions (converting from moles of one substance to moles of another substance).

3. **$Pb(NO_3)_2$ + 2NaI → PbI_2 + 2$NaNO_3$** What is the mole ratio between:
   a. NaI and PbI_2? = 2:1 b. $Pb(NO_3)_2$ and $NaNO_3$? = 1:2

4. What is a limiting reactant? What is an excess reactant?
   The **limiting reactant** is the reactant that is used up first & limits the amounts of products that will be formed. (The **limiting reactant** determines how much product you can make.)

   The **excess reactant** is the reactant(s) that you have more than enough of; will have some left over.

5. What is the percent yield? What is the equation to calculate percent yield?
   Percent yield is a ratio between actual yield and theoretical yield to measure a chemical reaction's efficiency.

$$\% \text{ Yield} = \left(\frac{\text{Actual}}{\text{Theoretical}}\right) \times 100$$

6. How do you find the actual yield? How do you find the theoretical yield?
   Actual yield comes from doing the experiment (amount actually made).

   Theoretical yield comes from calculations (amount possible to make).

7. Suzi Struggles was in the lab following a procedure that she calculated would produce **16.15g of $CaCO_3$.** When she finished her experiment, she ended up with **15.46g of $CaCO_3$**. Calculate Suzi's percent yield of $CaCO_3$.
   First, **identify the actual yield**. (Whatever is produced in the lab (what she ended up with) is the ACTUAL yield. In this case, it is **15.46 g of $CaCO_3$**.
   Then, **identify the theoretical yield**, (whatever was calculated) which is **16.15 g of $CaCO_3$**. Plug these into the equation above for percent yield!

$$\% \text{ yield} = \frac{15.46 \text{ g of } CaCO_3}{16.15 \text{ g of } CaCO_3} \times 100 = \boxed{95.73\%}$$

8. Balance: **1** C_2H_4 + **3** O_2 → **2** CO_2 + **2** H_2O
   If 45.71 grams of C_2H_4 react, how many moles of CO_2 will be produced?

$$\frac{45.71 \text{ g } C_2H_4}{} \times \frac{1 \text{ mol } C_2H_4}{28.052 \text{ g } C_2H_4} \times \frac{2 \text{ mol } CO_2}{1 \text{ mol } C_2H_4} = \frac{91.42}{28.052} \boxed{= 3.26 \text{ mol } CO_2}$$

9. Balance: **1** C_3H_8 + **5** O_2 → **3** CO_2 + **4** H_2O
If 2.6 moles of C_3H_8 are used, how many grams of water are produced?

$$\frac{2.6 \text{ mol } C_3H_8}{} \left| \frac{\underline{4} \text{ mol } H_2O}{\underline{1} \text{ mol } C_3H_8} \right| \frac{\underline{18.016} \text{ g } H_2O}{\underline{1} \text{ mol } H_2O} = \frac{187.3664}{1}$$

$\boxed{= 187.37 \text{ g } H_2O}$

10. Balance: **2** Cu + **1** O_2 → **2** CuO

If 8.37 moles of Cu are used, how many moles of O_2 will also be used?

$$\frac{8.37 \text{ mol Cu}}{} \left| \frac{\underline{1} \text{ mol } O_2}{\underline{2} \text{ mol Cu}} \right. = \frac{8.37}{2}$$

$\boxed{= 4.19 \text{ mol } O_2}$

11. Balance: **4** Fe + **3** O_2 → **2** Fe_2O_3

a. If 12.47 grams of Fe are used, how many grams of Fe_2O_3 are produced?

$$\frac{12.47 \text{ g Fe}}{} \left| \frac{\underline{1} \text{ mol Fe}}{\underline{55.85} \text{ g Fe}} \right| \frac{\underline{2} \text{ mol } Fe_2O_3}{\underline{4} \text{ mol Fe}} \left| \frac{\underline{159.7} \text{ g } Fe_2O_3}{\underline{1} \text{ mol } Fe_2O_3} \right. = \frac{3982.918}{223.4}$$

$\boxed{= 17.83 \text{ g } Fe_2O_3}$

b. 12.47 grams of Fe are used in this experiment and actually produced 15.64 grams of Fe_2O_3.
Using this information AND the answer from part A, calculate the percent yield of Fe_2O_3.

$$\frac{\text{Actual yield}}{\textbf{Theoretical}} \quad \left[\frac{15.64 \text{ g } Fe_2O_3}{\mathbf{17.83 \text{ g } Fe_2O_3}}\right] \text{ X } 100 = \boxed{\mathbf{87.72\ \%}}$$