

Percent Composition Worksheet 2 Answer Key

Name: _____ Date: _____ Period: _____

Percent Composition Practice 2.0 - Answer Key

Objective: Calculate percent composition of a compound

Directions: Solve the following percent composition problems. Show your work and include units!

1. Copper metal is a very valuable metal and can be found in different ores. One type of copper ore called azurite $\text{Cu}_3(\text{CO}_3)_2(\text{OH})_2$ is a blue type of ore. Another type of ore called malachite, $\text{Cu}_2\text{CO}_3(\text{OH})_2$ is a green type of ore. Calculate the percent of copper in each type of ore.

Azurite: $\left(\frac{\text{Cu}}{\text{Cu} + \text{C} + \text{O} + \text{H}} \right) = \left(\frac{63.55 \text{ g}}{3(63.55 \text{ g}) + 2(12.01 \text{ g}) + 8(16.00 \text{ g}) + 2(1.01 \text{ g})} \right) = 0.553 \times 100 = \boxed{55.3\% \text{ Cu}}$

Malachite: $\left(\frac{\text{Cu}}{\text{Cu} + \text{C} + \text{O} + \text{H}} \right) = \left(\frac{63.55 \text{ g}}{2(63.55 \text{ g}) + 1(12.01 \text{ g}) + 5(16.00 \text{ g}) + 1(1.01 \text{ g})} \right) = 0.575 \times 100 = \boxed{57.5\% \text{ Cu}}$

2. What is the mass of malachite if you have 160.0 g of copper in your ore sample?

$160.0 \text{ g Cu} \left(\frac{2(63.55 \text{ g Malachite})}{257.1 \text{ g Cu}} \right) = \boxed{678.4 \text{ g Malachite}}$ or $160 \text{ g} / 0.575 = 278.3 \text{ g}$

3. What is the percent of lead in a binary compound if the other element represents 13.4% of the compound?

$100\% - 13.4\% = \boxed{86.6\%}$

4. How many silver atoms can be found from 200.0 g of Ag_2O ?

$200.0 \text{ g Ag}_2\text{O} \left(\frac{215.74 \text{ g Ag}}{231.74 \text{ g Ag}_2\text{O}} \right) \left(\frac{1 \text{ mol Ag}}{107.87 \text{ g Ag}} \right) \left(\frac{6.022 \times 10^{23} \text{ Ag atoms}}{1 \text{ mol Ag}} \right) = \boxed{1.019 \times 10^{24} \text{ Ag atoms}}$

5. You have been awarded your choice of two mining locations due to your superior mining skills. One site, located in Namibia, Africa, is rich in chalcocite (Cu_2S). The other site, located in Ural Mountains of Russia, is rich in cuprite (Cu_2O). Which location would you choose to mine for copper metal? Can you decide by just looking at the formulas? Explain.

Chalcocite: $\left(\frac{\text{Cu}}{\text{Cu} + \text{S}} \right) = \left(\frac{63.55 \text{ g}}{127.34 \text{ g}} \right) = 0.7985 \times 100 = 79.85\% \text{ Cu}$

Cuprite: $\left(\frac{\text{Cu}}{\text{Cu} + \text{O}} \right) = \left(\frac{63.55 \text{ g}}{143.10 \text{ g}} \right) = 0.8882 \times 100 = 88.82\% \text{ Cu}$

I would mine in Ural because cuprite has a higher percent composition of copper than chalcocite. Since both formulas have the same amount of copper and only one other atom, the formula with the lighter other element will have a higher percentage of copper.

Percent composition worksheet 2 answer key is a crucial educational resource for students studying chemistry. Understanding percent composition is fundamental in stoichiometry, allowing students to determine the relative amounts of different elements within a compound. This article explores the concept of percent composition, provides example problems, and outlines how to solve them, ultimately guiding you to the answer key for worksheet 2.

What is Percent Composition?

Percent composition is the percentage by mass of each element in a compound. It provides insight into the chemical makeup of substances, which is vital for various applications in chemistry, such as calculating molar masses and performing reactions.

The formula for calculating the percent composition of an element in a compound is:

$$\text{Percent Composition} = \left(\frac{\text{Mass of the element in 1 mole of compound}}{\text{Molar mass of the compound}} \right) \times 100$$

Why is Percent Composition Important?

Understanding percent composition is essential for several reasons:

- It helps in determining the empirical and molecular formulas of compounds.
- It aids in stoichiometric calculations in chemical reactions.
- It allows chemists to assess the purity of substances.
- It is fundamental in the field of materials science and engineering.

Example Problems and Solutions

To illustrate the concept of percent composition, let's work through a few example problems.

Example Problem 1: Water (H₂O)

1. Step 1: Determine the molar mass of water.

- Hydrogen (H): $1.01 \text{ g/mol} \times 2 = 2.02 \text{ g/mol}$
- Oxygen (O): $16.00 \text{ g/mol} \times 1 = 16.00 \text{ g/mol}$
- Total molar mass of H₂O = $2.02 \text{ g/mol} + 16.00 \text{ g/mol} = 18.02 \text{ g/mol}$

2. Step 2: Calculate the percent composition.

- Percent composition of H:

$$\left(\frac{2.02 \text{ g/mol}}{18.02 \text{ g/mol}} \right) \times 100 = 11.21\%$$

- Percent composition of O:

$$\left(\frac{16.00 \text{ g/mol}}{18.02 \text{ g/mol}} \right) \times 100 = 88.79\%$$

Thus, the percent composition of water is approximately 11.21% hydrogen and 88.79% oxygen.

