

10-3 Review and Reinforcement

Empirical and Molecular Formulas

On the line at the left, write the letter of the term that best matches each description below. Each letter can be used once, more than once, or not at all.

a. percentage composition b. empirical formula c. molecular formula

- _____ 1. shows the simplest whole-number ratio of the atoms of the elements in a compound
- _____ 2. shows the actual number of atoms of each element in a molecular compound
- _____ 3. is determined by comparing the molar mass of the compound with the molar mass of the empirical formula
- _____ 4. relates the mass of each element in a compound to the entire mass of the compound
- _____ 5. can be used to determine the empirical formula
- _____ 6. must sum to 100 percent for all elements in a compound

Solve each of the following problems as directed. Show all your work.

7. A sample of iron oxide has a mass of 1.596 g. On analysis, it was found to contain 1.116 g of iron and 0.48 g of oxygen. Find the percentage composition of this compound.
8. Find the percentage composition of a compound that contains 17.6 g of iron and 10.3 g of sulfur. The total mass of the compound is 27.9 g.
9. Find the percentage composition of a compound containing 32.0 g of bromine and 4.9 g of magnesium.
10. A compound was analyzed and was found to contain 9.8 g of nitrogen, 0.7 g of hydrogen, and 33.6 g of oxygen. What is the empirical formula of the compound?

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11. Determine the empirical formula of a compound containing 3.6 g of carbon, 0.9 g of hydrogen, and 2.4 g of oxygen.

12. Determine the empirical formula of a compound containing 1.37 g of barium, 0.32 g of sulfur, and 0.64 g of oxygen.

13. A certain sugar has a chemical composition of 40 percent carbon, 6.6 percent hydrogen, and 53.3 percent oxygen. The molar mass is 180 g/mol. What is the molecular formula?

14. The neurotransmitter norepinephrine is 56.8 percent carbon, 6.5 percent hydrogen, 28.4 percent oxygen, and 8.3 percent nitrogen. Its molar mass is 169 g/mol. Find the molecular formula of this substance.

15. Tooth enamel, or hydroxyapatite, has a molar mass of 422 g/mol. Its composition is 28.5 percent calcium, 22 percent phosphorus, 49.3 percent oxygen, and 0.2 percent hydrogen. Calculate the molecular formula.

Answer each of the following questions in the space provided.

16. In what parts of your daily life might you need to calculate the percentage composition of something? List three examples.

17. Why is the molecular formula for a compound more useful in determining a compound's identity than its empirical formula?

18. If the ratio of two elements in a chemical formula is 1:1, does this necessarily mean that the number of atoms of each element is 1? Explain your answer.
