

Empirical and Molecular Formula Questions

You should be able to do these questions without a calculator.

1. Determine the empirical formula of a compound with the following composition by mass: 48.0 % C, 4.0 % H and 48.0 % O. [**C₄H₄O₃**]
2. Determine the empirical formula of a compound with the following composition by mass: 36.0 % C, 4.0 % H, 28.0 % N and 32.0 % O. [**C₃H₄N₂O₂**]
3. Determine the empirical formula of a compound with the following composition by mass: 24.0 % C, 7.0 % H, 38.0 % F and 31.0 % P. [**C₂H₇F₂P**]
4. Determine the empirical formula of a compound with the following composition by mass: 48.0 % C, 8.0 % H, 28.0 % N and 16.0 % O. If this compound has a molar mass of 200 g/mol, what is its molecular formula? [**C₄H₈N₂O** and **C₈H₁₆N₄O₂**]
5. A 100 mg sample of a compound containing C, H and O is burned and produced 176 mg of CO₂ and 36 mg of H₂O. Determine the empirical formula of the compound. [**C₄H₄O₃**]
6. Determine the empirical formula of a compound with the following composition by mass: 60.0 % C, 12.0 % H and 28.0 % N. [**C₅H₁₂N₂**] If this compound has a molar mass of 300 g/mol, what is its molecular formula? [**C₁₅H₃₆N₆**]
7. Determine the empirical formula of a compound with the following composition by mass: 18.0 % C, 2.5 % H, 63.5% I, and 16.0 % O. [**C₃H₅IO₂**] If this compound has a molar mass of 400 g/mol, what is its molecular formula? [**C₆H₁₀I₂O₄**]
8. Determine the empirical formula of a compound with the following composition by mass: 60.0 % C, 8.0 % H and 32.0 % O. [**C₅H₈O₂**] If 100 mg of this compound is neutralized with exactly 10.0 mL of 0.0500 M NaOH in a reaction with a 1:1 stoichiometry, what is the molecular formula of this compound? [**C₁₀H₁₆O₄**]