

Percent Composition WS

Name: _____

Period _____

Percent Composition: The percentage by mass of each element in a compound.

Example Calculate the mass of each element in potassium carbonate, K_2CO_3 .

First calculate the molar mass for K_2CO_3 . Find the atomic mass of each element from the periodic table. Multiply it by the number of times it appears in the formula and add up the total.

2 Potassium atoms	K	2 x 39.10g	=	78.20g K
1 carbon atom	C	1 x 12.01g	=	12.01g C
3 Oxygen atoms	O	3 x 16.00g	=	48.00g O
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				138.21g K_2CO_3

To find the percent of each element divide the part of the mass that pertains to that element with the total mass

Percent of Potassium	K =	$\frac{78.20g\ K}{138.21g\ K_2CO_3}$	X 100 =	56.58 % K
Percent of Carbon	C =	$\frac{12.01g\ C}{138.21g\ K_2CO_3}$	X 100 =	8.69 % C
Percent of Oxygen	O =	$\frac{48.00g\ O}{138.21g\ K_2CO_3}$	X 100 =	34.73 % O

Percent Composition Calculations

Using the example above, calculate the percentage composition of each element in the formulas shown below. Show your work and circle your answers.

1. Magnesium carbonate $MgCO_3$

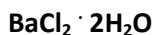
2. Sulfuric Acid H_2SO_4

3. Sodium Nitrate $NaNO_3$

4. Ammonium Sulfate $(NH_4)_2SO_4$

Hydrated Crystals:

Crystalline compounds that retain water during evaporation are referred to as being **hydrated** or are said to contain water of hydration. The ratio of moles of water to moles of compound is a small whole number. The formula for the hydrated compound barium chloride is:



The dot shows that for every one formula unit of BaCl_2 there are two molecules of water. The amount of water in a hydrate can be determined experimentally by heating the compound and driving the water off. The compound with the water removed is known as **anhydrous**.

5. Typical calculations are % water, % salt, and % of each ion. Find each of these for the above hydrated salt.

% H_2O =

%Salt =

% Ba^{+2} ions =

% Cl^{-1} ions =

Use percent as a conversion factor

Finally, %'s of each component of a compound can be used to calculate the mass of one piece within a certain sample of a compound. For example CaF_2 is approximately 50% Calcium ions. If you had 2 grams of calcium fluoride, about 1 gram would be calcium and about 1 gram would be fluoride ions since they each make up about $\frac{1}{2}$ of the compound by mass. To show work we would multiply by the % of each ion by the total mass.

6. Exactly how many grams of fluorine are in 0.45 g of Calcium fluoride? Use % composition as a conversion factor.

7. How many grams of hydrogen are in 1.27 g of iron (III) hydroxide?