

Worksheet: Calculating Empirical & Molecular Formulas

- The empirical formula for the compound having the formula $\text{H}_2\text{C}_2\text{O}_4$ is
[A] C_2H_2 [B] CO_2H [C] COH [D] $\text{C}_2\text{O}_4\text{H}_2$ [E] COH_2
- Calculate the empirical formula of a compound that is 85.6% C and 14.4% H (by mass).
[A] CH_2 [B] CH [C] C_3H_5 [D] C_2H_4 [E] C_2H
- A compound is analyzed and found to contain 12.1% carbon, 16.2% oxygen, and 71.7% chlorine (by mass). Calculate the empirical formula of this compound.
[A] COCl_2 [B] CO_2Cl_2 [C] CO_2Cl [D] COCl_4 [E] COCl
- A compound contains 40.0% carbon, 6.7% hydrogen, and 53.3% oxygen (by mass). Calculate the empirical formula.
[A] $\text{C}_2\text{H}_2\text{O}$ [B] CH_2O [C] CH_4O [D] C_2HO_2 [E] $\text{C}_3\text{H}_6\text{O}_3$
- A compound contains 25.94% N and 74.06% O (by mass). What is the empirical formula?
- Calculate the empirical formula of a compound containing 18.29% H and 81.71% C (by mass).
- Determine the empirical formula of a compound containing 54.2% F and 45.8% S (by mass).
- A compound has 40.68% carbon, 5.12% hydrogen, and 54.20% oxygen (by mass). Calculate its empirical formula.
- Calculate the empirical formula of a compound that is 50.04% C, 5.59% H, and 44.37% O (by mass).
- A 7.33-g sample of lanthanum, La, combines with oxygen to give 10.29 g of the oxide. Calculate the empirical formula of this oxide.
- Calculate the molecular formula of a compound with the empirical formula CH_2O and a molar mass of 150 g/mol.
[A] $\text{C}_3\text{H}_6\text{O}_3$ [B] $\text{C}_5\text{H}_{10}\text{O}_5$ [C] $\text{C}_2\text{H}_4\text{O}_2$ [D] $\text{C}_4\text{H}_8\text{O}_4$ [E] $\text{C}_6\text{H}_{12}\text{O}_6$

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12. Acetylene gas is 92.3% carbon and 7.7% hydrogen (by mass), and its molar mass is 26 g/mol. What is its molecular formula?
[A] C_2H_2 [B] CH_4 [C] CH [D] C_4H_4 [E] none of these
13. The empirical formula of a compound is known to be CH_2 , and its molar mass is 56 g/mol. What is the molecular formula?
14. The empirical formula of a compound is CH_2O , and its mass is 120 amu/molecule. Calculate its molecular formula.
[A] $C_3H_6O_3$ [B] $C_2H_4O_2$ [C] $C_4H_8O_4$ [D] CH_2O [E] none of these
15. A compound contains 12.8% C, 2.1% H, and 85.1% Br (by mass). Calculate the empirical formula and the molecular formula of this compound given that the molar mass is 188 g/mol.
16. A compound contains 10.13% C and 89.87% Cl (by mass). Determine both the empirical formula and the molecular formula of the compound given that the molar mass is 237 g/mol.
17. A certain compound has an empirical formula of NH_2O . Its molar mass is between 55 and 65 g/mol. Its molecular formula is
[A] $N_2H_4O_2$ [B] $N_2H_2O_2$ [C] not calculable [D] NH_2O
18. A compound has a molar mass of 86 g/mol and has the percent composition (by mass) of 55.8% C, 37.2% O, and 7.0% H. Determine the empirical formula and the molecular formula.
19. A compound has a molar mass of 100 g/mol and the percent composition (by mass) of 65.45% C, 5.45% H, and 29.09% O. Determine the empirical formula and the molecular formula.
[A] CHO and $C_6H_6O_6$ [B] CH_4O and $C_3H_{12}O_3$ [C] C_3HO and $C_6H_2O_2$
[D] CH_2O and $C_4H_8O_4$ [E] C_3H_3O and $C_6H_6O_2$

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20. The empirical formula for acetic acid is CH_2O . Its molar mass is 60 g/mol. The molecular formula is

- [A] $\text{C}_2\text{H}_6\text{O}$ [B] CH_2O [C] $\text{C}_2\text{H}_4\text{O}_2$ [D] C_2HO_2 [E] none of these