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**Empirical and Molecular Formulas**

Determine the empirical and molecular formulas for the following compounds.

1. A sample of gas from an automobile is analyzed, and determined to have 1.91 grams of carbon and 5.09 grams of oxygen. What is the empirical formula for this pollutant?
2. Another sample of pollution is analyzed and found to contain 5.04 grams of carbon and 6.72 grams of oxygen. Determine its empirical formulas.
3. A flammable liquid contains 1.42 grams carbon and 7.58 grams sulfur. What is the empirical formula?
4. Natural gas has a composition of 25 % H and 75 % C. What is the empirical formula for natural gas?
5. An organic compound contains .25 g H, .984 g C, and 6.53 g Br. What is the empirical formula for this compound?
6. A sample of urea contains 46.7 % N, 6.70 % H, 20.0 % C, and 26.6 % O. What is the empirical formula of urea?
7. The empirical formula of acetic acid is CH2O. What is the molecular formula of the compound given that its molar mass is approximately 60 g/mol?
8. A white powder is analyzed and found to contain 43.64% phosphorous and 56.36% oxygen by mass. The compound has a molecular weight of 283.88 g/mol. What are the compound’s empirical and molecular formulas?
9. Caffeine, a stimulant, contains 49.48 g carbon, 5.15 g hydrogen, 28.87 g nitrogen and 16.29 g oxygen and has a molecular weight of 194.2 g/mol. Determine the molecular formula of caffeine.
10. A compound that contains 30.4 % N and 69.6 % O has a molecular mass of 92 g/mol. Determine the empirical and molecular formulas.