Chem 1 Hour\_\_\_\_\_ Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
Dr. Wexler  
Calculating the Mass Percent of an Element in a Compound (HS-PS1-7)  
Date assigned\_\_\_\_\_

**Tutorial:**

**I. Mass percent is a type of proportion.**

For example, what is the proportion of H2O in magnesium sulfate heptahydrate (MgSO4•H2O). In this case we are talking about the amount of water mixed into the magnesium sulfate crystals.

We can also talk about the proportion of an individual element in a compound. For example, what is the mass percent of Mg in MgSO4? (see below – part V.)

**II. What is a percentage?**

Percentage literally means “per 100”, or parts out of 100 parts total. So, 50% is just a way of saying 50/100.

If you score 75 correct out of 100 on a quiz, then your score is 75%, which is just a way of saying 75/100 (75 out of 100).

**III. Converting from a number to a percentage.**

Multiply a number by 100 and put a % sign after it.

Thus 0.5 is the same as (0.5 x 100)% or 50%.

**IV. Converting from a percentage.**

Divide a percentage by 100 and remove the % sign. Thus, 5% becomes 5/100 = 0.05

**V. Calculating mass percent of an element in a compound**

Example: What is the mass percent of Mg in MgSO4?

A. To calculate this, first calculate the molar mass of the compound:

In MgSO4, there is one Mg, one S, and four O

Thus, Mg) 1 x 24.305  
S) 1 x 32.065  
 O) 4 x 15.9994

Summing the products, 24.305 + 32.065 + 63.9976 = 120.3676 g/mol

B. The mass percent of Mg in MgSO4 is the atomic mass of magnesium divided by the molar mass of MgSO4 = (24.305/ 120.3676) x 100 = 20.19%

**VI. Calculating the mass of an element for a given mass of a compound**

If you are given the mass of a compound, multiply this by the mass percent of the element of interest.

For example, the mass of Mg in 50g of MgSO4 is 50 x 20.19% = 50 x 0.2019 = 10.095g

**Answer the following questions on aluminum chloride:**

1. What is the formula for aluminum chloride?

2. What is the molar mass (atomic weight) of aluminum?

3. What is the molar mass (atomic weight) of chlorine?

4. What is the molar mass of aluminum chloride? (show your calculations)

5. What is the mass percent of aluminum in aluminum chloride? (show your calculations)

6. What is the mass percent of chlorine in aluminum chloride? (show your calculations)

7. How many grams of aluminum is contained in 200g of aluminum chloride? (show your calculations)

8. How many grams of chlorine is contained in 200g of aluminum chloride? (show your calculations)

9. For the single replacement reaction:   
 sodium + aluminum chloride 🡪 aluminum + sodium chloride

A. Write the balanced chemical equation:

B. If 1000g of aluminum chloride reacts with excess sodium, how many grams of aluminum will be recovered?