Percentage Composition (Practice Problems)

1. KNO_2 Assume 1 mole.

$1 \times K = 1 \times 39.1\ g/mol = 39.1\ g\ K \Rightarrow \frac{39.1\ g\ K}{85.1\ g\ KNO_2} = \boxed{45.9\%\ K}$

$1 \times N = 1 \times 14.0\ g/mol = 14.0\ g\ N \Rightarrow \frac{14.0\ g\ K}{85.1\ g\ KNO_2} = \boxed{16.5\%\ N}$

$2 \times O = 2 \times 16.0\ g/mol = 32.0\ g\ O \Rightarrow \frac{32.0\ g\ O}{85.1\ g\ KNO_2} = \boxed{37.6\%\ O}$

$85.1\ g\ KNO_2$

2. NH_4Cl. Assume 1 mole.

$1 \times N = 1 \times 14.0\ g/mol = 14.0\ g\ N \Rightarrow \frac{14.0\ g\ N}{53.5\ g\ NH_4Cl} = \boxed{26.2\%\ N}$

$4 \times H = 4 \times 1.0\ g/mol = 4.0\ g\ H \Rightarrow \frac{4.0\ g\ H}{53.5\ g\ NH_4Cl} = \boxed{7.5\%\ H}$

$1 \times Cl = 1 \times 35.5\ g/mol = 35.5\ g\ Cl \Rightarrow \frac{35.5\ g\ Cl}{53.5\ NH_4Cl} = \boxed{66.4\%\ Cl}$

$53.5\ g\ NH_4Cl$

3. $SrCl_2$. Assume 1 mole:

$1 \times Sr = 1 \times 87.6\ g/mol = 87.6\ g\ Sr \Rightarrow \frac{87.6\ g\ Sr}{158.6\ g\ SrCl_2} = \boxed{55.2\%\ Sr}$

$2 \times Cl = 2 \times 35.5\ g/mol = 71.0\ g\ Cl \Rightarrow \frac{71.0\ g\ Cl}{158.6\ g\ SrCl_2} = \boxed{44.8\%\ Cl}$

$158.6\ g\ SrCl_2$

4. $KMnO_4$. Assume 1 mole:

$1 \times K = 1 \times 39.1\ g/mol = 39.1\ g\ K \Rightarrow \frac{39.1\ g\ K}{158.0\ g\ KMnO_4} = \boxed{24.7\%\ K}$

$1 \times Mn = 1 \times 54.9\ g/mol = 54.9\ g\ Mn \Rightarrow \frac{54.9\ g\ Mn}{158.0\ g\ KMnO_4} = \boxed{34.7\%\ Mn}$

$4 \times O = 4 \times 16.0\ g/mol = 64.0\ g\ O \Rightarrow \frac{64.0\ g\ O}{158.0\ g\ KMnO_4} = \boxed{40.5\%\ O}$

$158.0\ g\ KMnO_4$

5. Sulfuric Acid $\Rightarrow H_2SO_4$. Assume 1 mole.

$2 \times H = 2 \times 1.0\ g/mol = 2.0\ g\ H \Rightarrow \frac{2.0\ g\ H}{98.1\ g\ H_2SO_4} = \boxed{2.0\%\ H}$

$1 \times S = 1 \times 32.1\ g/mol = 32.1\ g\ S \Rightarrow \frac{32.1\ g\ S}{98.1\ g\ H_2SO_4} = \boxed{32.7\%\ S}$

$4 \times O = 4 \times 16.0\ g/mol = 64.0\ g\ O \Rightarrow \frac{64.0\ g\ O}{98.1\ g\ H_2SO_4} = \boxed{65.2\%\ O}$

$98.1\ g\ H_2SO_4$

6. Potassium phosphate ⇒ K_3PO_4. Assume 1 mole.

$3 \times K = 3 \times 39.1\ g/mol = 117.3\ g\ K \Rightarrow \frac{117.3\ g\ K}{212.3\ g\ K_3PO_4} = \boxed{55.3\%\ K}$

