

Unit 3 - CHEMICAL QUANTITIES

EMPIRICAL AND MOLECULAR FORMULA**Practice Questions**

1. What's the empirical formula of a molecule containing 65.5% carbon, 5.5% hydrogen, and 29.0% oxygen?
2. If the molar mass of the compound in problem 1 is 110 g/mol, what is the molecular formula?
3. What's the empirical formula of a molecule containing 18.7% lithium, 16.3% carbon, and 65.0% oxygen?
4. If the molar mass of the compound in problem 3 is 73.8 grams/mole, what's the molecular formula?
5. The percentage composition of acetic acid is found to be 39.9% C, 6.7% H, and 53.4% O. Determine the empirical formula of acetic acid.
6. The molar mass for question #5 was determined by experiment to be 60.0 g/mol. What is the molecular formula?
7. A 50.51 g sample of a compound made from phosphorus and chlorine is decomposed. Analysis of the products showed that 11.39 g of phosphorus atoms were produced. What is the empirical formula of the compound?
8. When 2.5000 g of an oxide of mercury, (Hg_xO_y) is decomposed into the elements by heating, 2.405 g of mercury are produced. Calculate the empirical formula.
9. The compound benzamide has the following percent composition. What is the empirical formula?
C = 69.40 % H = 5.825 % O = 13.21 % N = 11.57 %
10. A component of protein called serine has an approximate molar mass of 100 g/mol. If the percent composition is as follows, what is the empirical and molecular formula of serine?
C = 34.95 % H = 6.844 % O = 46.56 % N = 13.59 %

Answers

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| 1. $\text{C}_3\text{H}_3\text{O}$ mass = 55 g/mol | 7. PCl_3 |
| 2. $\text{C}_6\text{H}_6\text{O}_2$ | 8. Hg_2O |
| 3. Li_2CO_3 | 9. $\text{C}_7\text{H}_7\text{NO}$ |
| 4. Li_2CO_3 | 10. $\text{C}_3\text{H}_7\text{NO}_3$ empirical formula |
| 5. CH_2O | $\text{C}_3\text{H}_7\text{NO}_3$ molecular formula |
| 6. $\text{C}_2\text{H}_4\text{O}_2$ | |