Chapter 10: The Mole

Changing grams to moles

How many moles in 28 grams of CO2 ? (0.64 moles CO_2)

Changing moles to grams

What is the mass of 5 moles of Fe2O3 ? (800g)

Changing moles to liters

Determine the volume, in liters, occupied by 0.030 moles of a gas at STP. (.67L)

Percent Composition

Find the percent composition of copper (Cu) in $CuBr_2$. (28.4)

Finding Empirical Formula

What's the empirical formula of a molecule containing 65.5% carbon, 5.5% hydrogen, and 29.0% oxygen? (C_3H_3O mass = 55 g/mole)
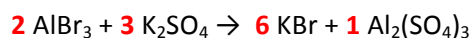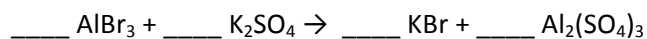
# Chapter 11: Chemical Reactions

Writing a chemical reaction

If a copper coil is placed into a solution of silver nitrate, silver crystals form on the surface of the copper. Additionally, highly soluble copper (I) nitrate is generated.   )

$Cu_{(s)} + AgNO_{3(aq)}$ → $Ag_{(s)} + CuNO_{3(aq)}$

Balancing a chemical reaction

_____ $AlBr_3$ + _____ K_2SO_4 → _____ KBr + _____ $Al_2(SO_4)_3$

2 $AlBr_3$ + **3** K_2SO_4 → **6** KBr + **1** $Al_2(SO_4)_3$

Identifying the Type of the Reaction- Single Rep, Double Rep, Combustion or Decomposition.

2 NaBr + 1 Ca(OH)$_2$ → 1 CaBr$_2$ + 2 NaOH
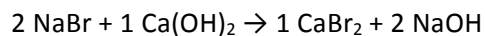
(double displacement)

Chapter 12 Stoichiometry

Moles to Mass

Given the reaction of $LiOH + HBr \rightarrow LiBr + H_2O$, if you are given 3 moles of LiOH, how many grams of H_2O are produced? (54 g)

Mass to Mass

Given the reaction $LiOH + HBr \rightarrow LiBr + H_2O$. If you start with 10.0 grams of lithium hydroxide, how many grams of lithium bromide will be produced? (**36.3 grams)**

Moles to Volume

Given the reaction of $2 SO_2(g) + O_2(g) \rightarrow 2 SO_3(g)$, if you are given 7 moles of of O_2, how many Liters of SO_3 are produced?

Mass to Volume

Given the reaction of $2 SO_2(g) + O_2(g) \rightarrow 2 SO_3(g)$, if you are given .234 g of SO_2, how many Liters of SO_3 are produced?

Limited Reactant

Given the reaction of $Pb(NO_3)_{2\ (aq)} + 2\ NaI_{\ (aq)} --> PbI_{2\ (s)} + 2\ NaNO_{3\ (aq)}$

 If I start with 25.0 grams of lead (II) nitrate and 15.0 grams of sodium iodide, how many grams of sodium nitrate can be formed?

To solve, do two calculations. In the first, determine the quantity of sodium nitrate that can be formed with 25 grams of lead (II) nitrate, assuming that there's plenty of sodium iodide present to react with it – their calculation should indicate that 12.8 grams of sodium nitrate can be formed.

Likewise, they should do a calculation in which they determine the quantity of sodium nitrate that can be formed with 15 grams of sodium iodide. Their calculation should find that 8.51 grams of sodium nitrate can be formed.

Since the smallest of the two answers is 8.51 grams, this is the quantity of sodium nitrate that will actually be formed in this reaction.

Theoretical Yield/Percent Yield

1)   LiOH + KCl --> LiCl + KOH

        a) I began this reaction with 20 grams of lithium hydroxide. What is my theoretical yield of lithium chloride? (**35.5 grams)**

        b) I actually produced 6 grams of lithium chloride. What is my percent yield? (**16.9%)**

Chapter 13 States of Matter

Properties of Solids, liquids and Gases

Definition of boiling point

Amorphic Solids

Changes of state (melting, freezing, boiling condensing, sublimation, deposition)

What happens with temperature during phase change?

