

MIXED MOLE PROBLEMS

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Name

Key

Solve the following problems.

1. How many grams are there in 1.5×10^{25} molecules of CO_2 ?

$$\underline{1.1 \times 10^3 \text{ g CO}_2}$$

2. What volume would the CO_2 in Problem 1 occupy at STP?

$$\underline{5.6 \times 10^2 \text{ L CO}_2}$$

3. A sample of NH_3 gas occupies 75.0 liters at STP. How many molecules is this?

$$\underline{2.02 \times 10^{24} \text{ molecules NH}_3}$$

4. What is the mass of the sample of NH_3 in Problem 3?

$$\underline{56.9 \text{ g NH}_3}$$

5. How many atoms are there in 1.3×10^{22} molecules of NO_2 ?

$$\underline{3.9 \times 10^{22} \text{ atoms}}$$

6. A 5.0 g sample of O_2 is in a container at STP. What volume is the container?

$$\underline{3.5 \text{ L O}_2}$$

7. How many molecules of O_2 are in the container in Problem 6? How many atoms of oxygen?

$$\underline{1.9 \times 10^{23} \text{ atoms}}$$
$$\underline{9.4 \times 10^{22} \text{ molecules}}$$

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PERCENTAGE COMPOSITION

Name _____

Determine the percentage composition of each of the compounds below.

1. KMnO_4

$\text{K} = \underline{24.7\%}$

$\text{Mn} = \underline{34.8\%}$

$\text{O} = \underline{40.5\%}$

2. HCl

$\text{H} = \underline{28.6\%}$

$\text{Cl} = \underline{71.2\%}$

3. $\text{Mg}(\text{NO}_3)_2$

$\text{Mg} = \underline{16.2\%}$

$\text{N} = \underline{18.9\%}$

$\text{O} = \underline{64.9\%}$

4. $(\text{NH}_4)_3\text{PO}_4$

$\text{N} = \underline{28.2\%}$

$\text{H} = \underline{8.1\%}$

$\text{P} = \underline{20.8\%}$

$\text{O} = \underline{42.9\%}$

5. $\text{Al}_2(\text{SO}_4)_3$

$\text{Al} = \underline{15.8\%}$

$\text{S} = \underline{28.1\%}$

$\text{O} = \underline{56.1\%}$

Solve the following problems.

6. How many grams of oxygen can be produced from the decomposition of 100. g of KClO_3 ? 39.3 g

7. How much iron can be recovered from 25.0 g of Fe_2O_3 ? 17.5 g

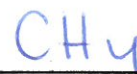
8. How much silver can be produced from 125 g of Ag_2S ? 109 g Ag

DETERMINING EMPIRICAL FORMULAS

Name _____

What is the empirical formula (lowest whole number ratio) of the compounds below?

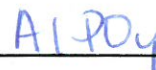
1. 75% carbon, 25% hydrogen



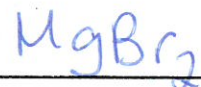
2. 52.7% potassium, 47.3% chlorine



3. 22.1% aluminum, 25.4% phosphorus, 52.5% oxygen



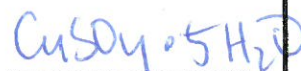
4. 13% magnesium, 87% bromine



5. 32.4% sodium, 22.5% sulfur, 45.1% oxygen



6. 25.3% copper, 12.9% sulfur, 25.7% oxygen, 36.1% water



DETERMINING MOLECULAR FORMULAS (TRUE FORMULAS)

Name _____

Solve the problems below.

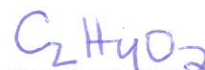
1. The empirical formula of a compound is NO_2 . Its molecular mass is 92 g/mol. What is its molecular formula?



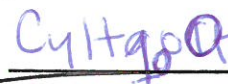
2. The empirical formula of a compound is CH_2 . Its molecular mass is 70 g/mol. What is its molecular formula?



3. A compound is found to be 40.0% carbon, 6.7% hydrogen and 53.5% oxygen. Its molecular mass is 60. g/mol. What is its molecular formula?



4. A compound is 64.9% carbon, 13.5% hydrogen and 21.6% oxygen. Its molecular mass is 74 g/mol. What is its molecular formula?



5. A compound is 54.5% carbon, 9.1% hydrogen and 36.4% oxygen. Its molecular mass is 88 g/mol. What is its molecular formula?



WORD EQUATIONS

Name _____

Write the word equations below as chemical equations and balance.

