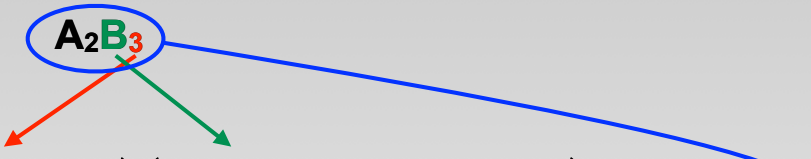
Mass Percent Composition of Compounds



$$\text{mass percent of element B} = \frac{(\text{how often element "B" appears in formula}) \cdot (\text{molar mass of element "B"})}{\text{molar mass of the whole compound}} \cdot 100\,\%$$

Obtaining an Empirical Formula from Experimental Data

Example: A compound containing nitrogen and oxygen is decomposed in the laboratory and produces 24.5 g nitrogen and 70.0 g oxygen. Calculate the empirical formula of the compound.

1). Write down (or calculate) as given the masses of each element present in a sample of the compound. If you are given mass percent composition, assume a 100g sample and calculate the masses of each element from the given percentages

2). Convert each of the masses in Step 1 to moles by using the appropriate molar mass for each element as a conversion factor

3). Write down a pseudo formula for the compound using the number of moles of each element (from Step 2) as subscripts

4). Divide all the subscripts in the formula by the smallest subscript

5). If the subscripts are not whole numbers, multiply all the subscripts by a small whole number to get whole number subscripts

Obtaining an Empirical Formula from Experimental Data

Example: A laboratory analysis of aspirin determined the following mass percent composition: C 60.00% ; H 4.48% ; O 35.52%

1). Write down (or calculate) as given the masses of each element present in a sample of the compound. If you are given mass percent composition, assume a 100g sample and calculate the masses of each element from the given percentages

2). Convert each of the masses in Step 1 to moles by using the appropriate molar mass for each element as a conversion factor

3). Write down a pseudo formula for the compound using the number of moles of each element (from Step 2) as subscripts

4). Divide all the subscripts in the formula by the smallest subscript

5). If the subscripts are not whole numbers, multiply all the subscripts by a small whole number to get whole number subscripts

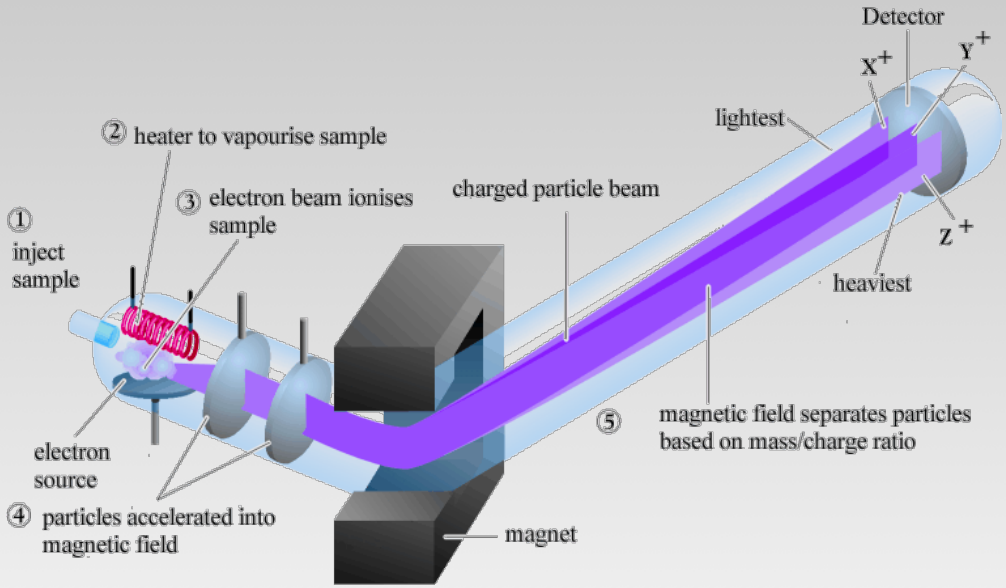
Calculating Molecular Formulas for Compounds

Butanedione contains the elements carbon, hydrogen and oxygen. The empirical formula of butanedione is C_2H_3O and its molar mass is 86.09 g/mol. Find its molecular formula.

Molar Mass = empirical formula molar mass $\cdot$ n

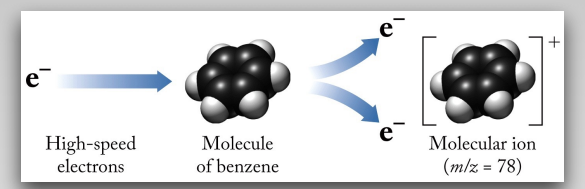
$$n = \frac{\text{molar mass}}{\text{empirical formula molar mass}}$$

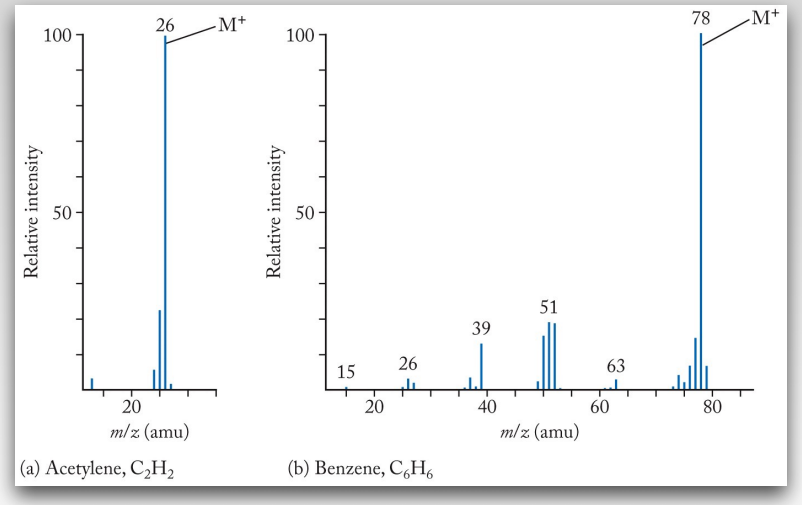
Principles of Mass Spectrometry



http://www.mhhe.com/physsci/chemistry/carey/student/olc/graphics/carey04oc/ch13/figures/1334.gif

Principles of Mass Spectrometry





ions are separated based on mass-to-charge ratio