

# CHEMISTRY

## CLASS NOTES FOR CBSE

### Chapter 03. Atoms and Molecules

All matter is made up of small particles called atoms and molecules. Different kinds of atoms and molecules have different properties due to which different kinds of matter also show different

#### 01. Laws of chemical combination

There are three important laws of chemical combination. These are :

- Law of conservation of mass (or matter),
- Law of constant proportions, and
- Law of multiple proportion

##### Law of conservation of mass

Matter is neither created nor destroyed in a chemical reaction. The law of conservation of mass means that in a chemical reaction, the total mass of products is equal to the total mass of reactants. There is no change in mass during a chemical reaction.



##### Law of constant proportions

A chemical compound always consists of the same elements combined together in the same proportion by mass. For example, water is a compound which always consists of the same two elements, hydrogen and oxygen combined together in the same constant proportion of 1:8 by mass (1 part by mass of hydrogen and 8 part by mass of oxygen).

#### 02. Dalton's atomic theory

The theory that all matter is made up of very tiny indivisible particles (atoms) is called atomic theory of matter.

Dalton put forward his atomic theory of matter in 1808. The various postulates (or assumptions) of Dalton's atomic theory of matter are as follows :

- All the matter is made up of very small particles 'atoms'
- Atoms cannot be divided.
- Atoms can neither be created nor destroyed.
- Atoms are of various kinds. There are as many kinds of atoms as are elements.



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- All the atoms of a given element are identical in every respect, having the same mass size and chemical properties.
- Atoms of different elements differ in mass, size and chemical properties.
- Chemical combination between two (or more) elements consists in the joining together of atoms of these elements to form molecules of compounds.
- The ‘number’ and kind of atoms in a given compound is fixed.
- During chemical combination, atoms of different elements combine in small whole numbers to form compounds.
- Atoms of the same elements can combine in more than one ratio to form more than one compound.

#### Drawbacks of Dalton’s atomic theory

It is now known that some of the statements of Dalton’s atomic theory of matter are not exactly correct. Some of the drawbacks of the Dalton’s atomic theory of matter are given below:

- One of the major drawbacks of Dalton’s atomic theory of matter is that atoms were thought to be indivisible (which cannot be divided). We now know that under special circumstances atoms can be further divided into still smaller particles called electrons, protons and neutrons. So atoms are themselves made up of three particles : electrons, protons and neutrons.
- Dalton’s atomic theory says that all the atoms of an element have exactly the same mass, It is however, now known that atoms of the same element can have slightly different masses.
- Dalton’s atomic theory said that atoms of different elements have different masses. It is however, now known that even atoms of different elements can have the same mass.

### 03. Atoms

An atom is the smallest particle of an element that can take part in a chemical reaction. Atoms are very, very small size. The size of an atom is indicated by its radius which is called ‘atomic (radius) of atom’. Atomic radius is measured in ‘nanometres’ (which is a very, very small unit of measuring length). The symbol of a nanometre is nm.

$$1 \text{ nanometre} = \frac{1}{10^9} \text{ Metre}$$

$$\text{or} \quad 1 \text{ nm} = \frac{1}{10^9}$$

$$\text{or} \quad 1 \text{ nm} = 10^{-9} \text{ m}$$

Hydrogen atom is the smallest atom of all.

The atomic radius of a hydrogen atom is 0.037 nanometre (or 0.037 nm )



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## 04. Symbols of elements

### Dalton's symbols of elements

Dalton's Symbols of Elements

Dalton was the first scientist to use the symbols to represent elements in a short way.

Element	Dalton's symbol
Hydrogen	⊙
Carbon	●
Oxygen	○
Phosphorus	⊖
Sulphur	⊕
Platinum	Ⓟ
Iron	Ⓛ
Copper	Ⓒ
Silver	Ⓢ
Gold	Ⓜ
Lead	Ⓛ
Mercury	Ⓜ

It was J.J Berzelius of Sweden who proposed that the first letter (or the first letter and another letter) of the name of an element be used as its symbol.

### Modern symbols of elements

The symbol of an element is the “first letter” of the english name or latin name of the element. for the element. For Example,

The symbol of Hydrogen is H (First letter of name)

The symbol of Oxygen is O (First letter of name)

### Symbols derived from english name of the elements

English name of the element	Symbol
(i) Hydrogen	H
(ii) Helium	He
(iii) Lithium	Li
(iv) Boron	B
(v) Carbon	C
(vi) Nitrogen	N

### Symbols derived from latin name of the element

English name of the element	Symbol	Latin name of the element
(i) Sodium	Na	Natrium
(ii) Potassium	k	Kalium
(iii) Iron	Fe	Ferrum
(iv) Copper	Cu	Cuprum
(v) Silver	Ag	Argentum



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