Stoichiometry of Equations

The goal in manipulating \_\_\_\_\_\_\_ mass, molar \_\_\_\_\_\_\_, and representative particles (\_\_\_) was to be able to determine exact quantities of a substance in a reaction [analytical or \_\_\_\_\_\_\_ \_\_\_\_\_\_\_] AND how they relate to each other.

The calculations of reactants and products in chemical reactions is called \_\_\_\_\_\_\_.

For chemists, stoichiometry is a form of \_\_\_\_\_\_\_.

Molar mass



A balanced chemical equation tells you the relative amounts of \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_ in the reaction.

N2(*g*) + 3H2(*g*) → 2NH3(*g*)

The balanced chemical equation can be interpreted using different quantities including numbers of \_\_\_\_\_\_\_, \_\_\_\_\_\_\_, \_\_\_\_\_\_\_, \_\_\_\_\_\_\_, and/or \_\_\_\_\_\_\_.

What are the mole ratios of the molecules?

\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ is the expected moles.

The \_\_\_\_\_\_\_ represent \_\_\_\_\_\_\_ and form mole \_\_\_\_\_\_\_.

Use the \_\_\_\_\_\_\_ to find mass of reactants & products.

This shows the law of \_\_\_\_\_\_\_ of Mass

General Problem Solving Rules

1. Write a \_\_\_\_\_\_\_ equation

* Based on the information given and using the knowledge gained in stoichiometry of formulas

2. Determine \_\_\_\_\_\_\_ of reactants and products

* The “MOLE” concept is the basis, the \_\_\_\_\_\_\_, for Quantitative Analysis

3. Use the MOLE \_\_\_\_\_\_\_ to interconvert between \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_

* \_\_\_\_\_\_\_ in an equation represent the number of \_\_\_\_\_\_\_ of any molecule or compound in that equation
* Since “MOLES” is a standard among all substances, we can use a MOLE \_\_\_\_\_\_\_ to interconvert different quantitative measurements

4. Convert \_\_\_\_\_\_\_ to the desired \_\_\_\_\_\_\_ or \_\_\_\_\_\_\_

You MUST always use \_\_\_\_\_\_\_ as the standard of conversion. Fill in the diagram:



12B. Quantitative Analysis deals with \_\_\_\_\_\_\_ quantities versus \_\_\_\_\_\_\_ quantities. Often you have a “\_\_\_\_\_\_\_” issue that prevents producing what you expected.

\_\_\_\_\_\_\_ Reactant: the reactant that controls the amount of \_\_\_\_\_\_\_ that forms; the reactant that is consumed \_\_\_\_\_\_\_ during a reaction.

\_\_\_\_\_\_\_ Reactant: any reactant that is \_\_\_\_ consumed completely during a reaction and is left over.

Limiting & excess reactant determinations must be based on \_\_\_\_\_\_\_ quantities & \_\_\_\_\_\_\_ relationships.

You cannot tell the limiting reactant based on \_\_\_\_\_\_\_, but only based on \_\_\_\_\_\_\_ (the standard) AND the mole \_\_\_\_\_\_\_. This is \_\_\_\_\_\_\_!

The \_\_\_\_\_\_\_ reactant limits the \_\_\_\_\_\_\_ of the other reactant that can combine, and the amount of \_\_\_\_\_\_\_ that can be formed.

The excess reactant is \_\_\_\_ completely used up in the reaction.

\_\_\_\_\_\_\_ yield, like the theoretical distance you can drive on a tank of gas [*darker line on map to the left*], is actually a \_\_\_\_\_\_\_ possible yield.



In reality, the \_\_\_\_\_\_\_ yield [*green line*] is \_\_\_\_\_\_\_ than the theoretical yield. In other words, you never drive as far on a tank as you calculate.

Percent Yield

The \_\_\_\_\_\_\_ or \_\_\_\_\_\_\_ amount of \_\_\_\_\_\_\_ is called the \_\_\_\_\_\_\_ yield.

The amount of product \_\_\_\_\_\_\_ produced is called the \_\_\_\_\_\_\_ yield.



The percent \_\_\_\_\_\_\_ is a measure of the \_\_\_\_\_\_\_ of a reaction carried out in the laboratory.

Reactions do \_\_\_\_ always go to completion; when a reaction is incomplete, \_\_\_\_\_\_\_ than the calculated amount of product is formed.

\_\_\_\_\_\_\_ reactants and competing side reactions may cause unwanted products to form.

\_\_\_\_\_\_\_ yield can be \_\_\_\_\_\_\_ than the theoretical yield due to a \_\_\_\_\_\_\_ of product during filtration or in transferring between containers.

Importance of Percent Yield

Comparing the percent yield for different experimental \_\_\_\_\_\_\_ helps identify the most \_\_\_\_\_\_\_ process.

Finding percent yield helps to determine the \_\_\_\_\_\_\_ of production.

Large deviations in percent yield can indicate problems in a \_\_\_\_\_\_\_ or \_\_\_\_\_\_\_ to equipment.

Theoretical yield is the \_\_\_\_\_\_\_ amount of product a reaction can form as determined by the \_\_\_\_\_\_\_ reactant.

\_\_\_\_\_\_\_ yield is the observed amount of product formed in a \_\_\_\_\_\_\_ reaction.

Actual yield is always \_\_\_\_\_\_\_ than theoretical yield.

Percent yield is the \_\_\_\_\_\_\_ of \_\_\_\_\_\_\_ yield to \_\_\_\_\_\_\_ yield, expressed as a percent.

Identification of the \_\_\_\_\_\_\_ reactant allows the accurate determination of \_\_\_\_\_\_\_ yield.

Percent yield is a comparison of \_\_\_\_\_\_\_ yield with \_\_\_\_\_\_\_ yield.

Fill in the chart below:

