



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

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

## Percent Composition by Mass Worksheet

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### Answers

1. What is the percent composition by mass for each element in sodium phosphate,  $\text{Na}_3\text{PO}_4$ ?

$$\text{Na: } 3 \times 23 \text{ g} = 69 \text{ g}$$

$$\text{P: } 31 \text{ g}$$

$$\text{O: } 4 \times 16 \text{ g} = 64 \text{ g}$$

$$\text{Molar mass of } \text{Na}_3\text{PO}_4 = 69 \text{ g} + 31 \text{ g} + 48 \text{ g} = 164 \text{ g}$$

$$\text{Na: } 69 \text{ g}/164 \text{ g} \times 100\% = 42.07\%$$

$$\text{P: } 31 \text{ g}/164 \text{ g} \times 100\% = 18.9\%$$

$$\text{O: } 64 \text{ g}/164 \text{ g} \times 100\% = 39.02\%$$

2. What is the percent composition by mass of each element in hydrogen peroxide,  $\text{H}_2\text{O}_2$ ?

$$\text{H: } 2 \times 1 \text{ g} = 2 \text{ g}$$

$$\text{O: } 2 \times 16 \text{ g} = 32 \text{ g}$$

$$\text{Molar mass of } \text{H}_2\text{O}_2 = 2 \text{ g} + 32 \text{ g} = 34 \text{ g}$$

$$\text{H: } 2 \text{ g}/34 \text{ g} \times 100\% = 5.8\%$$

$$\text{O: } 32 \text{ g}/34 \text{ g} \times 100\% = 94.11\%$$

3. Find the percent composition of  $\text{Fe}_3\text{O}_4$ .

$$\text{Fe: } 3 \times 55 \text{ g} = 165 \text{ g}$$

$$\text{O: } 4 \times 16 \text{ g} = 64 \text{ g}$$

$$\text{Molar mass of } \text{Fe}_3\text{O}_4 = 165 \text{ g} + 64 \text{ g} = 229 \text{ g}$$

$$\text{Fe: } 165 \text{ g}/229 \text{ g} \times 100\% = 72.36\%$$

$$\text{O: } 64 \text{ g}/229 \text{ g} \times 100\% = 27.64\%$$

4. Find the percent composition of  $\text{Ca}_3(\text{PO}_4)_2$ .

$$\text{Ca: } 3 \times 40 \text{ g} = 120 \text{ g}$$

$$\text{P: } 2 \times 31 \text{ g} = 62 \text{ g}$$

$$\text{O: } 8 \times 16 \text{ g} = 128 \text{ g}$$

$$\text{Molar mass of } \text{Ca}_3(\text{PO}_4)_2 = 120 \text{ g} + 62 \text{ g} + 128 \text{ g} = 310 \text{ g}$$

$$\text{Ca: } 120 \text{ g}/310 \text{ g} \times 100\% = 38.76\%$$

$$\text{P: } 62 \text{ g}/310 \text{ g} \times 100\% = 20\%$$

$$\text{O: } 128 \text{ g}/310 \text{ g} \times 100\% = 41.27\%$$

5. In an experiment, 2.0 moles of oxygen atoms react with 80.1 g of calcium to form a new compound. What is the percent composition of each element in the new compound?

$$\text{O: } 16 \text{ g/mol} \times 2.0 \text{ moles} = 32 \text{ g}$$

$$\text{Mass of the new compound} = 32 \text{ g} + 80.1 \text{ g} = 112.1 \text{ g}$$

$$\text{O: } 32 \text{ g}/112.1 \text{ g} = 28.54\%$$

$$\text{Ca: } 80.1 \text{ g}/112.1 \text{ g} = 71.45\%$$

6. In an experiment, 0.05 moles of iron are mixed with 0.05 moles of sulfur and heated in a test tube to form a new compound. What is the percent mass of each element in the new compound?

$$\text{Fe: } 55.85 \text{ g/mol} \times 0.05 \text{ mol} = 2.79 \text{ g}$$

$$\text{S: } 32 \text{ g/mol} \times 0.05 \text{ mol} = 1.6 \text{ g}$$

$$\text{Total mass of the compound} = 2.79 \text{ g} + 1.6 \text{ g} = 4.39 \text{ g}$$

$$\text{Fe: } 2.79 \text{ g}/4.39 \text{ g} = 63.5\%$$

$$\text{S: } 1.6 \text{ g}/4.39 \text{ g} = 36.4\%$$