Empirical and Molecular Formula Questions (no calculator)

These problems may be done with or 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. **[C₄H₈N₂O]** If this compound has a molar mass of 200 g, what is its molecular formula? **[C₈H₁₆N₄O₂]**

5. A 100 mg sample of a compound containing C, H and O is burned; the combustion resulted in 176 mg of CO_2 and 36 mg of H_2O. 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, 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, 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]**