4.7 Calculating Chemical Formulas

Calculating an Empirical Formula

1. Find the mass of each element in 100 g of the compound, using percentage composition.
2. Find the amount in moles of each element by converting the mass in 100 g to moles, using the molar mass of the element.
3. Find the whole number ratio of atoms in 100 g to determine the empirical formula. Reduce the ratio to lowest terms.

- E.g. The percent composition of the antibiotic, chloromycetin, is: 40.87% carbon, 3.72% hydrogen, 8.67% nitrogen, 24.77% oxygen, and 21.98% chlorine.

Calculating a Molecular Formula

From the empirical formula and measured molar mass.

1. Calculate the molar mass of the empirical formula.
2. Compare the measured molar mass of the substance with the molar mass derived from the empirical formula and increase subscripts in the empirical formula by the multiple needed to make the tow molar masses equal.

From percent composition and measured molar mass.

1. Find the mass of reach element in one mole of the compound by multiplying the percentage by the molar mass of the compound.
2. Use the molar mass of the element to convert the mass of the element to amount in moles.
3. The mole ratio of the element in the compound provides the subscripts in the molecular formula

- Using the information from the question above. Find the molecular formula.

Homework

- Practice Questions: 1,2,3,4,5,6,8,9,11,13,14,15
- Section Questions: 1-6