

Percent Composition

Name Key - Mr. Sulmeyer Period _____

Determine the percent composition of each element in each of the compounds below.

1. KMnO_4	Name of the compound = <u>Potassium Permanganate</u>	GFM of the compound: <u>158 g/mol</u>
% K = <u>24.6 %</u>	$\% \text{K} = \frac{39}{158} \times 100 = 24.6 \%$	<u>GFM</u> $K = 1 \times 39 = 39$ $Mn = 1 \times 55 = 55$ $O = 4 \times 16 = \frac{64}{158}$
% Mn = <u>34.8 %</u>	$\% \text{Mn} = \frac{55}{158} \times 100 = 34.8 \%$	
% O = <u>40.5 %</u>	$\% \text{O} = \frac{64}{158} \times 100 = 40.5 \%$	
2. HCl	Name of the compound = <u>Hydrochloric Acid</u>	GFM of the compound: <u>36 g/mol</u>
% H = <u>2.7 %</u>	$\% \text{H} = \frac{1}{36} \times 100 = 2.7 \%$	<u>GFM</u> $H = 1 \times 1 = 1$ $Cl = 1 \times 35 = \frac{35}{36}$
% Cl = <u>97.2 %</u>	$\% \text{Cl} = \frac{35}{36} \times 100 = 97.2 \%$	
3. $\text{Mg}(\text{NO}_3)_2$	Name of the compound = <u>Magnesium Nitrate</u>	GFM of the compound: <u>148 g/mol</u>
% Mg = <u>16.2 %</u>	$\% \text{Mg} = \frac{24}{148} \times 100 = 16.2 \%$	<u>GFM</u> $Mg = 1 \times 24 = 24$ $N = 2 \times 14 = 28$ $O = 6 \times 16 = \frac{96}{148}$
% N = <u>18.9 %</u>	$\% \text{N} = \frac{28}{148} \times 100 = 18.9 \%$	
% O = <u>64.8 %</u>	$\% \text{O} = \frac{96}{148} = 64.8 \%$	
4. $(\text{NH}_4)_3\text{PO}_4$	Name of the compound = <u>Ammonium Phosphate</u>	GFM of the compound: <u>149 g/mol</u>
% N = <u>28.1 %</u>	$\% \text{N} = \frac{42}{149} \times 100 = 28.1 \%$	<u>GFM</u> $N = 3 \times 14 = 42$ $H = 12 \times 1 = 12$ $P = 1 \times 31 = 31$ $O = 4 \times 16 = \frac{64}{149}$
% H = <u>8.0 %</u>	$\% \text{H} = \frac{12}{149} \times 100 = 8.0 \%$	
% P = <u>20.8 %</u>	$\% \text{P} = \frac{31}{149} \times 100 = 20.8 \%$	
% O = <u>42.9 %</u>	$\% \text{O} = \frac{64}{149} \times 100 = 42.9 \%$	
5. $\text{Al}_2(\text{SO}_4)_3$	Name of the compound = <u>Aluminum Sulfate</u>	GFM of the compound: <u>342 g/mol</u>
% Al = <u>15.7 %</u>	$\% \text{Al} = \frac{54}{342} \times 100 = 15.7 \%$	<u>GFM</u> $Al = 2 \times 27 = 54$ $S = 3 \times 32 = 96$ $O = 12 \times 16 = \frac{192}{342}$
% S = <u>28.1 %</u>	$\% \text{S} = \frac{96}{342} \times 100 = 28.1 \%$	
% O = <u>56.1 %</u>	$\% \text{O} = \frac{192}{342} = 56.1 \%$	

Solve the following problems using your knowledge of gram formula mass and percent composition. (Show all work)

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

What is the % of O in KClO_3 ?

$$\% \text{ O} = \frac{48}{122} \times 100 = 39.3\%$$

$$100 \text{ g} \times 0.393 = \boxed{39.3 \text{ g Oxygen}}$$

GFM KClO_3
 $\text{K} = 1 \times 39 = 39$
 $\text{Cl} = 1 \times 35 = 35$
 $\text{O} = 3 \times 16 = \underline{\underline{48}}$
 122 g/mol

7. How much iron can be recovered from 25.0 g of iron (III) oxide (Fe_2O_3)?

What is the % Fe in Fe_2O_3 ?

$$\% \text{ Fe} = \frac{112}{160} \times 100 = 70\%$$

$$25.0 \text{ g} \times 0.70 = \boxed{17.5 \text{ g Fe}}$$

GFM Fe_2O_3
 $\text{Fe} = 2 \times 56 = 112$
 $\text{O} = 3 \times 16 = \underline{\underline{48}}$
 160 g/mol

8. How much silver can be produced from 125 grams of Silver (I) sulfide (Ag_2S)?

What is the % silver?

$$\% \text{ Ag} = \frac{216}{248} \times 100 = 87\%$$

$$0.87 \times 125 \text{ g} = \boxed{108.75 \text{ g Ag}}$$

GFM
 $\text{Ag} = 2 \times 108 = 216$
 $\text{S} = 1 \times 32 = \underline{\underline{32}}$
 248