$1 \times P = 1 \times 31.0\ g/mol = 31.0\ g\ P \Rightarrow \frac{31.0\ g\ P}{212.3\ g\ K_3PO_4} = \boxed{14.6\%\ P}$

$4 \times O = 4 \times 16.0\ g/mol = 64.0\ g\ O \Rightarrow \frac{64.0\ g\ O}{212.3\ g\ K_3PO_4} = \boxed{30.1\%\ O}$

7. Ammonium bromide ⇒ NH_4Br. Assume 1 mole.

$1 \times N = 1 \times 14.0\ g/mol = 14.0\ g\ N \Rightarrow \frac{14.0\ g\ N}{97.9\ g\ NH_4Br} = \boxed{14.3\%\ N}$

$4 \times H = 4 \times 1.0\ g/mol = 4.0\ g\ H \Rightarrow \frac{4.0\ g\ H}{97.9\ g\ NH_4Br} = \boxed{4.1\%\ H}$

$1 \times Br = 1 \times 79.9\ g/mol = 79.9\ g\ Br \Rightarrow \frac{79.9\ g\ Br}{97.9\ g\ NH_4Br} = \boxed{81.6\%\ Br}$

8. Barium hydroxide ⇒ $Ba(OH)_2$. Assume 1 mole.

$1 \times Ba = 1 \times 137.3\ g/mol = 137.3\ g\ Ba \Rightarrow \frac{137.3\ g\ Ba}{171.3\ g\ Ba(OH)_2} = \boxed{80.15\%\ Ba}$

$2 \times O = 2 \times 16.0\ g/mol = 32.0\ g\ O \Rightarrow \frac{32.0\ g\ O}{171.3\ g\ Ba(OH)_2} = \boxed{18.7\%\ O}$

$2 \times H = 2 \times 1.0\ g/mol = 2.0\ g\ H \Rightarrow \frac{2.0\ g\ H}{171.3\ g\ Ba(OH)_2} = \boxed{1.2\%\ H}$

9. $\frac{43.40\ g\ Cu}{10.95\ g\ S}$ / $54.35\ g$ compound.

Cu: $\frac{43.40\ g\ Cu}{54.35\ g\ cmpd.} = \boxed{79.85\%\ Cu}$

S: $\frac{10.95\ g\ S}{54.35\ g\ cmpd} = \boxed{20.15\%\ S}$

10. $\frac{13.74\ g\ C}{1.15\ g\ H}$ / $14.89\ g$ cmpd.

C: $\frac{13.74\ g\ C}{14.89\ g\ cmpd.} = \boxed{92.28\%\ C}$

H: $\frac{1.15\ g\ H}{14.89\ g\ cmpd} = \boxed{7.72\%\ H}$

11. 21.8 g O
4.09 g Al
6.36 g N
32.25 g cmpd

O: $\frac{21.8\text{ g O}}{32.25\text{ g cmpd}}$ = 67.6% O

Al: $\frac{4.09\text{ g Al}}{32.25\text{ g cmpd}}$ = 12.7% Al

N: 100% − 67.6% O − 12.7% Al = 19.7% N

12. Mass of cmpd. = 40.85 g

C: $\frac{10.90\text{ g C}}{40.85\text{ g cmpd.}}$ = 26.68% C

H: $\frac{0.90\text{ g H}}{40.85\text{ g cmpd.}}$ = 2.2% H

O: $\frac{29.05\text{ g O}}{40.85\text{ g cmpd}}$ = ⟶ = 71.11% O

13. Mass of cmpd. = 13.669 g

H: $\frac{0.547\text{ g H}}{13.669\text{ g}}$ = 4.00% H

O: $\frac{8.707\text{ g O}}{13.669\text{ g cmpd}}$ = 63.70% O

C: 100% − 4.00% H − 63.70% O = 32.30% C

14. 46.28 g cmpd.

Ca: $\frac{13.61\text{ g Ca}}{46.28\text{ g cmpd}}$ = 29.41% Ca

O: $\frac{21.77\text{ g O}}{46.28\text{ g cmpd.}}$ = 47.04% O

* Other components of ore:

100% − 29.4% Ca − 47.0% O
= 23.55%