BAL BHARATI PUBLIC SCHOOL, PITAMPURA, DELHI – 110034

SUBJECT : - CHEMISTRY

CLASS - IX

CHAPTER-3: ATOMS AND MOLECULES

Week:21st DECEMBER to 24th DECEMBER2020

Guidelines

- Refer to the content given below and view the links.
- These notes will help you to understand the concept and complete the assignment that follows.

. • The assignment is to be done in the Chemistry notebook.

- Please read Science NCERT book before you begin answering.

Instructional Aids / Resources:

NCERT link for ch-3 is given below:

https://ncert.nic.in/ncerts/l/iesc103.pdf

YouTube LINKS:

For better understanding, refer to the given YouTube links: -

https://www.youtube.com/watch?v=qw_txG0hUXg

https://www.youtube.com/watch?v=URKyMXNErU0

Learning Outcomes:

Each student will be able to:

1. Understand the concept of Atom as a matter
2. Understand and apply laws of chemical combination
3. Relate and analyse the laws of chemical combinations.
4. Understand the importance of symbols of atoms
5. Calculate the Atomic mass of an atom

Sub Topics:

1. Introduction

2. Laws of chemical combination

a) Law of conservation of mass

b) Law of constant or definite proportion

3. Dalton Atomic Theory

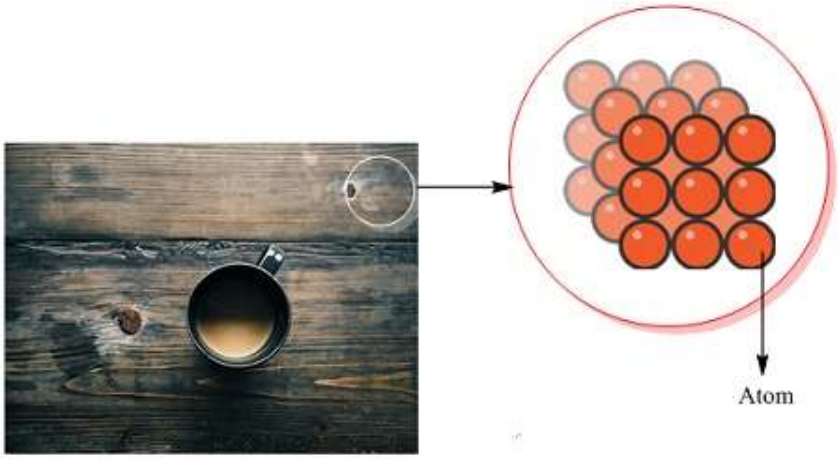
4. Atoms and naming of atoms

5. Determination of Atomic mass

LESSON DEVELOPMENT

1. INTRODUCTION

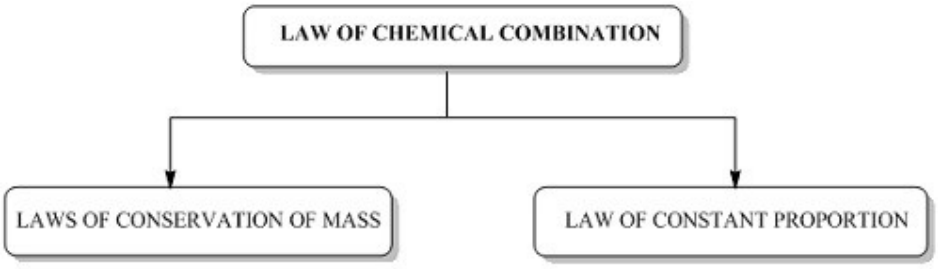
The entire Universe is composed of matter and energy. Energy is the aptitude to perform a work. On the other hand, matter has mass and occupies space. Maharishi Kannad postulated that if we go on dividing matter, we will derive smaller and smaller particles which on further division give off further smaller particles finally leading to the derivation of the smallest particle that cannot be further divided. He named these particles to be parmanu or atom. Matters are composed of basic elements that cannot be broken down to substances with different chemical or physical properties.



2. LAWS OF CHEMICAL COMBINATION

To understand the chemistry of the compounds, it is essential to devise a theory that accounts for both qualitative and quantitative interpretations during chemical changes.

The laws were laid down by Antoine L. Lavoisier.



a. Laws of conservation of mass

The law states that mass can neither be created nor destroyed in a chemical reaction i.e. Total masses of reactants is equal to the sum of masses of products and the masses of unreacted reactants. For instance, the reaction of carbon with oxygen to produce carbon-dioxide involves conservation of mass in the following way.

