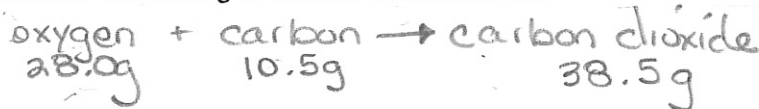


Show all work and give answers to the correct significant figures.

1. Carbon dioxide is formed when 28.0 g of oxygen reacts with 10.5 g of carbon. Use the laws of matter to determine the following:



a. The mass of carbon dioxide produced

$$\boxed{38.5\text{g}}$$

b. The mass percent of oxygen in carbon dioxide

$$\frac{28.0\text{g oxygen}}{38.5\text{g total CO}_2} \times 100\% = \boxed{72.7\%}$$

← Notice - these add up to 100%

c. The mass percent of carbon in carbon dioxide

$$\frac{10.5\text{g C}}{38.5\text{g CO}_2} = 0.272727 \times 100\% = \boxed{27.3\%}$$

d. The mass of carbon that would react with 41.0 g of oxygen

$$\frac{41.0\text{g oxygen} \mid 10.5\text{g carbon}}{28.0\text{g oxygen}} = \frac{15.375\text{g carbon}}{\boxed{15.4\text{g carbon}}}$$

e. The grams of oxygen remaining unreacted (leftover) if 15.0 g of oxygen is reacted with 3.00 g of carbon

$$\frac{3.00\text{g carbon} \mid 28.0\text{g oxygen}}{10.5\text{g carbon}} = \frac{15.0\text{g oxygen}}{8.00\text{g oxygen}} = \boxed{7.0\text{g oxygen remaining}}$$

2. Several compounds containing only sulfur (S) and fluorine (F) are known. Three of them have the following compositions:

- 2.376 g of F for every 2.000 g of S
- 3.563 g of F for every 1.500 g of S
- 9.513 g of F for every 2.670 g of S

Show how these data illustrate the law of multiple proportions.

	Ratio of F:S	All 3 Compounds Related:	
A) $\frac{2.376\text{g F}}{2.000\text{g S}}$	$= 1.188 \text{ F} : 1 \text{ S}$	$\div 1.188 = 1$	SF
B) $\frac{3.563\text{g F}}{1.500\text{g S}}$	$= 2.375 \text{ F} : 1 \text{ S}$	$\div 1.188 = 2$	SF ₂
C) $\frac{9.513\text{g F}}{2.670\text{g S}}$	$= 3.563 \text{ F} : 1 \text{ S}$	$\div 1.188 = 3$	SF ₃

$\boxed{1 : 2 : 3}$

3. Calcium carbonate (limestone) is made of calcium, carbon, and oxygen. 96.00 g of oxygen reacts with 24.02 g of carbon and 80.16 g of calcium. Use the laws of matter to determine the following:

a. The mass of limestone produced

$$\begin{array}{l} \text{calcium} + \text{carbon} + \text{oxygen} \rightarrow \text{calcium carbonate} \\ 80.16\text{g} + 24.02\text{g} + 96.00\text{g} \rightarrow 200.18\text{g} \\ \hline \boxed{200.18\text{ g limestone produced}} \end{array}$$

b. The mass percent of oxygen in limestone

$$\frac{96.00\text{ g Oxygen}}{200.18\text{ g limestone}} = 0.479568 = 0.4796 \times 100\% = \boxed{47.96\% \text{ Oxygen}}$$

c. The mass percent of carbon in limestone

$$\frac{24.02\text{ g carbon}}{200.18\text{ g limestone}} = 0.119992007 = 0.1200 \times 100\% = \boxed{12.00\% \text{ carbon}}$$

d. The mass percent of calcium in limestone

$$\frac{80.16\text{ g calcium}}{200.18\text{ g limestone}} = 0.400439604 = 0.4004 \times 100\% = \boxed{40.04\% \text{ calcium}}$$

e. The mass of oxygen that would react with 50.00 g of carbon

$$\frac{50.00\text{g C} \mid 96.00\text{ g O}_2}{24.02\text{ g C}} = \boxed{199.8\text{ g O}_2}$$

f. The mass of calcium that would react with 50.00 g of carbon

$$\frac{50.00\text{ g C} \mid 80.16\text{ g Ca}}{24.02\text{ g C}} = \boxed{166.9\text{ g Ca}}$$