Reading phase diagrams see quiz at:
http://www.sciencegeek.net/APchemistry/APtaters/PhaseDiagrams.htm

Chapter 14- Gases

Properties of Gases

The Gas Laws- Boyle's Law, Charles' Law Gay-Lussac's Law The Ideal Gas Law

Ex.. Use Boyle's law to solve for the missing value in each of the following

a. P_1 = 600mm Hg $\qquad$ V_1 = 200mL $\qquad$ P_2 = 780mmHg $\qquad$ V_2=?

(0.83 atm)

Ex.. A sample of air has a volume of 550.0mL at 106°C. At what temperature will its volume

be 700.0mL at constant pressure?

($\qquad$ T = 482 K or 209°C)

3. A sample of gas at 104°C and 0.870 atm occupies a volume of 3.0L. What volume

would this gas occupy at 60°C and 1.7 atm?

(V_2 = 1.36L)

Ex. What is the volume of 1 mole of any gas at STP? ___(22.4 L)_____

What is STP?

(STP stands for standard temperature and pressure. This is the value for the

average atmospheric pressure at sea level (1 atm or 760mm of Hg or 101.3 kPa)

and the temperature 0°C (273 K) It is under these conditions that 1 mole of a gas

will fill 22.4 liters.)

6. a. How many moles are contained in 2.5L of CO_2 at STP?

(2.5 L X $\underline{1\ mole}$ = 0.112 mol)

$\qquad$ **22.4 L**

Ex. a. What is the volume in liters of 2.00 mol of F_2 at 100 K and 150 atm?

R= 0.0821 L atm / mol   K.

(PV=nRT   V = 10.95L

Dalton's Law of Partial Pressure

Ex. A mixture of three gases A, B and C is at a total pressure of 8.15 atm. The partial

pressure of gas A is 2.70 atm; that of gas B is 2.09atm. What is the partial pressure of

gas C?

$$(C = 3.36 \text{ atm})$$

Chapter 16- Solutions

Factors affecting the rate of dissolving

Saturated, unsaturated, Supersaturated

Solubility Chart see worksheet with answers at:
http://iss.schoolwires.com/cms/lib4/NC01000579/Centricity/Domain/3130/Solubility%20Worksheet.doc

Concentration – molarity

Calculate the molarity when 75.0 grams of $MgCl_2$ is dissolved in 500.0 mL of solution.

$$\frac{75.0 \text{ g}}{95.2 \text{ g/mol}} = 0.788 \text{ mol}$$

$$\frac{0.788 \text{ mol}}{0.500 \text{ L}} = 1.58 \text{ M}$$

Dilution formula

How many mL of a 1.6 M solution of LiCl must be used to make 1.0 L of .28M LiCl?   (M1V1= M2V2
answer= 175ml)

Mass/mass %

If you have 90 grams of water, and you add 10 grams of salt (sodium chloride), what is the mass/mass % concentration of salt?

(90 grams + 10 grams = 100 grams (mass of total solution).

(10 grams) / (100 grams) = 0.1 --> 10% mass mass percent concentration.)

Volume/volume %

What is the % v/v of a solution made when water is added to 175 mL isopropyl alcohol to form 250 mL of solution ?   (70%)

Chapter 19- Acids and Bases

Acid Base Theories   Arrhenius, Bronsted Lowry, Lewis

Hydrogen Ions and Acidity What is the [OH-] of a solution whose $[H^+]$ is 2.75 x 10^{-4} M? (3.636 x 10^{-11})

Conjugate acid base pairs Identify the conjugate acid base pairs

$$HNO_2(aq) + HS^-(aq) \rightleftarrows NO_2^-(aq) + H_2S(aq)$$

$$(HNO_2(aq) + HS^-(aq) \rightleftarrows NO_2^-(aq) + H_2S(aq))$$
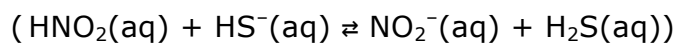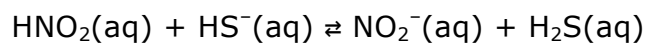
acid   base   conj. base   conjugate acid

 Acids and Bases

Neutralization Reactions