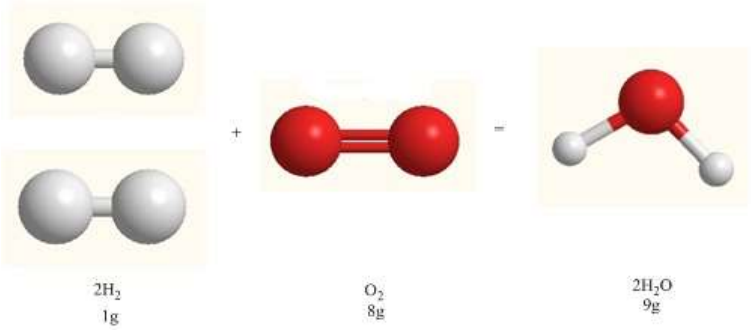
$C\ (12g) + O_2\ (32g) \longrightarrow CO_2\ (44g)$

Here we used 12 g of carbon and 32 g of oxygen. After reaction, the amount of carbon – dioxide produced will be 44g i.e. the sum total of the amount of carbon and oxygen used.

b. Laws of constant proportion

The law states that in a chemical substance the elements are always present in a definite proportion by mass. It is also termed as law of definite proportion.

For instance, the ratio of hydrogen and oxygen in water obtained from any source is 1:8 i.e. 1g of hydrogen and 8g of oxygen together make up 9g of water.



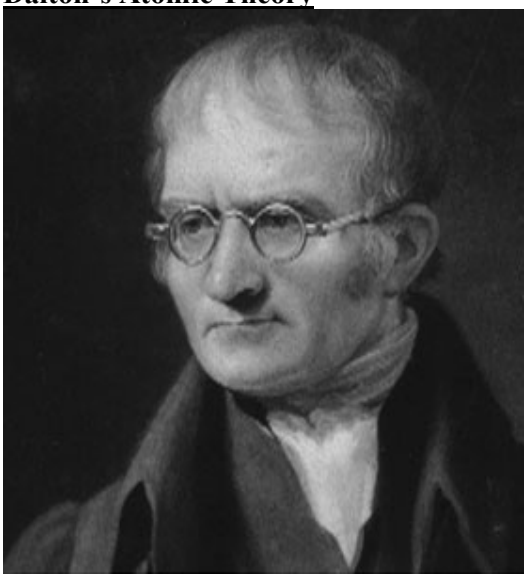
Similarly, the ratio of nitrogen and hydrogen in ammonia is 14:3.

Atoms

According to John Dalton, all elements, compounds or mixtures are composed of some small particles which cannot be further divided into smaller particles. They are known as atoms. They are referred to as the basic building blocks of an element, compound or mixture. They are very small and their radius can be measured in nanometres.

Atomic radius is measured in nanometres. $1/10^9$ m = 1 nm or 1m = 10^9 nm.

Dalton's Atomic Theory

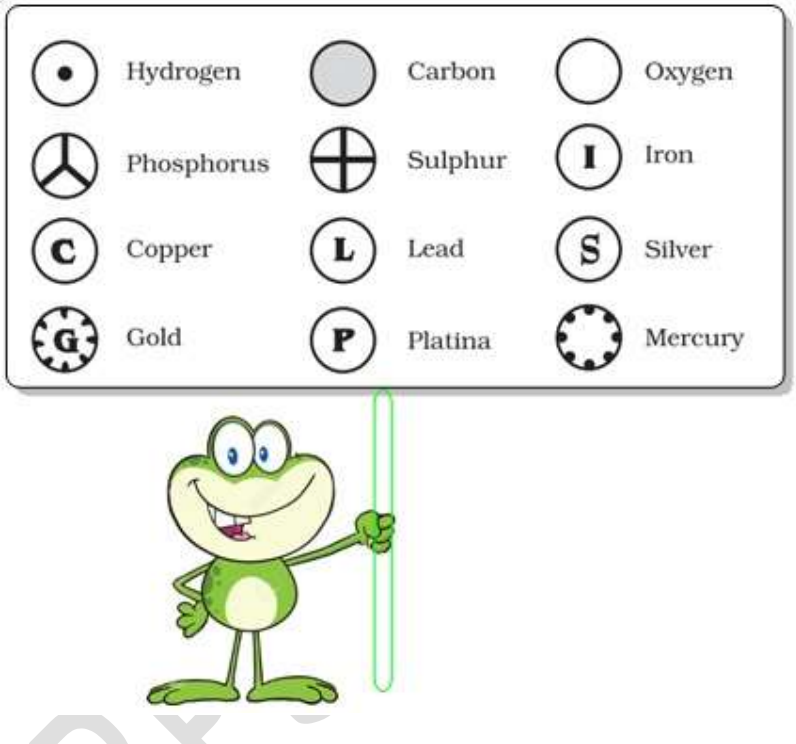


John Dalton

The postulates of this theory may be stated as follows:

- Matters are composed of very tiny particles called atoms.
- These particles are too small to see and cannot be created or destroyed in a chemical reaction.
- Atoms of a specified element are identical in mass and chemical properties.
- Atoms of different elements have different masses and chemical properties.
- Atoms combine in the ratio of small whole numbers to form compounds.
- The relative number and kinds of atoms are constant in a given compound.

Naming Atoms

- Suppose there are ten students in your class but they do not have their names. Now if you want to call any one of your friends, how would you call them without any specification that denotes them particularly?
- At that time calling through their names makes it easier to call them. Similarly, atoms too possess their specific names so that they can be denoted by their names. Initially Dalton used symbols to denote the elements. Using one symbol meant one atom of that element.
- 

Symbols of some commonly known elements given by Dalton:

The names of the elements were named in accordance with the place they were derived from. For instance, copper was excavated from Cyprus.

