John Dalton, a British school teacher, published his theory about atoms in 1808. His findings were based on experiments and the laws of chemical combination.

Postulates

1. All matter consists of indivisible particles called atoms.
2. Atoms of the same element are similar in shape and mass, but differ from the atoms of other elements.
3. Atoms cannot be created or destroyed.
4. Atoms of different elements may combine with each other in a fixed, simple, whole number ratios to form compound atoms.
5. Atoms of same element can combine in more than one ratio to form two or more compounds.
6. The atom is the smallest unit of matter that can take part in a chemical reaction.

Drawbacks of Dalton's Atomic Theory

- The indivisibility of an atom was proved wrong: an atom can be further subdivided into protons, neutrons and electrons. However an atom is the smallest particle that takes part in chemical reactions.
- According to Dalton, the atoms of same element are similar in all respects. However, atoms of some elements vary in their masses and densities. These atoms of different masses are called isotopes. For example, chlorine has two isotopes with mass numbers 35 and 37.
- Dalton also claimed that atoms of different elements are different in all respects. This has been proven wrong in certain cases: argon and calcium atoms each have an atomic mass of 40 amu. These atoms are known as isobars.
- According to Dalton, atoms of different elements combine in simple whole number ratios to form compounds. This is not observed in complex organic compounds like sugar ($C_{12}H_{22}O_{11}$).
- The theory fails to explain the existence of allotropes; it does not account for differences in properties of charcoal, graphite, diamond.

Merits of Dalton's Atomic Theory

- The atomic theory explains the laws of chemical combination (the Law of Constant Composition and the Law of Multiple Proportions).
- Dalton was the first person to recognize a workable distinction between the fundamental particle of an element (atom) and that of a compound (molecule).

Contributors

- Binod Shrestha (University of Lorraine)