

Chapter 3 Stoichiometry

3.1 Atomic Masses

- amu based in ^{12}C
- Mass determined by the mass spectrometer
- atomic mass- weighted average of all isotopes found in nature

Calculation atomic mass:

Atomic mass = (% abundance "Ia")(mass "Ia")+(% "Ia")+(% "Ib")(Mass "Ib") +

-Relative Abundance determined by mass spec.

-relative abundance determined by mass spectrometer

3.2 The Mole

mole(mol) - equal to the number of atoms in exactly 12 grams of ^{12}C

Avagadro's number- 6.022×10^{23}

the mass of 1 mole of an element is equal to its atomic mass a grams

Sample 3.4

A silicon chip used in an integrated circuit of a microcomputer has a mass of 5.68 mg. How many silicon atoms are present in the chip?

3.3 Molar Mass

molar mass- mass in grams of one mole of a compound

Do sample 3.7 -3.8

3.4 Percent Composition of Compounds

* Sample 3.9

Carovone is a substance that occurs in two forms having different arrangements of atoms but the same molecular formula ($\text{C}_{10}\text{H}_{14}\text{O}$) and mass. One type of carovone gives caraway seeds their characteristic smell, and other type is responsible for the smell of spearmint oil. Compute the mass percent of each element in carovone.

Mass C 10 mol * 12.01 = 120.1 g

Mass % C (120.1g/ 150.2) = 79.96 %

Mass H 14 mol * 1.008 = 14.11 g

Mass % H (14.11g/ 150.2) = 9.394 %

Mass O 1 mol * 16 mol = 16 g

Mass % O (16.00/150.2) = 10.65 %

3.5 Determining the Formula of a Compound

empirical formula-need composition

molecular formula-need composition & molar mass.

Sample Exercise 3.11

71.65% C 24.27% C 4.07 %H

Molar Mass= 98.965/mol

<u>Method 1</u> "I like"	71.65 g	*	$\frac{1 \text{ mol}}{35.45 \text{ g}}$	=	2.021 mol Cl/2.021	=	1
	24.27 g	*	$\frac{1 \text{ mol}}{12.01 \text{ g}}$	=	2.021 mol C/2.021	=	1
	4.07 g	*	$\frac{1 \text{ mol}}{1.008 \text{ g}}$	=	4.04 mol H / 2.021	=	2
	Empirical Molar Mass			=	49.48		CH_2Cl

