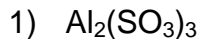


Find the percent composition of all of the elements in the following compounds (1 pt per line)



$$\begin{array}{l} \text{Al } 26.982 \times 2 = 53.964 \div 294.15 \\ \text{S } 32.065 \times 3 = 96.195 \div 294.15 \\ \text{O } 15.999 \times 9 = 143.991 \div 294.15 \\ \hline 294.15 \end{array}$$

$$\begin{array}{l} \text{Al: } 18.35\% \\ \text{S: } 32.70\% \\ \text{O: } 48.95\% \end{array}$$



$$\begin{array}{l} \text{Na } 22.99 \times 1 = 22.990 \div 102.894 \\ \text{Br } 79.904 \times 1 = 79.904 \div 102.894 \\ \hline 102.894 \end{array}$$

$$\begin{array}{l} \text{Na: } 22.34\% \\ \text{Br: } 77.66\% \end{array}$$



$$\begin{array}{l} \text{Fe } 55.845 \times 1 = 55.845 \div 115.853 \\ \text{C } 12.011 \times 1 = 12.011 \div 115.853 \\ \text{O } 15.999 \times 3 = 47.997 \div 115.853 \\ \hline 115.853 \end{array}$$

$$\begin{array}{l} \text{Fe: } 48.20\% \\ \text{C: } 10.37\% \\ \text{O: } 41.43\% \end{array}$$



$$\begin{array}{l} \text{C } 12.011 \times 1 = 12.011 \\ \text{O } 15.999 \times 2 = 31.998 \\ \hline 44.009 \end{array}$$

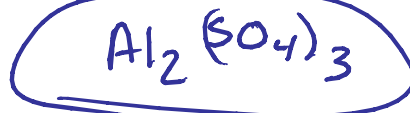
$$\begin{array}{l} \text{C: } 27.29\% \\ \text{O: } 72.71\% \end{array}$$

## Percent composition, Empirical and Molecular Formula Quiz

Solve the following problems: (10 points each)

- 5) What is the empirical formula of a compound that contains 0.1577 grams of aluminum, 0.2811 grams of sulfur, and 0.5612 grams of oxygen?

a. What is the empirical formula of the compound?



$$\frac{0.1577 \text{ g Al}}{26.982 \text{ g}} \times \frac{1 \text{ mol}}{1} = \frac{0.005845}{0.005845} = 1 \times 2 = 2$$

$$\frac{0.2811 \text{ g S}}{32.065 \text{ g}} \times \frac{1 \text{ mol}}{1} = \frac{0.008767}{0.005845} = 1.499 = 1.5 \times 2 = 3$$

$$\frac{0.5612 \text{ g O}}{15.999 \text{ g}} \times \frac{1 \text{ mol}}{1} = \frac{0.03508}{0.005845} = 6 \times 2 = 12$$

b. If the molar mass of the compound is approximately 342 grams/mole, what's the molecular formula?

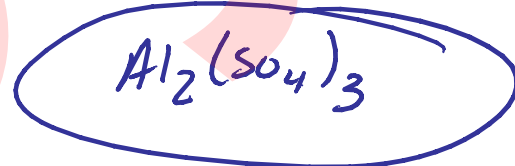


$$\text{Al } 26.982 \times 2 = 53.964$$

$$\text{S } 32.065 \times 3 = 96.195$$

$$\text{O } 15.999 \times 12 = 191.988 = 342.147$$

$$\frac{342}{342.147} = 0.9995 = 1$$

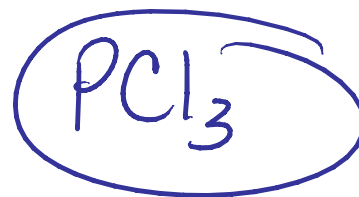


- 6) What is the empirical formula of a compound that contains 2.255 g phosphorus and 7.745 g chlorine?

a. What is the empirical formula of the compound?

