

Chapter 11 Review - "The Mole"

1) Use a factor-label (*dimensional analysis*) expression to solve the following problems.

- a. If you need to measure out 0.20 moles of sodium chloride, how many grams should you weigh out?

- b. How many molecules of water are there in 75.0 g of water?

- c. How many grams of carbon dioxide contain 4.50×10^{23} molecules of CO_2 ?

- d. How many atoms of oxygen are in 4.33 moles of sulfur trioxide?

2) Calculate the % composition of each element in the following compounds.

Aluminum Carbonate = _____ %Al _____ %C _____ %O

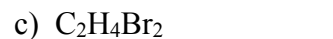
Barium Cyanide = _____ %Ba _____ %C _____ %N

3) Calculate the empirical formulas of the following compounds given their percent compositions.

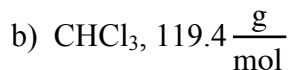
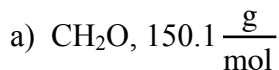
a) 47.35% C, 10.60% H, 42.05% O

b) What acid contains 3.69% H, 37.77% P, and 58.54% O?

4) Given the following molecular formulas, give the empirical formula.



5) Given the following empirical formulas and molecular formula masses, calculate the molecular formulas. (*SHOW WORK IN SPACE BELOW*)



molecular formula = _____

molecular formula = _____

6) If a compound has molar mass of 164.3 g/mol and is composed of 87.73% C and 12.27% H, what is the molecular formula of the compound?

7) Given the following lab data, determine the empirical formula of the compound. A 2.50 g sample of hydrate containing copper, chlorine, and water was measured out. It was heated until it came to a constant mass of 1.50 g. The remaining solid was allowed to react with a metal to produce 0.71 g of copper. The remainder of compound was assumed to be chlorine.

a) What was the mass of water in compound?

e) What was the mass of chlorine in the compound?

b) What was the number of moles of water in the compound?

f) What was the number of moles of chlorine in the compound?

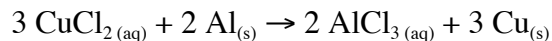
c) What was the mass of copper in the compound?

g) If the formula of the compound was $Cu_xCl_y \cdot zH_2O$. What are x, y, and z?

d) What was the number of moles of copper in the compound?

Chapter 12 Review - "Stoichiometry"

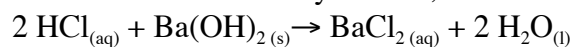
- 1) Given the equation for the reaction of copper (II) chloride and aluminum



a. How many **moles** of CuCl_2 will react with 0.54 **moles** of aluminum?

b. How many **moles** of copper would precipitate when 1.2 **moles** of aluminum reacted?

- 2) For the reaction of hydrochloric acid and barium hydroxide,



a. How many **moles** of hydrochloric acid will react with 0.750 **grams** of barium hydroxide?

b. How many **grams** of barium hydroxide should be used to produce 3.40 **moles** of water?

- 3) For the reaction of lead (II) nitrate and potassium iodide to produce lead (II) iodide and potassium nitrate, write a balanced equation:

a. How many **grams** of potassium nitrate are needed to cause 0.450 **grams** of lead (II) nitrate to completely react?

b. What is the **theoretical yield** of lead (II) iodide from the reaction in part a?

c. If 0.495 grams of lead (II) iodide are actually recovered, what is the **percent yield**?

- 4) What is the definition of the limiting reactant?

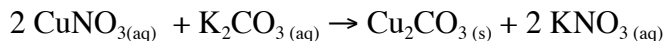
5) If you are making hamburgers and you have the following ingredients:

16 buns, 24 hamburger patties, 36 pickle slices, 16 slices of cheese, and 30 strips of bacon...

- a) How many bacon cheeseburgers can you make if each one requires 1 bun, 1 hamburger, 3 pickles, 1 slice of cheese and 3 strips of bacon?

- b) How many pickles will you have left over?

6) For the reaction:



Identify AND circle the **limiting reactant** for the following mixtures:

- a) 5.0 moles CuNO_3 , 5.0 moles K_2CO_3
- b) 15.00 moles CuNO_3 , 5.00 moles K_2CO_3
- c) 10.00 moles CuNO_3 , 5.00 moles K_2CO_3
- d) 4.00 g CuNO_3 , 2.00 g K_2CO_3
- e) 2.50 g of CuNO_3 , 1.60 g of K_2CO_3



- a. If 3.00 grams of magnesium nitrate react with 4.00 grams of sodium hydroxide, which reactant is limiting?

b. What mass of magnesium hydroxide **should** precipitate as a result?

- c. If this reaction only works in 65% yield, what mass of magnesium hydroxide is actually collected?

8) When 2.50 moles of zinc react with 3.50 moles of iron (III) hydroxide to produce an actual yield of 47.5 grams of iron, what is the percent yield of the reaction?