

Do Now ...January 9, 2017



Objective: Apply the mole concept to chemical equations.

Copy and Complete: In a chemical equation we can think of the **coefficients** as moles.



For every 1 mole of O_2 we get _____ moles of H_2O .

Monday – January 9, 2017

Today:

Warm-Up, Intro to Rxn Stoichiometry,
Practice

HW: Finish practice on Guided Notes

Interpreting Equations

Interpret for:

- Particles (atoms, molecules)
- Moles
- Mass
- Volume

Interpreting Equations



Moles: 1 3 2

Particles: 6.0×10^{23} $3(6.0 \times 10^{23})$ $2(6.0 \times 10^{23})$

Mass: 28.0g 3(2.0g) 2(17.0g)

Volume: 22.4L 3(22.4L) 2(22.4L)

Interpreting Equations: Practice



Moles: 1 1 2 1

Particles: 6.0×10^{23} 6.0×10^{23} $2(6.0 \times 10^{23})$ 6.0×10^{23}

Mass: 34.1g 253.8g $2(127.9\text{g})$ 32.1g

Volume: 22.4L 22.4L $2(22.4\text{L})$ N/A

Stoichiometry

Stoichiometry is the calculation of amounts of substances in chemical reactions.

We use balanced equations and the mole concept to solve stoichiometry problems.

Stoichiometry - Practice



1. For every 1 mole of N_2 reacted, how many moles of NH_3 are produced? **2 mol**
2. For every 2 moles of N_2 reacted, how many moles of NH_3 are produced? **4 mol**
3. For every 3 moles of H_2 reacted, how many moles of NH_3 are produced? **2 mol**
4. For every 6 moles of H_2 reacted, how many moles of NH_3 are produced? **4 mol**
5. For every 2 moles of NH_3 produced, how many moles of H_2 are used? **3 mol**

Stoichiometry

In the equation below, if 4 moles of NO_2 are used, how many moles of O_2 and N_2 gas are produced?



How many grams of O_2 are produced?

Stoichiometry - Practice



1. For every 2 mole of K reacted, how many moles of KBr are produced?
2. For every 4 moles of K reacted, how many moles of KBr are produced?
3. For every mole of Br₂ reacted, how many moles of KBr are produced?
4. For every 5 moles of Br₂ reacted, how many moles of KBr are produced?
5. For every 2 moles of KBr produced, how many moles of Br₂ used?

Stoichiometry

In the equation below, if 6 moles of NO_2 are used how many moles of N_2 are produced?



How many grams of O_2 are produced?

1. How many moles of hafnium nitride are produced when 2.00 moles of nitrogen reacts with excess hafnium?



2. How many moles of PbI_4 are produced when 11.7 moles of sodium nitrate are reacted?



Practice

How many atoms are in 7.2g of sodium metal?

What is the mass of 82.3L of oxygen gas?

What volume will 3.2g of hydrogen gas occupy?

Do Now ... January 10, 2017



Objective: Apply the mole concept to chemical equations.

Copy & Complete: $\text{N}_2 + 3 \text{H}_2 \rightarrow 2 \text{NH}_3$

If I start with:

1 mole of N_2 , _____ mole(s) NH_3 are formed.

2 mole of N_2 , _____ mole(s) NH_3 are formed.

2.5 mole of N_2 , _____ mole(s) NH_3 are formed.

Tuesday – January 10, 2017

Today: W-Up, Content & Practice:
Mass-Mass Stoichiometry

HW: Google Form

Mole Ratio: Practice



Calculate the number of moles of

- a) nitrogen
- b) hydrogen

required to make **7.24 mol** of ammonia (NH_3).

Mole Ratio



How many moles of ammonia are produced when 0.60 mole of nitrogen reacts with hydrogen?

Mole ratios $\frac{1 \text{ mole N}_2}{2 \text{ mole NH}_3}$ or $\frac{2 \text{ mole NH}_3}{1 \text{ mole N}_2}$

$$0.60 \text{ mole N}_2 \times \frac{2 \text{ mole NH}_3}{1 \text{ mole N}_2} = 1.2 \text{ mol NH}_3$$

One More Mole Ratio: Practice



How many moles of nitrogen gas would be produced if 0.75 moles of sodium nitride were decomposed?

How many grams of nitrogen gas would be formed?

3. How many moles of chlorine are need to produce .4789 moles of iodine?



4. How many moles of barium cyanide are need to produce 12.0 moles of barium sulfate?



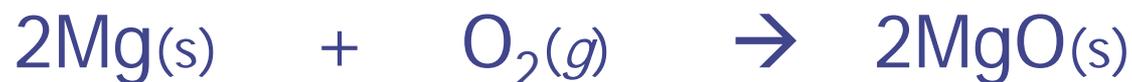
Success with Stoichiometry

For practice go to www.breslyn.org and click on link to interactive practice.

