Percent Composition

What is percent composition? the percent by mass of the elements (atoms or ions) in a compound (molecules or form. units)

Percent composition is also referred to as mass %

or % by mass

How do you calculate percent composition?

$$\frac{\text{g part}}{\text{g whole}} \times 100$$

Example 1: Find the percent composition of aluminum sulfate.

1. Write the correct chemical formula for the compound.

Al^{3+} SO_4^{2-} → $Al_2(SO_4)_3$

2. Calculate molar mass of the compound.

2 Al × 26.98 = 53.96
3 S × 32.07 = 96.21
12 O × 16.00 = 192.00
342.17 g

3. Percent of Al = $\frac{53.96\text{ g Al}}{342.17\text{ g } Al_2(SO_4)_3} \times 100 = 15.77\%\text{ Al}$

Percent of S = $\frac{96.21\text{ g S}}{342.17\text{ g } Al_2(SO_4)_3} \times 100 = 28.12\%\text{ S}$

Percent of O = $\frac{192.00\text{ g O}}{342.17\text{ g } Al_2(SO_4)_3} \times 100 = 56.112\%\text{ O}$

4. Check that the sum of the percentages is 100%

Example 2: For the above compound, calculate the mass of Al in a 35.00 gram sample of aluminum sulfate.

35.00 g × .1577 = 5.520 g Al

Percent Composition

1.) H_2SO_4 Molar Mass?

$2H \times 1.01 = 2.02$
$1S \times 32.06 = 32.06$
$4O \times 16.00 = 64.00$

$98.08\,g \rightarrow MM$

$\%H \quad \frac{2.02}{98.08} \times 100 = 2.06\%H$

$\%S \quad \frac{32.06}{98.08} \times 100 = 32.69\%S$

$\%O \quad \frac{64.00}{98.08} \times 100 = 65.25\%O$

100%

acetate

2.) $LiC_2H_3O_2$ Molar Mass

1 Li x 6.94 = 6.94
2C x 12.01 = 24.02
3H x 1.01 = 3.03
2O x 16.00 = 32.00

65.99 g / 1 mole MM

%Li $\frac{6.94}{65.99} \times 100 = 10.52$ %Li

%C $\frac{24.02}{65.99} \times 100 = 36.40$ %C

%H $\frac{3.03}{65.99} \times 100 = 4.59$ %H

%O $\frac{32.00}{65.99} \times 100 = 48.49$ %O

100 %

#3 $\overset{+2}{Zn}\ \overset{-1}{NO_3}$ $Zn(NO_3)_2$

#4

Percent Composition

#3 Zinc nitrate $Zn(NO_3)_2$

$1\ Zn \times 65.39 = 65.39\ g$

$2\ N \times 14.01 = 28.02\ g$

$6\ O \times 16.00 = 96.00\ g$

$189.41\ g$

$\%\ Zn = \frac{65.39}{189.41} \times 100 = 34.52\%\ Zn$

$\%\ N = \frac{28.02}{189.41} \times 100 = 14.79\%\ N$

$\%\ O = \frac{96.00}{189.41} \times 100 = 50.68\%\ O$

99.99

Percent Composition

#4 CO_2

$1C \times 12.01 = 12.01$

$2O \times 16.00 = 32.00$

MM → 44.01 g/mole

$\%C = \frac{12.01}{44.01} \times 100 = 27.29\ \%C$

$\%O = \frac{32.00}{44.01} \times 100 = 72.71\ \%O$

100.00

#5. $\frac{g\ H_2O}{g\ BaCl_2 \cdot 2H_2O} \times 100 = \%\ H_2O$

$1Ba \times 137.33 = 137.33$
$2Cl \times 35.45 = 70.90$
$4H \times 1.01 = 4.04$
$2O \times 16.00 = 32.00$ } 36.00 g H_2O
244.27 g

$\frac{36.00g}{244.27g} \times 100 =$ 14.75% H_2O

#6. $Mg(OH)_2$

$1Mg \times 24.31 = 24.31$
$2O \times 16.00 = 32.00$
$2H \times 1.01 = 2.02$
58.33 g/mol

$\frac{32.00g\ O}{58.33g\ Mg(OH)_2} \times 100 = 54.86\ \%O$

$175g \times .5486 =$ 96.0 g Oxygen