

Name: _____

Block: _____

Date: _____

Chemistry 11 **Percentage Composition, Empirical Formulae,** Assignment
And Molecular Formulae

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. must sum to 100% for all 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 to the molar mass of the empirical formula
- _____ 4. relates the mass of each element in compound to the entire mass of the compound
- _____ 5. can be used to determine the empirical formula
- _____ 6. shows the simplest whole number ratio of the atoms of the elements in a compound

Solve each problem as directed. **SHOW ALL YOUR WORK!**

7. A sample of iron oxide has a mass of 1.596g. On analysis, it was found to contain 1.116g of iron and 0.48g of oxygen. Find the percentage composition of this compound.
8. Find the percentage composition of a compound containing 32.0g of bromine and 4.9g of magnesium.

9. Determine the empirical formula of a compound containing 3.6g of carbon, 0.9g of hydrogen, and 2.4g of oxygen.
10. A certain sugar has a chemical composition of 40% carbon, 6.6% hydrogen, and 53.3% oxygen. The molar mass is 180. g/mol. What is the molecular formula?
11. Calculate the percentage composition of the **bold** species in $\text{Fe}_2(\text{SO}_4)_3 \cdot 9\text{H}_2\text{O}$.
12. Find the percentage composition of a compound that contains 17.6g of iron and 10.3g of sulphur.
13. The neurotransmitter norepinephrine is 56.8% carbon, 6.5% hydrogen, 28.4% oxygen, and 8.3% nitrogen. Its molar mass is 169g/mol. Find the molecular formula of this substance.

14. A compound was analyzed and was found to contain 9.8g of nitrogen, 0.7g of hydrogen and 33.6g of oxygen. What is the empirical formula of the compound?
15. A sample of an unknown compound with a mass of 0.847g has the following composition; 50.51% fluorine, and 49.49% iron. When the compound is decomposed into its elements, what mass of each element would be recovered?
16. Determine the empirical formula of a compound containing 1.37g of barium, 0.32g of sulphur, and 0.64g of oxygen.
17. A compound has a molar mass of 422g/mol. Its composition is 28.49% calcium, 22.02% phosphorus, 49.25% oxygen and 0.24% hydrogen. Calculate the molecular formula.

18. A sample compound that has a mass of 0.432g is analyzed. The sample is found to be made up of oxygen and fluorine only. Given that the sample contains 0.128g of oxygen, calculate the percentage composition of the compound.
19. Determine the empirical formula of a compound containing 0.928g of gallium and 0.412g of phosphorus.
20. Determine the empirical formula of a compound containing 1.723g of carbon, 0.289g of hydrogen, and 0.459g of oxygen.
21. A compound is known to have a molar mass of 391.5g/mol. Find the molecular formula of the compound given the results of an analysis of a 310.8g sample revealed that the sample only contained boron and iodine. The mass of the iodine in the sample is found to be 302.2g.

22. Determine the empirical formula of a compound containing 20.23% aluminum and 79.77% chlorine.
23. Calculate the percentage composition of $(\text{NH}_4)_2\text{Sn}(\text{OH})_6$.
24. Find the molecular formula of a compound that contains 42.56g of palladium, and 0.80g of hydrogen. The molar mass of the compound is 216.8g/mol.
25. Octane, a compound of hydrogen and carbon, has a molar mass of 114.26g/mol. If one mole of the compound contains 18.17g of hydrogen, what is its molecular formula?
26. Find the molecular formula of a compound that contains 30.45% nitrogen, and 69.55% oxygen. The molar mass of the compound is 92.02g/mol.

27. Find the molecular formula of a compound given that a sample of the compound contains 42.4g of hydrogen, and 169.7g of carbon and the molar mass is 30.0g/mol.
28. A gas has the empirical formula CH_2 . If 0.850L of the gas at STP has a mass of 1.59g, what is the molecular formula?
29. Calculate the percentage composition of the **bold** species in $\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$.
30. A compound has an empirical formula of C_5H_{11} . If 0.0275mol of the compound has a mass of 3.91g, what is the molecular formula of the compound?
31. A gas has the empirical formula CH . If 450.mL of the gas at STP has a mass of 0.522g, what is the molecular formula?