

Name : \_\_\_\_\_

Date : \_\_\_\_\_ Score: \_\_\_\_\_

## Percent Composition and Molecular Formula Worksheet

1. What is the molar mass of  $P_4O_{10}$ ?

2. How many grams of aluminum can be recovered from 34.6 g of  $Al_2O_3$ ?

3. Write the name of  $Fe_2(CO_3)_3$ . \_\_\_\_\_

How many grams of iron can be recovered from a 115 g sample of  $Fe_2(CO_3)_3$ ?

4. In the lab, a chemist analyzed a sample of methanol and found that it comprised 6.2 g of carbon, 4.1 g of hydrogen, and 15.9 g of oxygen. What is the composition of each element?

5. A compound contains 1.2 moles of carbon and 3.2 moles of hydrogen. What is the percent composition by mass of each element?

6. What is the percent composition by mass for each element in aspirin,  $C_9H_8O_4$ ?

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### Answers

1. What is the molar mass of  $P_4O_{10}$ ?

$$P: 4 \times 30.97 \text{ amu} = 123.88 \text{ amu}$$

$$O: 10 \times 16.00 \text{ amu} = 160 \text{ amu}$$

$$\text{Molar mass of } P_4O_{10} = 123.88 \text{ amu} + 160 \text{ amu} = 283.88 \text{ amu}$$

2. How many grams of aluminum can be recovered from 34.6 g of  $Al_2O_3$ ?

$$\text{Molar mass of } Al_2O_3 = 2 \times 26.98 \text{ amu} + 3 \times 16.00 \text{ amu} = 101.96 \text{ amu}$$

$$Al: 2 \times (26.98 \text{ amu} / 101.96 \text{ amu}) \times 34.6 \text{ g} = 18.31 \text{ g}$$

3. Write the name of  $Fe_2(CO_3)_3$ . Iron (III) carbonate

How many grams of iron can be recovered from a 115 g sample of  $Fe_2(CO_3)_3$ ?

$$\text{Molar mass of } Fe_2(CO_3)_3 = 2 \times 55.85 \text{ amu} + 3 \times 12.01 \text{ amu} + 9 \times 16.00 \text{ amu} = 291.73 \text{ amu}$$

$$Fe: 2 \times (55.85 \text{ amu} / 291.73 \text{ amu}) \times 115 \text{ g} = 38.289 \text{ g}$$

4. In the lab, a chemist analyzed a sample of methanol and found that it comprised 6.2 g of carbon, 4.1 g of hydrogen, and 15.9 g of oxygen. What is the composition of each element?

$$\text{Mass of the substance} = 6.2 \text{ g} + 4.1 \text{ g} + 15.9 \text{ g} = 26.2 \text{ g}$$

$$C: 6.2 \text{ g} / 26.2 \text{ g} \times 100\% = 24\%$$

$$H: 4.1 \text{ g} / 26.2 \text{ g} \times 100\% = 15.6\%$$

$$O: 15.9 \text{ g} / 26.2 \text{ g} \times 100\% = 60.7\%$$

5. A compound contains 1.2 moles of carbon and 3.2 moles of hydrogen. What is the percent composition by mass of each element?

$$C: 12 \text{ g/mol} \times 1.2 \text{ mol} = 14.4 \text{ g}$$

$$H: 1 \text{ g/mol} \times 3.2 \text{ mol} = 3.2 \text{ g}$$

$$\text{Mass of the compound} = 14.4 \text{ g} + 3.2 \text{ g} = 17.6 \text{ g}$$

$$C: 14.4 \text{ g} / 17.6 \times 100\% = 82\%$$

$$H: 3.2 \text{ g} / 17.6 \text{ g} \times 100\% = 18\%$$

6. What is the percent composition by mass for each element in aspirin,  $C_9H_8O_4$ ?

$$\text{Molar mass of } C_9H_8O_4 = 9 \times 12 \text{ g} + 8 \times 1 \text{ g} + 4 \times 16 \text{ g} = 180 \text{ g}$$

$$C: 9 \times 12 \text{ g} / 180 \text{ g} \times 100\% = 60\%$$

$$H: 8 \times 1 \text{ g} / 180 \text{ g} \times 100\% = 4.44\%$$

$$O: 4 \times 16 \text{ g} / 180 \text{ g} \times 100\% = 35.55\%$$