

UNIT

12

ATOMIC STRUCTURE



Learning Objectives



After the completion of this lesson, students will be able to:

- ◆ understand the advantages and limitations of Dalton's atomic theory.
- ◆ distinguish the fundamental particles and their properties.
- ◆ get an idea about Thomson's atom model and its limitations.
- ◆ calculate the valency of different elements.
- ◆ write the chemical formula and molecular formula of compounds.
- ◆ balance the chemical equations.
- ◆ state the laws of chemical combinations.

Introduction

Every substance in our surrounding is made up of unique elements. There are 118 elements identified worldwide so far. Out of these elements, 92 elements occur in the nature and the remaining elements are synthesised in the laboratories. Copper, Iron, Gold and Silver are some of the elements found in the nature. Elements like Technetium, Promethium, Neptunium and Plutonium are synthesised in the laboratories. Each element is made up of similar, minute particles called atoms. For example, the element gold is made up of gold atoms which determine its characteristics. The word atom is derived from the Greek word **atomos**. **Tomos** means smallest divisible particle and **atomas** means smallest indivisible particle. Ancient Greek philosophers like Democritus, have spoken about atoms. Even our Tamil poet Avvaiyar has mentioned about atoms in her poem while describing Thirukkural (அணுவைத் துளைத்து ஏழ் கடலைப்புகட்டிக் குறுகத் தரித்த குறள்). But, none of them have scientific

base. The first scientific theory about atom was given by John Dalton. Followed by him, J.J. Thomson and Rutherford have given their theory about atom. In this lesson, we will study how atomic theories evolved at different times. We will also study about valency, molecular formula, rules for naming chemical compounds and balancing chemical equations.

12.1 Dalton's Atomic Theory

John Dalton provided a basic theory about the nature of matter. He proposed a model of atom known as Dalton's atomic theory in 1808 based on his experiments. The main postulates of Dalton's atomic theory are:

- All the matters are made up of extremely small particles called atoms (Greek philosopher Democritus used the same name for the smallest indivisible particles).
- Atoms of the same element are identical in all aspects (size, shape, mass and properties).