$$\frac{2.255 \text{ g P}}{30.974 \text{ g}} \times \frac{1 \text{ mol}}{1} = \frac{0.07280}{0.07280} = 1$$

$$\frac{7.745 \text{ g Cl}}{35.453 \text{ g}} \times \frac{1 \text{ mol}}{1} = \frac{0.2185}{0.07280} = 3$$



b. If the molar mass of the compound is approximately 137 grams/mole, what's the molecular formula?



$$\text{P } 30.974 \times 1 = 30.974$$

$$\text{Cl } 35.453 \times 3 = 106.359 = 137.333$$

$$\frac{137}{137.333} = 0.9975 = 1$$

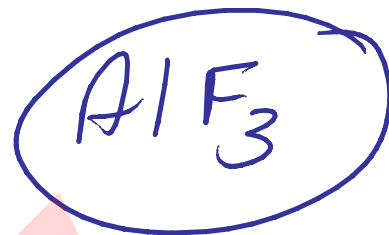


7) If a compound contains 32.13% aluminum, and 67.87% fluorine:

a. What is the empirical formula of the compound?

$$\frac{32.13 \text{ g Al} / 1 \text{ mol}}{26.982 \text{ g}} = \frac{1.191}{1.191} = 1$$

$$\frac{67.87 \text{ g F} / 1 \text{ mol}}{18.998 \text{ g}} = \frac{3.572}{1.191} = 2.9995 = 3$$



b. If the molar mass of the compound is approximately 84 grams/mole, what's the molecular formula?



$$\text{Al } 26.982 \times 1 = 26.982$$

$$\text{F } 18.998 \times 3 = 56.997$$

$$\hline 83.979$$

$$\frac{84}{83.979} = 1.0002$$



8) If a compound contains 46.91% sodium, 24.51 % carbon and 28.59% nitrogen:

a. What is the empirical formula of the compound?

$$\frac{46.91 \text{ g Na} / 1 \text{ mol}}{22.990 \text{ g}} = \frac{2.040}{2.040} = 1$$

$$\frac{24.51 \text{ g C} / 1 \text{ mol}}{12.011 \text{ g}} = \frac{2.041}{2.040} = 1.0004 = 1$$

$$\frac{28.59 \text{ g N} / 1 \text{ mol}}{14.007 \text{ g}} = \frac{2.041}{2.040} = 1.0004 = 1$$



b. If the molar mass of the compound is approximately 50 grams/mole, what's the molecular formula?



$$\text{Na } 22.990 \times 1 = 22.990$$

$$\text{C } 12.011 \times 1 = 12.011$$

$$\text{N } 14.007 \times 1 = 14.007$$

$$\hline 49.008$$

$$\frac{50}{49.008} = 1.02 = 1$$



9) If a compound contains 37.49% carbon, 12.58% hydrogen, and 49.93% oxygen:

a. What is the empirical formula of the compound?

$$\frac{37.49\text{g C}}{12.011\text{g}} \bigg| \frac{1\text{mol}}{3.121} = 1$$

$$\frac{12.58\text{g H}}{1.0079\text{g}} \bigg| \frac{1\text{mol}}{3.121} = 3.998 = 4$$

$$\frac{49.93\text{g O}}{15.999\text{g}} \bigg| \frac{1\text{mol}}{3.121} = 1$$



b. If the molar mass of the compound is approximately 192 grams/mole, what's the molecular formula?

C  $12.011 \times 1 = 12.011$

H  $1.0079 \times 4 = 4.0316$

O  $15.999 \times 1 = 15.999$   
32.04

$$\frac{192}{32.04} = 5.99 = 6$$



10) If a compound contains 92.26% carbon and 7.74% hydrogen:

a. What is the empirical formula of the compound?

$$\frac{92.26\text{g C}}{12.011\text{g}} \bigg| \frac{1\text{mol}}{7.681} = 1.0002$$

$$\frac{7.74\text{g H}}{1.0079\text{g}} \bigg| \frac{1\text{mol}}{7.679} = 1$$



b. If the molar mass of the compound is approximately 78 grams/mole, what's the molecular formula?

C  $12.011 \times 1 = 12.011$

H  $1.0079 \times 1 = 1.0079$   
13.0189

$$\frac{78}{13.0189} = 5.99$$

