NOTES: 12.1-12.2 – Mole Ratios (Using Balanced Equations)

Balanced Equations…

● a balanced chemical equation is like a recipe that tells a chemist:

-what **quantities** of _____ to mix; and

-what **quantities** of _____ to expect

● the **quantity** of a reactant or product is usually measured in _____ or _____;

● however, it could be measured in **liters** (gases), tons, **individual molecules**, etc.

STOICHIOMETRY:

● **STOICHIOMETRY** = _____

● for chemists, it is a form of bookkeeping

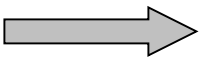
"everyday" example:

● a cookie recipe calls for (among other ingredients):

-1.25 cups butter
-1 cup sugar
-2 eggs
-1 cup brown sugar
-2.5 cups flour

● according to the recipe, this will make 48 cookies…so, we could summarize this:

1.25 cups butter
1 cup sugar
2 eggs
1 cup brown sugar
2.5 cups flour



_____

● all of these amounts may be used as ratios, or conversion factors, in calculations

● if you wanted to make 96 cookies, how many cups of flour would you need?

ANSWER:_____

● assuming you had excess amounts of all ingredients, what is the maximum number of cookies you could make with 3.50 cups of butter?

ANSWER:_____

Balanced Chemical Equations

● we can make similar interpretations (and calculations) using a balanced chemical equation

● consider the production of ammonia from nitrogen and hydrogen:

equation:_____

We can interpret this equation in terms of:

$$N_2 + 3H_2 \rightarrow 2NH_3$$

● **particles**:

_____ of N_2 reacts with

_____ of H_2 to produce

_____ of NH_3

(a _____)

Example: How many H_2 molecules are required to react with 15 molecules of N_2?

ANSWER:_____

We can also interpret this equation in terms of:

$$N_2 + 3H_2 \rightarrow 2NH_3$$

● **MOLES**:

_____ of N_2 reacts with

_____ of H_2 to produce

_____ of NH_3

(a _____)

Example: How many moles of NH_3 will be produced when 37.0 moles of H_2 react?
(assume there is enough N_2 to react)

ANSWER:_____

Examples for you to try:

● Iron (III) oxide reacts with carbon monoxide to form iron and carbon dioxide.

Equation:_____

How many CO molecules are required to react with 25 particles of Fe_2O_3?

ANSWER:_____

How many iron atoms can be produced by the reaction of 2.5×10^5 particles of Fe_2O_3?

ANSWER:_____

● consider the following reaction: $2H_2S + 3O_2 \rightarrow 2SO_2 + 2H_2O$

How many moles of O_2 are required to react with 22.5 moles of H_2S?

ANSWER:_____