

9th Class

➤ Law Of Chemical Combination:

❖ Definition:

- The Law of Chemical Combination states that when elements combine to form compounds, they do so in fixed ratios by mass.
- This fundamental principle is crucial in understanding the stoichiometry of chemical reactions and the composition of compounds.

❖ Key Points:

1. Law of Definite Proportions:

- Also known as the Law of Constant Composition.
- States that a given compound always contains the same elements in the same proportions by mass, regardless of the source or method of preparation.
- Example: Water (H_2O) always has a fixed ratio of hydrogen to oxygen, which is 2:16 (or 1:8).

2. Law of Multiple Proportions:

- If two elements can combine to form more than one compound, the masses of one element that combine with a fixed mass of the other element are in ratios of small whole numbers.
- Example: Carbon and oxygen can form both carbon monoxide (CO) and carbon dioxide (CO_2). The ratio of the masses of oxygen in CO to CO_2 is 1:2.

❖ Experimental Basis:

1. Combustion Reactions:

- The study of combustion reactions, where a substance reacts with oxygen to produce oxides, provided crucial experimental evidence for the Law of Definite Proportions.

2. Stoichiometry:

- The quantitative study of reactants and products in chemical reactions helps confirm the fixed ratios in which substances combine.

❖ Implications:

1. Conservation of Mass:

- The Law of Chemical Combination supports the principle of the conservation of mass, which states that mass is neither created nor destroyed in a chemical reaction.

2. Atomic Theory:

- The atomic theory proposed by John Dalton in the early 19th century was influenced by the Law of Chemical Combination. Dalton's theory suggested that elements are composed of indivisible particles (atoms) that combine in fixed ratios.

❖ Application in Modern Chemistry:

1. Stoichiometry:

- The Law of Chemical Combination forms the basis of stoichiometry, allowing chemists to predict the quantities of reactants and products in a chemical reaction.

2. Analytical Chemistry:

- In analytical chemistry, the law is employed to determine the composition of unknown substances by analyzing the masses of the elements present.