

Name : Date :

Molar Mass and Percent Composition

1. What is the percent composition by mass for each element in water, H_2O ?
2. What is the percent composition by mass for each element in carbon monoxide, CO ?
3. What is the percent composition by mass for each element in carbon dioxide, CO_2 ?
4. What is the percent composition by mass for each element in glucose, $\text{C}_6\text{H}_{12}\text{O}_6$?
5. What is the percent composition by mass for each element in ammonium sulfate, $(\text{NH}_4)_2\text{SO}_4$?
6. What is the percent composition by mass for each element in aspirin, $\text{C}_9\text{H}_8\text{O}_4$?

Molar Mass and Percent Composition

Answers

1. What is the percent composition by mass for each element in water, H_2O ?

$$\text{Molar mass of } \text{H}_2\text{O} = 2 \times 1 \text{ g} + 16 \text{ g} = 18 \text{ g}$$

$$\text{H: } 2 \times 1 \text{ g} / 18 \text{ g} \times 100\% = 11.11\%$$

$$\text{O: } 16 \text{ g} / 18 \text{ g} \times 100\% = 88.89\%$$

2. What is the percent composition by mass for each element in carbon monoxide, CO ?

$$\text{Molar mass of } \text{CO} = 12 \text{ g} + 16 \text{ g} = 28 \text{ g}$$

$$\text{C: } 12 \text{ g} / 28 \text{ g} \times 100\% = 42.86\%$$

$$\text{O: } 16 \text{ g} / 28 \text{ g} \times 100\% = 57.14\%$$

3. What is the percent composition by mass for each element in carbon dioxide, CO_2 ?

$$\text{Molar mass of } \text{CO}_2 = 12 \text{ g} + 2 \times 16 \text{ g} = 44 \text{ g}$$

$$\text{C: } 12 \text{ g} / 44 \text{ g} \times 100\% = 27.27\%$$

$$\text{O: } 2 \times 16 \text{ g} / 44 \text{ g} \times 100\% = 72.72\%$$

4. What is the percent composition by mass for each element in glucose, $\text{C}_6\text{H}_{12}\text{O}_6$?

$$\text{Molar mass of } \text{C}_6\text{H}_{12}\text{O}_6 = 6 \times 12 \text{ g} + 12 \times 1 \text{ g} + 6 \times 16 \text{ g} = 180 \text{ g}$$

$$\text{C: } 6 \times 12 \text{ g} / 180 \text{ g} \times 100\% = 40\%$$

$$\text{H: } 12 \times 1 \text{ g} / 180 \text{ g} \times 100\% = 6.67\%$$

$$\text{O: } 6 \times 16 \text{ g} / 180 \text{ g} \times 100\% = 53.33\%$$

5. What is the percent composition by mass for each element in ammonium sulfate, $(\text{NH}_4)_2\text{SO}_4$?

$$\text{Molar mass of } (\text{NH}_4)_2\text{SO}_4 = 2 \times 14.007 \text{ g/mol} + 8 \times 1.01 \text{ g/mol} + 32.065 \text{ g/mol} + 4 \times 15.999 \text{ g/mol} = 132.119 \text{ g/mol}$$

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

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

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

$$\text{O: } 4 \times 15.999 \text{ g/mol} / 132.119 \text{ g/mol} \times 100\% = 48.43\%$$

6. What is the percent composition by mass for each element in aspirin, $\text{C}_9\text{H}_8\text{O}_4$?

$$\text{Molar mass of } \text{C}_9\text{H}_8\text{O}_4 = 9 \times 12 \text{ g} + 8 \times 1 \text{ g} + 4 \times 16 \text{ g} = 180 \text{ g}$$

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

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

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