Laws of Chemical Combination

Law of Conservation of Mass

Mass can neither be created nor destroyed in a chemical reaction. This means the total mass of reactants equals the total mass of products

Law of Definite Proportions

In a chemical substance, the elements are always present in a definite proportion by mass. This means a compound always contains the sa

Dalton's Atomic Theory

Postulates of Dalton's Atomic Theory

Every matter is made up of very tiny particles called atoms. Atoms are indivisible particles, which cannot be created or destroyed in a chemi
Atoms of different elements have different masses and chemical properties. Atoms combine in the ratio of small whole numbers to form cor

Atoms

Basic Properties of Atoms

Atoms are the building blocks of all matter. Atomic radius is measured in nanometers (1 meter = 10^9 nanometers). Atoms of most elements a

Elements and Naming

Element Symbols and Naming Rules

Each element has a unique name and symbol approved by IUPAC (International Union of Pure and Applied Chemistry). The symbol is usuall
same initial letter, the symbol includes the first letter followed by another letter from the name. Some symbols are derived from Latin, Germa

English name of the element	
Hydrogen	
Boron	
Oxygen	
Nitrogen	
Fluorine	

Name of the element	
Barium	
Bismuth	
Bromine	
Silicon	
Cadmium, Calcium	

Name of the element	Latin/German/Greek
Sodium	*Natrium*
Potassium	*Kalium*
Copper	*Cuprum*
Iron	*Ferrum*
Gold	*Aurum*
Silver	*Argentum*

Molecules

Molecules of an element are formed by atoms of the same type. Atoms of the same or different elements join in definite proportions to form

Ions

An ion is a charged particle that can be positively or negatively charged. Ions may be single atoms or groups of atoms (polyatomic ions) ca

Valency

Valency is the combining capacity of an element. It helps determine how atoms combine to form compounds.

Valency	Name of ion	Symbol	Non-metallic element
1	Sodium	Na^+	Hydrogen
	Potassium	K^+	Hydride
	Silver	Ag^+	Chloride
	Copper (I)*	Cu^+	Bromide
			Iodide
2	Magnesium	Mg^{2+}	Oxide
	Calcium	Ca^{2+}	Sulphide
	Zinc	Zn^{2+}	
	Iron (II)*	Fe^{2+}	
	Copper (II)*	Cu^{2+}	
3	Aluminium	Al^{3+}	Nitride
	Iron (III)*	Fe^{3+}	

Some elements show variable valency, represented by Roman numerals in brackets.

Rules for Writing Chemical Formulas

The formula of a compound is written by placing symbols of constituent elements side by side. The more metallic element's symbol is writte
more than one are enclosed in brackets. If valencies have a highest common factor, divide to get the simplest ratio. The compound must be

Relative Mass

Atomic and Molecular Mass

Scientists use relative mass scale to compare masses of atoms. The atomic mass unit (amu) is defined as 1/12th the mass of one carbon-12 atomic masses in a molecule. Formula unit mass is the sum of atomic masses in a formula unit of a compound.

Solved Examples

Example (a): A sample of vitamin C contains 2.58×10^{24} oxygen atoms. How many moles of oxygen atoms are present?

Solution:

Number of moles = Given number of particles / Avogadro's number

$= 2.58 \times 10^{24} / 6.022 \times 10^{23}$

$= 4.284$ moles

Example (b): Write one word for the following:

(i) In a balanced chemical equation, the sum of masses of reactants and products remains unchanged.

(ii) A group of atoms carrying a fixed charge on them.

Solution:

(i) Law of conservation of mass

(ii) Polyatomic ion

Example (c): Write chemical formulae of the following compounds:

(i) Sodium phosphate

(ii) Ammonium carbonate

Solution:

(i) Na_3PO_4

(ii) $(NH_4)_2CO_3$

Practice Set

- **Level 1 (Easy):** Define valency and explain its importance in chemical formula writing.
- **Level 2 (Moderate):** Explain the law of definite proportions with an example.
- **Level 3 (Challenging):** Calculate the number of moles in 3.01×10^{23} atoms of nitrogen.

Answer Key

Level 1: Valency is the combining capacity of an element. It helps determine how atoms combine to form compounds by indicating how mar

Level 2: The law of definite proportions states that a chemical compound always contains the same elements in the same proportion by ma

Level 3: Number of moles = Number of atoms / Avogadro's number = 3.01×10^{23} / 6.022×10^{23} = 0.5 moles.

Quick Reference Table

Common Mistakes and Misconceptions

Glossary

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