1.2 ATOMIC STRUCTURE

THE DEVELOPMENT OF THE ATOMIC THEORY

Dalton's Atomic Theory

Dalton proposed that atoms are like billiard balls (solid spheres). He proposed the following theory:

- All matter is made up of tiny indivisible particles called atoms.
- All atoms of an element are identical and atoms of different elements are different
- Atoms are rearranged to form new substances in chemical reactions, but they are never created or destroyed

Homework: Construct a table for the development of the atom. Summarize the theories and models of the following scientists: Democritus, Aristotle, Alchemists, Dalton, Thomson, Rutherford, Chadwick, and Bohr. You can use the following format

SCIENTIST	THEORY	MODEL OF THE ATOM
Democritus (400 BCE)		
Aristotle(450 BCE)		
Alchemists (1^{st} – 17^{th} Century CE)		
John Dalton (1808)		
J.J. Thomson (1897)		
Ernest Rutherford (1909)		
James Chadwick (1932)		
Niels Bohr (1913)		

1.2 THE STRUCTURE OF THE ATOM

Atoms are the smallest particle of an element. It retains the properties of the element. Atoms are made up of smaller parts called **subatomic particles**.

Table 1 on Page 14

Particle	Symbol	Charge	Location	Mass (kg)	Mass (a.m.u.)
electron	e^-	1-	In energy levels outside nucleus	9.11×10^{-31}	negligible
proton	P^+	1+	In the nucleus	1.67×10^{-27}	1
neutron	N^0	0	In the nucleus	1.67×10^{-27}	1

The nucleus is the centre of the atom and contains the protons and neutrons.

Atomic Number (Z) – The number of protons in the nucleus.
Mass Number (A) – The sum of the particles in the nucleus, the number of protons and neutrons in the nucleus

As a result, the number of neutrons = mass # – atomic #
For example, for fluorine = 19 – 9 = 10

In a neutral atom, the number of protons is equal to the number of electrons. If they are electrically neutral, the positive charges (protons) must equal the negative charges (electrons).

STANDARD ATOMIC NOTATION

- This is a notation used by chemists to determine the number of protons, electrons, and neutrons in an atom.

BOHR-RUTHERFORD DIAGRAMS

- Bohr-Rutherford Diagrams were created to represent not only the particles within an atom, but also the arrangement of electrons around the nucleus.
- Chemical reactions focus on the electrons in the outermost **valence shell** called **valence electrons**

Example 1: Carbon

Example 2: Magnesium

HOMEWORK: Read Page 11-16 and do questions #1,2,5,6, and 10