Example Problem 2: Calcium Carbonate (CaCO₃)

1. Step 1: Find the molar mass of calcium carbonate.

- Calcium (Ca): 40.08 g/mol
- Carbon (C): 12.01 g/mol × 1 = 12.01 g/mol
- Oxygen (O): 16.00 g/mol × 3 = 48.00 g/mol
- Total molar mass of CaCO₃ = 40.08 g/mol + 12.01 g/mol + 48.00 g/mol = 100.09 g/mol

2. Step 2: Calculate the percent composition.

- Percent composition of Ca:

$$\left(\frac{40.08 \text{ g/mol}}{100.09 \text{ g/mol}} \right) \times 100 = 40.00\%$$

- Percent composition of C:

$$\left(\frac{12.01 \text{ g/mol}}{100.09 \text{ g/mol}} \right) \times 100 = 11.98\%$$

- Percent composition of O:

$$\left(\frac{48.00 \text{ g/mol}}{100.09 \text{ g/mol}} \right) \times 100 = 47.99\%$$

Therefore, the percent composition of calcium carbonate is approximately 40.00% calcium, 11.98% carbon, and 47.99% oxygen.

Percent Composition Worksheet 2

In a typical classroom setting, percent composition worksheets serve as practice tools for students. Worksheet 2 often contains various compounds for students to analyze.

Here are some compounds you might find in Worksheet 2:

1. Sodium Chloride (NaCl)
2. Sulfuric Acid (H₂SO₄)
3. Glucose (C₆H₁₂O₆)

Answer Key for Percent Composition Worksheet 2

Now that we have reviewed the concepts and example problems, let's provide a concise answer key for common compounds found in a typical percent composition worksheet.

Compound: Sodium Chloride (NaCl)

- Molar Mass:

- Sodium (Na): 22.99 g/mol
- Chlorine (Cl): 35.45 g/mol
- Total = 58.44 g/mol

- Percent Composition:

- Na:

$$\left[\left(\frac{22.99 \text{ g/mol}}{58.44 \text{ g/mol}} \right) \times 100 \right] \approx 39.33\%$$

- Cl:

$$\left[\left(\frac{35.45 \text{ g/mol}}{58.44 \text{ g/mol}} \right) \times 100 \right] \approx 60.67\%$$

Compound: Sulfuric Acid (H₂SO₄)

- Molar Mass:

- Hydrogen (H): 1.01 g/mol × 2 = 2.02 g/mol
- Sulfur (S): 32.07 g/mol
- Oxygen (O): 16.00 g/mol × 4 = 64.00 g/mol
- Total = 98.09 g/mol

- Percent Composition:

- H:

$$\left[\left(\frac{2.02 \text{ g/mol}}{98.09 \text{ g/mol}} \right) \times 100 \right] \approx 2.06\%$$

- S:

$$\left[\left(\frac{32.07 \text{ g/mol}}{98.09 \text{ g/mol}} \right) \times 100 \right] \approx 32.66\%$$

- O:

$$\left[\left(\frac{64.00 \text{ g/mol}}{98.09 \text{ g/mol}} \right) \times 100 \right] \approx 65.28\%$$

Compound: Glucose (C₆H₁₂O₆)

- Molar Mass:

- Carbon (C): 12.01 g/mol × 6 = 72.06 g/mol
- Hydrogen (H): 1.01 g/mol × 12 = 12.12 g/mol
- Oxygen (O): 16.00 g/mol × 6 = 96.00 g/mol
- Total = 180.18 g/mol

- Percent Composition:

- C:

$$\left(\frac{72.06 \text{ g/mol}}{180.18 \text{ g/mol}} \right) \times 100 \approx 40.00\%$$

- H:

$$\left(\frac{12.12 \text{ g/mol}}{180.18 \text{ g/mol}} \right) \times 100 \approx 6.73\%$$

- O:

$$\left(\frac{96.00 \text{ g/mol}}{180.18 \text{ g/mol}} \right) \times 100 \approx 53.27\%$$

Conclusion

Understanding percent composition is a fundamental skill in chemistry that enhances students' analytical and problem-solving abilities. The percent composition worksheet 2 answer key serves as a valuable tool for students to check their understanding and accuracy in calculating the percent composition of various compounds. Mastering this concept will not only aid in academic pursuits but also provide a solid foundation for future studies in chemistry and related fields.

Frequently Asked Questions

What is a percent composition worksheet used for?

A percent composition worksheet is used to calculate the percentage by mass of each element in a compound.

Where can I find the answer key for percent composition worksheet 2?

The answer key for percent composition worksheet 2 can typically be found in the teacher's guide or educational resource websites that provide chemistry worksheets.

How do you calculate percent composition?

To calculate percent composition, divide the mass of the element in the compound by the total mass of the compound, then multiply by 100.

What are common compounds used in percent composition worksheets?

Common compounds include water (H_2O), sodium chloride (NaCl), and glucose ($\text{C}_6\text{H}_{12}\text{O}_6$).

Why is understanding percent composition important in chemistry?

Understanding percent composition is important for stoichiometry, determining empirical formulas, and analyzing chemical reactions.

Are there online resources for percent composition practice?

Yes, there are many online platforms that offer practice problems and worksheets, including Khan Academy, ChemCollective, and educational websites.

What skills do students develop by completing percent composition worksheets?

Students develop skills in critical thinking, problem-solving, and quantitative analysis by completing percent composition worksheets.

Can percent composition be applied in real-world scenarios?

Yes, percent composition is used in various fields such as pharmaceuticals, nutrition, and environmental science to analyze mixtures and compounds.

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