NAME_____

CHEM 1301

Stoichiometry HMWK #10

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- **Moles to Moles**

  Use the following reaction to answer the following questions. None of the problems are connected, so don't carry information from one problem to another!

  $$4\ Na\ (s) + O_2(g) \rightarrow 2\ Na_2O(s)$$

1. For the reaction shown, calculate how many moles of Na_2O are formed when 0.967 moles of Na are reacted in the following reaction.

2. When 2.19 moles of Na are reacted, how many moles of O_2 also react?

3. If you form 8.6943 mol Na_2O, how many moles of Na and how many moles of O_2 were reacted?

- **Mass-to-mass Stoichiometry**

Refer to the following reaction to answer the next set of problems. (Balance the reaction before you start!)

$$\_\_\_\_\_Al(s) + \_\_\_\_\_H_2SO_4(aq) \rightarrow \_\_\_\_\_Al_2(SO_4)_3\ (aq) + \_\_\_\_\_H_2(g)$$

1. A) How many grams of aluminum can be reacted using 23.65 g H_2SO_4?

   B) As the reaction in part A progresses, how many grams of H_2 gas are produced?

2. In a completely separate setup, I need to make 10.00g $Al_2(SO_4)_3$. How many grams of Al should I begin the reaction with?

3. If I begin with 9.72 mol H_2SO_4, how many grams of H_2 can I make?

4. For the reaction shown, calculate how many grams of oxygen form when each quantity of reactants completely reacts.

$$\_\_\_\_\_KClO_3(s) \rightarrow \_\_\_\_\_KCl\ (s) + \_\_\_\_\_\ O_2\ (g)$$

A) 2.97 g $KClO_3$

B) 0.7541 g $KClO_3$

C) 15.69 kg $KClO_3$ (NOTE THE kg!!)

D) How many grams of KCl will also form when 0.7541g $KClO_3$ react? (Same mass as Part B)

E) Use your answer for parts B and D to show that you have not violated the Law of Mass Conservation. (Add the masses of the 2 products that you calculated, is this equal to the mass of the reactant you began with?)

- **Theoretical Yield/Pecent Yield**

1. Consider the reaction below:

$$\_\_\_\_\_ N_2H_4\,(g) + \_\_\_\_\_ N_2O_4\,(g) \rightarrow \_\_\_\_\_ N_2\,(g) + \_\_\_\_\_ H_2O\,(g)$$

A) A reaction initially contains 5.27g of N_2H_4, and excess N_2O_4. What is the theoretical yield of N_2 for the reaction?

B) You recover 4.95g of N_2 at the end of the reaction. What is the percent yield for the reaction?

2. A scientist calculated that he should make 20.32g of a drug he is synthesizing from a reaction. The known percent yield of the reaction is 64.23%. How much of the drug can he expect to recover at the end of his reaction?

3. A different scientist calculated that she should synthesize 8.54g of her product but only recovers 2.98g of it. What is the percent yield of the reaction?