

Stoichiometry: Not Just Another Long Word, Chapter 12

I. Stoichiometry

- A. The study of the _____ in a given reaction.
- B. What relates reactants and products?
1. _____
 2. What do the coefficients in the equation mean?
 - a. _____
 - b. _____
 3. Example: $2 \text{Na} + \text{Cl}_2 \rightarrow 2 \text{NaCl}$ This reaction has the following relationships:
 - a. _____
 - b. _____
 - c. _____
 4. These are _____ They allow for the _____
 5. FYI: _____ means that you have _____ and that you can _____ in calculation
 6. Mol-to-mol ratio examples: use this equation for a and b: $\text{N}_2\text{H}_4 + 2 \text{H}_2\text{O}_2 \rightarrow \text{N}_2 + 4 \text{H}_2\text{O}$
 - a. How many moles of water is made with 2 moles of H_2O_2 ?

b. How many moles of N_2H_4 are in 2.97 moles of N_2 ?

c. Lithium mixed with chlorine gas forms lithium chloride. If 0.965 moles of lithium is used, how many moles of chlorine gas is required to react with it?

II. The Next Level!!!

- A. You are going to combine everything that you have learned the last couple of units.
1. _____
 2. _____
 3. _____
- B. These are going to be the TOOLS you need!
- C. To solve stoichiometry problems:
1. Make sure the _____
 2. _____ the given substance (A)
 3. Use the _____ to convert to moles of B.
 4. _____ of B.

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5. Review: Three possible steps:

- a.
- b.
- c.

D. Example: How many grams of aluminum oxide are produced when 2.3 g of aluminum reacts with iron (III) oxide?

E. Example: When sodium reacts with calcium chloride, it creates sodium chloride. If 0.6877 moles of sodium chloride is created, how many grams of calcium chloride will be required?

III. Limiting Reactants and Percent Yield

A. Identifying Limiting Reactants (LR)

1. Analogy: The ingredients for making Rice Krispies treats include 6 cups of cereal, 3 tbsps of butter and 4 cups of marshmallows. If there were 6 cups of Rice Krispies, 6 tbsps of butter and 12 cups of marshmallows, how many batches can be made? Which ingredient limits the amount of batches made?

2.

3. Limiting Reactant:

a. If given _____, the limiting reactant must be found.

b. The

c. Excess reactant:

d. Steps:

i. solve for the

ii. the _____ is given by the

iii. the _____ is given by the

iv. to solve for the amount of excess reactant leftover:

a.

b.

e. Example: Find the amount of silver produced when 3.5 g of copper (II) is reacted with 6.0 g of silver nitrate.

f. Example: If 4.1 g of Cr is heated with 9.3 g of Cl_2 , what mass of CrCl_3 will be produced?

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B. Percent Yield

1. Because of reasons beyond your control, not every reaction happens as calculated.
2. The _____ that is actually produced
3. Percent Yield:
4. To find this:
 - a. First,
 - b. Compare the expected yield to the actual yield (given in the problem) by using the following equation:

5. Example: Determine the percent yield for the reaction between 3.74 g of Na and excess O_2 if 4.34 g of Na_2O is recovered.

6. Example: Determine the percent yield for the reaction between 46.5g ZnS and 13.3 g of O_2 if 18.4 g of ZnO is recovered along with an unknown quantity of sulfur dioxide.