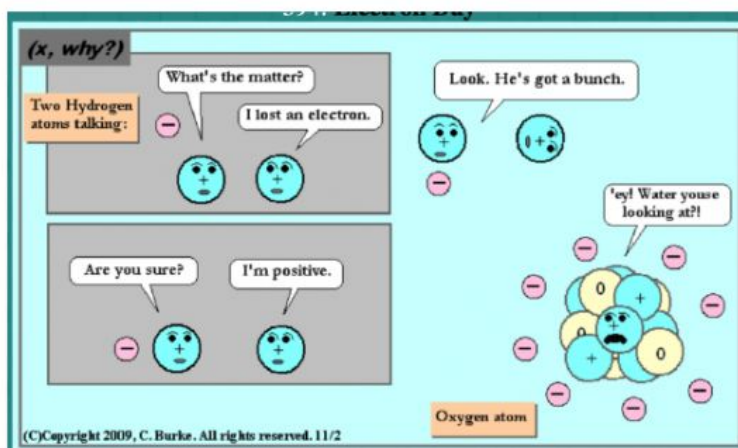


Chapter 1

Matter



Subtopic	Learning outcomes	Reflection
1.1. Atoms & Molecules	a) Write isotope notation.	
	b) Interpret mass spectrum.	
	c) Calculate the average atomic mass of an element given the relative abundances of isotopes or a mass spectrum.	
	d) Calculate relative atomic mass based on C-12.	
1.2 Mole Concept	a) Define the terms empirical formula and molecular formulae.	
	b) Determine empirical formula and molecular formulae from mass composition or combustion data.	
	c) Define each of the following concentration measurements:	
	d) Calculate each of the following concentration measurements:	
	d) Calculate relative atomic mass based on C-12. i. Molarity, (M) ii. Molality, (m) iii. Mole fraction, (X) iv. Percentage by mass, (% w/w) v. Percentage by volume, (%V/V)	

1.1. Atoms & Molecules

a) Write isotope notation.

Isotope notation: A symbol for isotopes of an element



Proton number - The number of protons in the nucleus of an atom

Nucleon number - The total number of protons and neutrons in the nucleus of an atom

$$\text{Number of neutrons} = \text{Nucleon number (A)} - \text{Proton number (Z)}$$

Test yourself 1

Identify correct isotopic notation

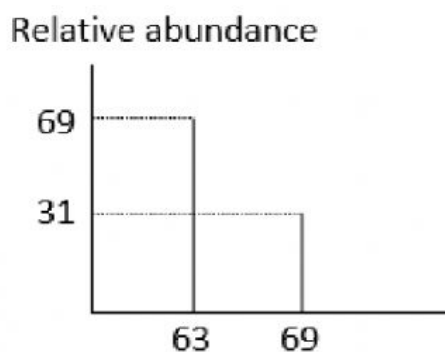


b) Interpret mass spectrum.

Mass spectrum

y-axis = The height of the peak represents relative abundance is shown
x-axis = The mass of each isotope (isotopic mass).

example : Mass spectrum of copper



$$\text{Average atomic mass} = \frac{\text{Total mass of all isotopes}}{\text{Total abundance}}$$

$$= \frac{\sum Q_i m_i}{\sum Q_i}$$

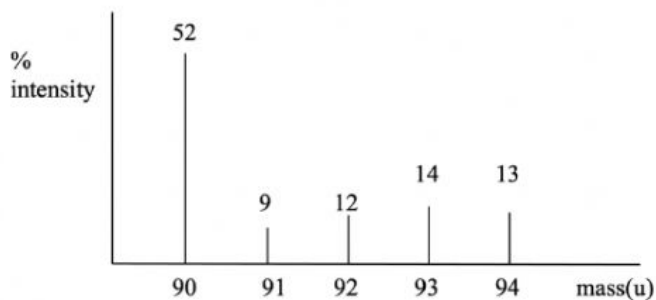
Where

Q_i = abundance of isotopes

m_i = atomic mass of isotopes

Test yourself 2

When a sample of element Y is analysed in the mass spectrometer, the following mass spectrum is obtained.

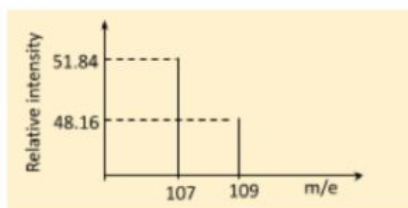


By using the data from the mass spectrum, complete the following table:

Isotope	Isotopic mass	Abundance
Y-90		
	91	
		12
	93	
Y-94		

Test yourself 3

The mass spectrum of an element Z is shown below.



Which of the following statements is correct?

- A. The nucleon number of Z is 105.
- B. The atomic mass of Z is 108 amu.
- C. Z consists of three isotopes.
- D. The isotopes of Z have the same number of protons.