

Name : _____

Molar Mass and Percent Composition

1. What is the percent composition of each element in C_6H_6 ?

2. A chemist breaks down a compound into 3.4 moles of carbon and 6.8 moles of oxygen. What is the percent composition by mass?

3. What is the percent composition of the elements in the following compounds?
 - a. NaOH

 - b. $CuBr_2$

 - c. Fe_3O_4

 - d. $(NH_4)_2SO_4$

Name : _____

Molar Mass and Percent Composition

Answers

1. What is the percent composition of each element in C_6H_6 ?

$$\text{Molar mass of } C_6H_6 = 6 \times 12.01 \text{ g/mol} + 6 \times 1.01 \text{ g/mol} = 78.12 \text{ g/mol}$$

$$C: 6 \times 12.01 \text{ g/mol} = 72.06 \text{ g/mol}$$

$$H: 6 \times 1.01 \text{ g/mol} = 6.06 \text{ g/mol}$$

$$C: 72.06 \text{ g/mol} / 78.12 \text{ g/mol} \times 100\% = 92.2\%$$

$$H: 6.06 \text{ g/mol} / 78.12 \text{ g/mol} \times 100\% = 7.8\%$$

2. A chemist breaks down a compound into 3.4 moles of carbon and 6.8 moles of oxygen. What is the percent composition by mass?

$$C: 12 \text{ g/mol} \times 3.4 \text{ mol} = 40.8 \text{ g}$$

$$O: 16 \text{ g/mol} \times 6.8 \text{ mol} = 108.8 \text{ g}$$

$$\text{Total mass} = 40.8 \text{ g} + 108.8 \text{ g} = 149.6 \text{ g}$$

$$C: 40.8 \text{ g} / 149.6 \text{ g} \times 100\% = 27.27\%$$

$$O: 108.8 \text{ g} / 149.6 \text{ g} \times 100\% = 72.72\%$$

3. What is the percent composition of the elements in the following compounds?

a. NaOH

$$\text{Molar mass of NaOH} = 22.98 \text{ g/mol} + 15.99 \text{ g/mol} + 1.01 \text{ g/mol} = 39.98 \text{ g/mol}$$

$$Na: 22.98 \text{ g/mol} / 39.98 \text{ g/mol} \times 100\% = 57.5\%$$

$$O: 15.99 \text{ g/mol} / 39.98 \text{ g/mol} \times 100\% = 40\%$$

$$H: 1.01 \text{ g/mol} / 39.98 \text{ g/mol} \times 100\% = 2.5\%$$

b. $CuBr_2$

$$\text{Molar mass of } CuBr_2 = 63.546 \text{ g/mol} + 2 \times 79.904 \text{ g/mol} = 223.354 \text{ g/mol}$$

$$Cu: 63.546 \text{ g/mol} / 223.354 \text{ g/mol} \times 100\% = 28.45\%$$

$$Br: 2 \times 79.904 \text{ g/mol} / 223.354 \text{ g/mol} \times 100\% = 71.55\%$$

c. Fe_3O_4

$$\text{Molar mass of } Fe_3O_4 = 3 \times 55.845 \text{ g/mol} + 4 \times 15.99 \text{ g/mol} = 231.522 \text{ g/mol}$$

$$Fe: 3 \times 55.845 \text{ g/mol} / 231.522 \text{ g/mol} \times 100\% = 72.36\%$$

$$O: 4 \times 15.99 \text{ g/mol} / 231.522 \text{ g/mol} \times 100\% = 27.64\%$$

d. $(NH_4)_2SO_4$

$$\text{Molar mass of } (NH_4)_2SO_4 = 2 \times 14.007 \text{ g/mol} + 8 \times 1.01 \text{ g/mol} + 32.065 \text{ g/mol} + 4 \times 15.999 \text{ g/mol} = 132.119 \text{ g/mol}$$

$$N: 2 \times 14.007 \text{ g/mol} / 132.119 \text{ g/mol} \times 100\% = 21.20\%$$

$$H: 8 \times 1.01 \text{ g/mol} / 132.119 \text{ g/mol} \times 100\% = 6.11\%$$

$$S: 32.065 \text{ g/mol} / 132.119 \text{ g/mol} \times 100\% = 24.26\%$$

$$O: 4 \times 15.99 \text{ g/mol} / 132.119 \text{ g/mol} \times 100\% = 48.43\%$$