Empirical and Molecular Formulae

Read from Empirical and Molecular Formulae in **Lesson 2: Quantitative Analysis of Compounds** in the **Chemistry Tutorial Section, Chapter 7** of **The Physics Classroom**:

Part 1: Empirical Formulae
The empirical formula is the smallest whole number ratio of different atoms in a compound. Show all work and determine the empirical formula of the following compounds.

1. Crystal Lettuce measured a 0.926-gram strip of aluminum in her chemistry class and then burned the metal in the air during the lab period. The white solid that formed had a mass of 1.750 grams. What is the empirical formula of the oxide that formed in this lab?

2. Crystal analyzed another compound in the lab. This compound was found to be 30.39% phosphorus and the rest was chlorine. What is the empirical formula and name of the compound analyzed by Crystal?

3. Aaron Agin analyzed a compound that consisted of 4.87 grams of nitrogen and 13.97 grams of oxygen. Aaron insists that the empirical formula of this compound is NO. (This is a big NO, because he is not correct.) What is the correct empirical formula and name of the compound analyzed by Aaron?

The Mole and Its Applications

Part 2: Molecular Formulae

The molecular formula is the actual formula of a compound and is usually not reduced. Show all work and determine the molecular formula of the following compounds.

1. Ima Jazzed loves her morning cup(s) of coffee. She was interested to learn that the caffeine in her coffee is 49.48% carbon, 5.19% hydrogen, 28.85% nitrogen, and 16.48% oxygen. Caffeine's molar mass is approximately 194 g/mole. What is the empirical and molecular formula of caffeine?

2. Crystal Lettuce is back in the lab. She produced a sample of magnetite when she took a piece of iron weighing 12.78 grams and burned it in the air during a chemistry lab. The mass of the iron oxide produced was 17.67 grams. What is the formula of this iron oxide or magnetite that Crystal produced?

3. Pentacosane is a hydrocarbon molecule found in fuel oil. Pentacosane is 86.88% carbon and the rest is hydrogen. It has a molar mass of approximately 345 g/mole. What is the empirical and molecular formula of pentacosane?