

3. STOICHIOMETRY

CH30S

UNIT 2 – CHEMICAL REACTIONS

MR. WIEBE

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REACTIONS ARE LIKE BAKING!



1 cup butter
 1/2 cup white sugar
 1 cup packed brown sugar
 1 teaspoon vanilla extract
 2 eggs
 2 1/2 cups all-purpose flour
 1 teaspoon baking soda
 1 teaspoon salt
 2 cups semisweet chocolate chips

Makes 3 dozen

How many eggs are needed to make 3 dozen cookies?

How many eggs would we need to make 9 dozen cookies?

How much brown sugar would I need if I used 1 1/2 cups white sugar?

2

THE ANALOGY

BAKING	CHEMICAL REACTIONS
The Recipe	
The Ingredients (butter, sugar, etc)	
The Amounts (cups, teaspoons, etc)	
The Delicious Cookies!	

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IT'S ALL ABOUT THE MOLE RATIOS!

THE REACTION THAT WILL TAKE PLACE IN OUR ROCKETS:



- What is the total # of moles of reactants needed for this reaction to occur?
- What fraction of this total is made up by each reactant?

THE COEFFICIENTS IN YOUR BALANCED EQUATION ARE MOLES!

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IT'S ALL ABOUT THE MOLE RATIOS!

THE REACTION THAT WILL TAKE PLACE IN OUR ROCKETS:



- What is the ideal mole ratio of reactants for this reaction?
- What are some ways we could write this ratio?

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IT'S ALL ABOUT THE MOLE RATIOS!

THE REACTION THAT WILL TAKE PLACE IN OUR ROCKETS:



If we had 3 moles of oxygen available, how many moles of hydrogen would we need to react with it completely? How many moles of water would be produced?

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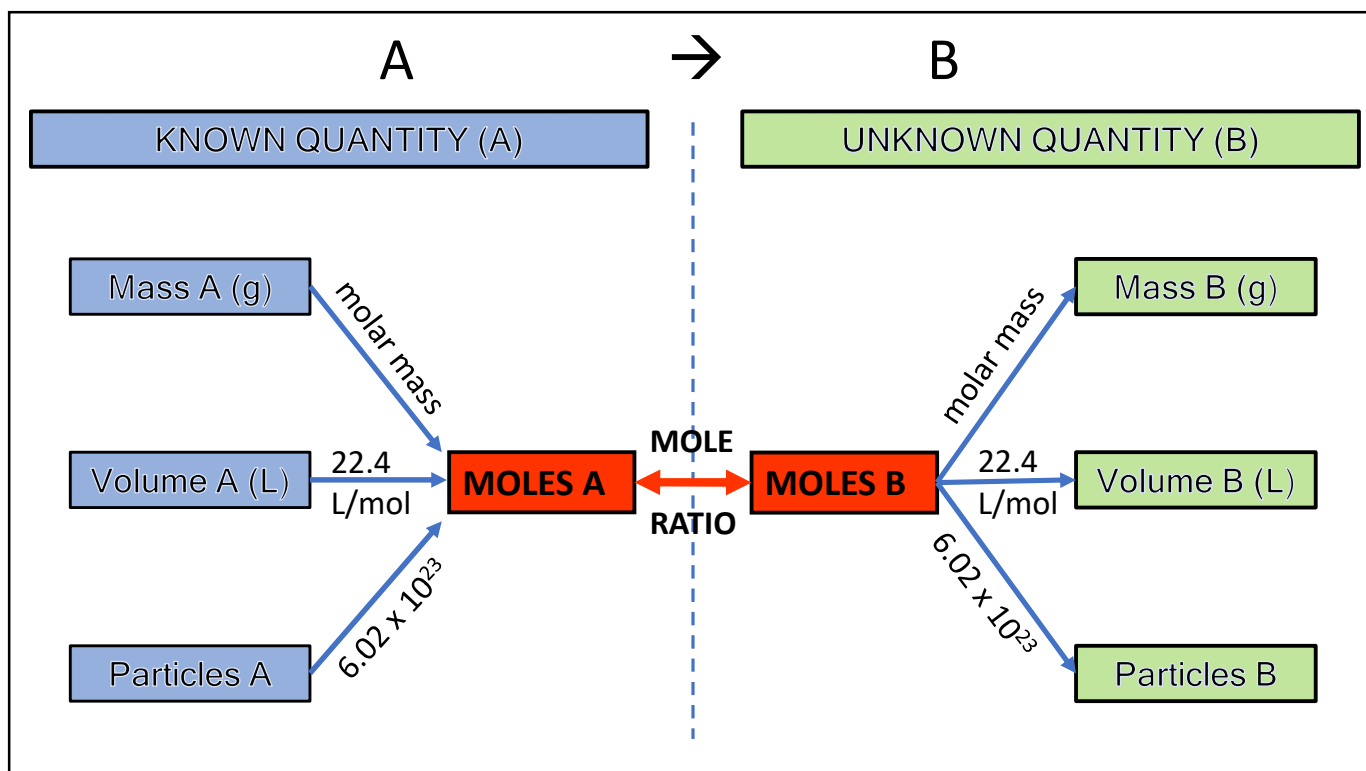
IT'S ALL ABOUT THE MOLE RATIOS!

THE REACTION THAT WILL TAKE PLACE IN OUR ROCKETS:



If we had 50 moles of hydrogen available, how many moles of oxygen would we need to react with it completely? How many moles of water would be produced?

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EXAMPLE #1

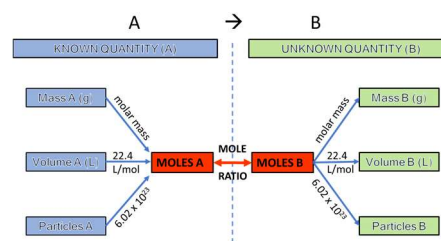
A small piece of aluminum foil is placed in a solution of copper(II) chloride. A reaction occurs.

1. What type of reaction will occur?
2. Write the word equation for this reaction.
3. Write the formula equation for this reaction.
4. Balance your formula equation.

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EXAMPLE #1

Balanced Equation:

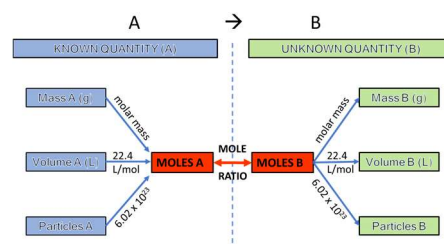


What mass of copper will be produced if 5.0 g of aluminum foil is completely reacted?

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EXAMPLE #1

Balanced Equation:



What mass of aluminum foil is required to react to produce 25.0 g of copper?

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EXAMPLE #2

A small piece of magnesium is placed in a solution of hydrochloric acid (hydrogen chloride). A reaction occurs.

Balanced Equation:

What volume of hydrogen gas will be produced if 0.50 g of magnesium is completely reacted?

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EXAMPLE #3

A candle made of paraffin wax ($C_{25}H_{52}$) is combusted.

Balanced Equation:

How many water molecules will be produced if 1.25 g of paraffin wax are combusted?