1. zinc + lead (II) nitrate yield zinc nitrate + lead



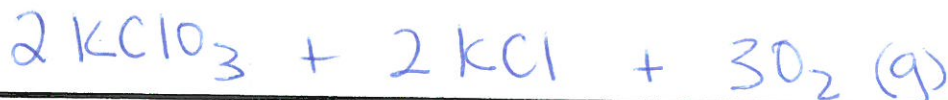
2. aluminum bromide + chlorine yield aluminum chloride + bromine



3. sodium phosphate + calcium chloride yield calcium phosphate + sodium chloride



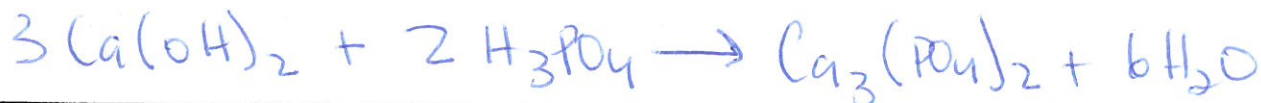
4. potassium chlorate when heated yields potassium chloride + oxygen gas



5. aluminum + hydrochloric acid yield aluminum chloride + hydrogen gas



6. calcium hydroxide + phosphoric acid yield calcium phosphate + water



7. copper + sulfuric acid yield copper (II) sulfate + water + sulfur dioxide



8. hydrogen + nitrogen monoxide yield water + nitrogen



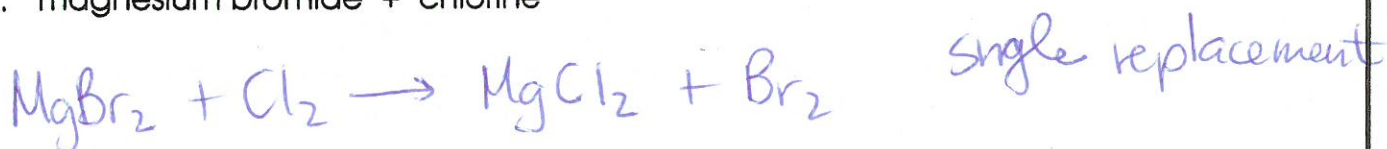
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PREDICTING PRODUCTS OF CHEMICAL REACTIONS

Name _____

Predict the products of the reactions below. Then, write the balanced equation and classify the reaction.

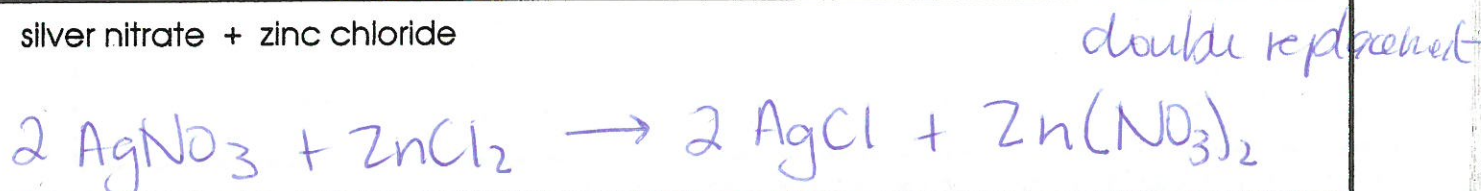
1. magnesium bromide + chlorine



2. aluminum + iron (III) oxide



3. silver nitrate + zinc chloride



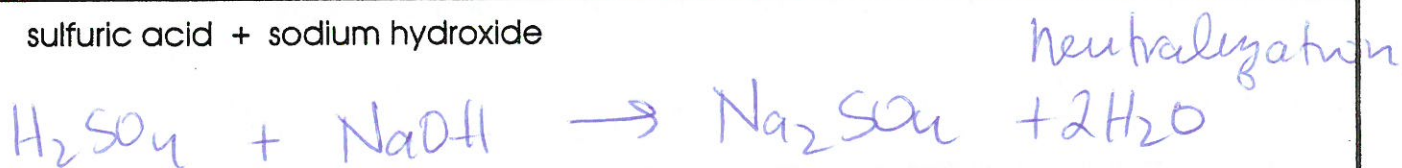
4. hydrogen peroxide (catalyzed by manganese dioxide)



5. zinc + hydrochloric acid



6. sulfuric acid + sodium hydroxide



7. sodium + hydrogen



8. acetic acid + copper