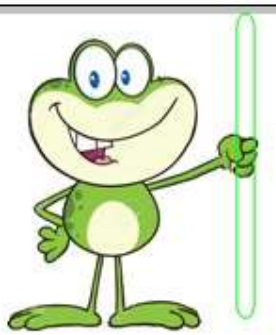
Then, later on Berzilius insisted on using the first single or the first two alphabets to denote the element. But now-a-days IUPAC (International Union of Pure and Applied Chemistry) assigns the names of the elements.

Symbols of atoms of different elements

- There are 115 elements present on the earth till now.
- Symbols of elements are either the first letter or the first two letters of the name of the elements.
- First letter of the symbols is always capital. For instance, H for hydrogen, Al not AL for aluminium, Co for cobalt.

- Some of the names involve the first letter of the element name and the letter that appears later in it. For instance, Cl for chlorine, Zn for zinc etc.
- Some of the elements have their symbols derived from their names in Latin or Greek. For instance, Na (natrium) for sodium, Fe (Ferrous) for iron, K (kalium) for potassium.

HYDROGEN	**H**	CARBON	**C**	OXYGEN	**O**
PHOSPHORUS	**Ph**	SULPHUR	**S**	IRON	**Fe**
COPPER	**Cu**	LEAD	**Pb**	SILVER	**Ag**
GOLD	**Au**	PLATINA	**Pt**	MERCURY	**Hg**



Elements with modern symbols:

Atomic mass

Atomic mass refers to the mass of an atom. It depicts how many times an atom of an element is heavier than one-twelfth ($1/12^{th}$) the mass of one atom of carbon-12 of mass of one carbon atom. The relative atomic masses of all elements have been established with reference to an atom of carbon-12. It is measured in unit called amu (atomic mass unit). 1/12 of the mass of one atom of carbon is termed as relative atomic mass. It does not possess a unit.
Mathematically,

mass of one atom of an element = atomic mass **X** (1/12th) of the mass of one atom of carbon.

Or

atomic mass = mass of one atom of an element / (1/12th) of the mass of one atom of carbon.

Easy way to calculate atomic mass of oxygen atom:

The Proton number Z = 8
The Neutron number N = 8
The atomic mass of the oxygen atom is given by 15.9994 amu i.e. nearly 16.

ASSIGNMENT

Q1. Which postulate of Dalton's atomic theory is the result of the law of conservation of mass?

Q2. Which postulate of Dalton's atomic theory can explain the law of definite proportions?

Q3. Hydrogen and oxygen combine in the ratio of 1:8 by mass to form water. What mass of oxygen gas would be required to react completely with 3 g of hydrogen gas?

Q4. In a reaction, 5.3g of sodium carbonate reacted with 6 g of acetic acid. The products were 2.2 g of carbon dioxide, 0.9 g water and 8.2 g of sodium acetate. Show that these observations are in agreement with the law of conservation of mass.

Q5. When 3.0g of carbon is burnt in 8.00 g of oxygen, 11.00 g of carbon dioxide is produced. What mass of carbon dioxide will be formed when 3.00g of carbon is burnt in 50.00 g of oxygen? Which law of chemical combination will govern your answer?

Q6. Which of the following represents 12 u?
(a) Mass of 1 hydrogen atom
(b) Mass of C-12 atom
(c) Mass of 0-16 atom
(d) 1/12th of mass of C-12 atom.

Q7. The chemical symbol for barium is:
a.B
b.Ba
c.Be
d.Bi

Q8. The chemical symbol P stands for:
a.Phosphorus
b.Potassium
c.Polonium
d.Promethium

Q9. The percentage of copper and oxygen in samples of CuO obtained by different methods were found to be the same. This illustrates the law of:
a.Constant proportion
b.Conservation of mass
c.Multiple proportions
d.Reciprocal proportions

Q10. In compound A, 1.00g of nitrogen unites with 0.57 g of oxygen. In compound B, 2.00g of nitrogen combines with 2.24g of oxygen. In compound C, 3.00g of nitrogen combines with 5.11g of oxygen. These results obey:

a.Law of constant proportion
b.Law of multiple proportion
c.Law of reciprocal proportion
d. Dalton's law of partial pressure

ALTERNATE ACADEMIC CALENDAR ACTIVITIES

ACTIVITY 1

Based on the Air Quality Index provided for different cities in the given link:

- Students may find out the air quality of different states in general.

- Students may present their findings in the form of an appropriate table, graph, etc.
- Students may make a list of the different prominent air pollutants and find out using internet the possible sources of such pollutants.

Link: https://cpcb.nic.in//

ACTIVITY 2

Students may watch the given videos on air pollution in order to have an idea about atmosphere and air pollution.

Live interaction on Air pollution https://www.youtube.com/watch?v=lhYClwdF5gU

Live interaction on Air pollution https://www.youtube.com/watch?v=4XknE275G88

• Students may describe the hypothetical situation if there is no atmosphere by designing a poster.