Your quizzes, warm-ups, class practice, notes, and book are also valuable resources.

Mass – Mass Demo - Mg

If 7.5g of MgO is formed, how many liters of oxygen gas was consumed?



Solving the problem:



Mass – Mass



If 3.0g of Mg is completely burnt, how many grams of oxygen gas will be used?

Solving the problem:



Another Mole Ratio: Practice

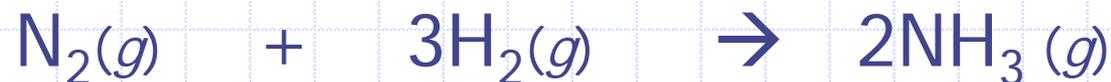
Balance the equation and find the mole ratios for oxygen and methane.

Oxygen reacts with methane to yield carbon dioxide and water.

How many moles of carbon dioxide would be produced if 3.3 moles of oxygen were reacted?

How many grams of carbon dioxide?

Mass – Mass Calculations



Use the balanced equation above to calculate the number of grams of ammonia produced by the reaction of 5.40 g of hydrogen with an excess of nitrogen.

Solving the problem:



Pre-Lab...



2.00g

?





Do Now ... January 11, 2017

Objective: Determine mass of CO_2 in baking soda.

Copy and calculate :

➤ GFM for NaHCO_3 _____

➤ Moles in 3 grams of NaHCO_3 _____



Wednesday, January 10, 2017

Today:

W-Up, Lab: Baking Soda and CO_2

HW: Review p 140-151 in your book.

Important Ideas

We can find the mass for elements on the periodic table.
(This is the mass of one mole or 6.0×10^{23} atoms).

Adding up the masses of the elements in a compound gives you the Gram Formula Mass (GFM).

Some practice...

1. Convert 3.4 g HCl to moles.
2. Avogadro's number is: _____
3. How many moles are in 3.4×10^{23} molecules?
4. Find the percent mass of H in HCl.
5. If one mole of a gas occupies 22.4 L, how many liters will 2 moles occupy?
6. Convert 23899 to scientific notation.



Do Now ... January 12, 2017

Objective: Apply the mole concept to chemical equations.

Copy & Complete:

Calculate the molar mass (GFM) of NH_3 . _____

Find the % composition of N in NH_3 . _____

Convert 1000 to scientific notation. _____

Thursday, January 12, 2017

Today:

W-up, Complete Lab Calculations, Mass-to-Mass practice.

HW: Google Form

Initial: _____g

Final: _____g



Mass – Mass Calculations: Practice



How many grams of CaC_2 are needed to react completely with 49.0 g of H_2O ?

1. Balance the equation.
2. Find what is given and what is asked for.
3. Convert grams to moles (of given).
4. Use the mole ratio to find moles (of asked for).
5. Convert moles to grams, molecules, or liters.

Stoichiometry Example

Air-bags are activated when a severe impact causes a steel ball to compress a spring and electrically ignite a detonator cap. This causes NaN_3 to decompose explosively. The balanced equation for this decomposition is shown below.



If all of the 2.0 grams of NaN_3 (GFM=130 g) are detonated, what volume of gas is produced under standard conditions?

Calculating Volume

How many liters of oxygen are needed to produce 19.8L of SO_3 , according to this balanced equation?



liters $\text{SO}_3 \rightarrow$ moles $\text{SO}_3 \rightarrow$ moles $\text{O}_2 \rightarrow$ liters O_2

Calculating Volume

How many liters of oxygen are needed to produce 19.8L of SO_3 , according to this balanced equation?



- How many liters of HF are needed to produce 9.40L of H_2 ?
- How many molecules of H_2 are produced by the reaction of tin with 20.0L of HF?

Some practice...

1. Convert 3.4 g HCl to moles.
2. Avogadro's number is: _____
3. How many moles are in 3.4×10^{23} molecules?
4. Find the percent mass of H in HCl.
5. If one mole of a gas occupies 22.4 L, how many liters will 2 moles occupy?
6. Convert 23899 to scientific notation.

Practice

1. Convert 12.0g of CaO to molecules.
(Hint: convert from g \rightarrow moles \rightarrow molecules)
2. How many grams C₂H₂ are produced by adding water to 5.00g of CaC₂?



Do Now ... January 13, 2017



Objective: Prepare for and demonstrate knowledge of mass-to-mass stoichiometry on quiz.

Copy & Complete:

The mole always contains the same number of particles (6.02×10^{23}). However, one mole of different substances will have different masses.

1 mole H = 1.01 g

1 mole O = 16.00g

Friday, January 13, 2017

Today: W-up, Practice, Quiz

HW: Prepare for unit Test next week.

Mass – Mass Calculations: Practice



- How many moles of O_2 are used when 3.4 moles of C_2H_2 burns?
- How many grams O_2 are required to burn 52.0g of C_2H_2 ?
- What type of reaction is this?

