

Molar Conversions & Stoichiometry: SOL Review #5

Chapters 10, 11

Name: _____

Chapter 10: Molar Conversions

Molar Mass

Mole, Gram, Liter, Particles conversions

Empirical/Molecular Formulas, Percent Composition

Chapter 11: Stoichiometry

Molar Ratios

Mole-Mole ***very common!*

Gram-Gram

L-L

Percent Yield

Molar Conversions: (Usually no balanced equation provided. Staying with the SAME compound.)

- 1) The number of molecules in 48.0 grams of oxygen gas (O₂) is --

9.03 x 10²³ molecules

- 2) A balloon is filled with 3.8 L of helium gas at STP. Approximately how many moles of helium are contained in the balloon?

0.17 mol

- 3) Calculate the volume occupied by 8.75 x 10²³ particles of an ideal gas at STP.

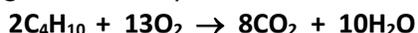
32.5 L

Stoichiometry Calculations: (Balanced equation must be provided, or you must be able to write your own. Converting from one compound to a DIFFERENT compound.)

- 4) When copper reacts with silver nitrate according to the equation below, how many grams of copper are required to produce 432 g of silver? $\text{Cu} + 2\text{AgNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + 2\text{Ag}$

127.25 g

- 5) If 5.0 liters of butane react with oxygen, how many liters of carbon dioxide can be made?



20.0 L

- 6) Nitrogen can react with hydrogen to produce ammonia (NH₃). How many moles of hydrogen will be needed to produce 0.79 mol of NH₃?

1.185 mol

Conceptual Review

- 7) What is the mass of one mole of $C_6H_{12}O_6$? **180.18 g (HINT: molar mass)**
- 8) Chlorine gas is a diatomic molecule. What is the mass of one mole of chlorine gas? **70.9 g (molar mass of Cl_2)**
- 9) What is the volume of 6.022×10^{23} molecules of any gas? **22.4 L (1 mole of any gas at STP)**
- 10) What is the mole ratio of C_4H_{10} to CO_2 in the reaction $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$? **1:4**
coefficients represent moles!

Percent Composition; Empirical and Molecular Formulas

- 11) Find percent composition of each element (*round to one decimal place*)

$Al(NO_3)_3$ %Al = **12.67%** % N = **19.73%** % O = **67.6%**

- 12) A compound is composed of 39% phosphorus and 61% oxygen and the molar mass is 79 g/mol. What is the molecular formula for this compound?
a) PO_4 b) P_2O_4 **c) PO_3** d) P_2O_6
- 13) What is the molecular formula of a compound with a molar mass of 92.011 g/mol and an empirical formula of NO_2 ?
a) NO_5 **b) N_2O_4** c) N_3O_3 d) N_3O_6
- 14) The empirical formula for a substance is CH_2 . If the molecular mass of the substance is 56, the molecular formula is -
a) C_2H_4 b) C_3H_6 **c) C_4H_8** d) C_5H_{10}

Percent Yield

- 15) A student reacts baking soda with vinegar to produce 57.0 g of carbon dioxide gas. If the theoretical yield of carbon dioxide is 71.5g, what is the percent yield?

$$\text{Percent yield} = \frac{\text{actual yield}}{\text{theoretical yield}} \times 100 \text{ percent} \quad \mathbf{79.72\%}$$

(PreIB only:)

- 16) Excess oxygen gas (O_2) reacts with 244 g of iron (Fe) to produce 332 g of Fe_2O_3 . What is the percent yield?

actual from experiment = 332 g

theoretical from stoichiometry = 348.70 g

percent yield = **95.21%**