Remember: Write what you know and want to find under the equation. Then plan your solution.

Combustion

Ethanol, CH_3OH , reacts with oxygen gas to form carbon dioxide and water.

If 3.0g of ethanol is reacted, how many moles of carbon dioxide gas will be generated? How many liters?

Balanced Equation



Practice

1. For the balanced equation shown below, how many grams of CO reacted, if 74.8 grams of H₂ are used?



2. For the balanced equation shown below, how many grams of heptane will react with 80.3 g O₂?



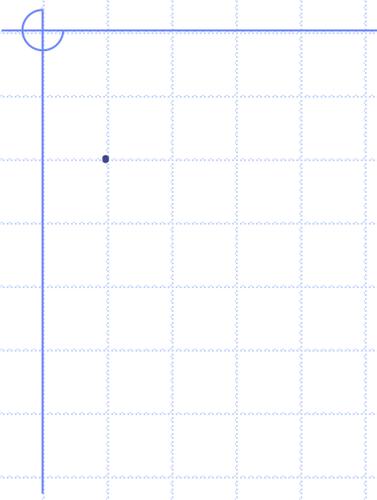
3. For the balanced equation shown below, how many liters of H₂ will be produced if 2.7 grams of H₂SO₄ are reacted completely?



---Old Content ---



----- F - Cards -----



1 MOLE

6.02×10^{23} Particles

SI Abbreviation for Mole

mol

STP

Standard Temperature
and Pressure

6.02×10^{23} Particles

Avogadro's Number

1 mole

GFM



Gram Formula Mass



Methane



Methyl group

1 mole of a gas occupies:

22.4 Liters

moles → grams

multiply by GFM

grams → moles

divide by GFM



Ethane

Chemical Equations and the Mole

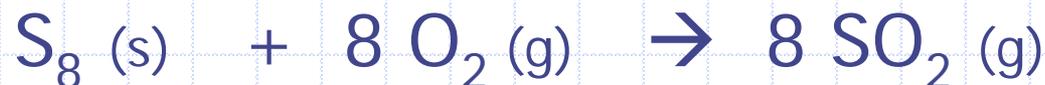
In the equation below, how many moles NO_2 are used for each mole of O_2 produced ?



How many moles of N_2 are produced for each mole of NO_2 used?

Chemical Equations and the Mole

In the equation below, how many moles of O_2 are used for each mole of S_8 ?



How many moles of SO_2 are produced for each mole of S_8 ?

If 8 moles of oxygen gas are used, how many moles of sulfur dioxide gas are generated?

Chemical Equations and the Mole



If 3 moles of carbon are used, how many moles of carbon monoxide gas are generated?

If 6 moles of carbon are used, how many moles of carbon dioxide gas are generated?

If 2 moles of silicon dioxide are used, how many moles of carbon monoxide gas are generated?

Warm-Up

1. Convert 12.0g of CaO to molecules.
(Hint: convert from g \rightarrow moles \rightarrow molecules)
2. Convert 10L of H₂ gas to grams.
(Hint: convert L \rightarrow moles \rightarrow grams)
3. Convert 2.1×10^{22} molecules of NaCl to grams.
(Hint: another multi-step conversion)

Warm-Up

1. How many molecules are in 1.0 grams of water?
2. What is the mass of 2000mL of carbon dioxide gas?
(note: 1L = 1000mL)
3. How much space will ten grams of oxygen gas occupy?

Warm-Up

1. How many atoms are in 0.5 moles of copper metal?
2. How many moles are in 39.0 grams of K_2SO_4 ?
3. How many liters are in 10 grams of N_2 ?

Mass – Mass Calculations: Practice



How many moles of CaC_2 are needed to react completely with 49.0 g of H_2O ?

Mass – Mass Calculations: Practice



How many grams C_2H_2 are produced by adding water to 5.00g of CaC_2 ?

Mass – Mass Calculations: Practice



How many grams of $\text{Ca}(\text{OH})_2$ are produced when 0.89 mol of C_2H_2 is produced.

Mass to Mass Calculation

20.0 g of silver nitrate is reacted with an excess of sodium chloride to produce silver chloride.



What mass of silver chloride is produced?

Warm-Up –mole-gram

Mole Conversion Practice

1. Calculate the molar mass of CaCl_2
2. Convert 11g H_2O to moles.
3. Convert 3.5 moles NaCl to grams.
4. How many liters does 0.5 moles O_2 (g) occupy?

Warm – Up

1. Convert 3.0 moles of H_2SO_4 to grams.
2. Convert 2.0 moles C_2H_4 to grams.
3. Convert 0.5 moles PCl_3 to grams.
4. How many liters does 3.0 moles $\text{N}_2 (g)$ occupy?