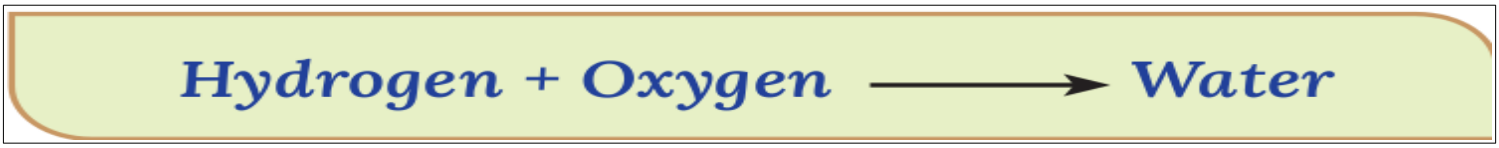
ELEMENTS AND COMPOUNDS

Molecules are the smallest, independent and stable particles that have all the fundamental properties of a pure substance.

Magnesium + Hydrochloric Acid→ Magnesium Chloride + Hydrogen



- All matter is made up of minute particles called atoms.
- An atom is the smallest particle that can participate in a chemical reaction.
- An atom cannot be divided during a chemical reaction.
- An atom cannot be created or destroyed.
- All atoms of an element are of the same size, property and mass.
- Atoms of different elements differ in their size, property and mass.

Molecules	Atoms in a molecule
Ammonia	One atom of nitrogen Three atoms of hydrogen
Oxygen	Two atoms of oxygen
Chlorine	Two atoms of chlorine
Methane	One atom of carbon Four atoms of hydrogen
Hydrogen	Two atoms of hydrogen
Carbon dioxide	One atom of carbon Two atoms of oxygen

Elements are pure substances made up of the same type of atoms. They cannot be further divided into components through chemical reactions.

• Compounds are pure substances formed by the combination of atoms of two or more elements in a fixed ratio. These can be dissociated into constituent elements through chemical reactions.

Categorise the following into elements and compounds.

Oxygen, water, salt, sugar, carbon, nitrogen, carbon dioxide, ammonia, magnesium oxide

Elements	Compounds
oxygen carbon nitrogen	water salt sugar carbondioxide ammonia magnesium oxide

The modern symbol system of representing elements by letters was introduced by a scientist named Berzelius.

Some elements have symbols based on their Latin names.

Element	Latin name	Symbol
Sodium	Natrium	Na
Potassium	Kalium	K
Iron	Ferrum	Fe
Gold	Aurum	Au
Copper	Cuprum	Cu

Find out how the elements given below got their names.

- Chromium **colour**
- Iridium **rainbow**
- Neptunium **planet**

Lavoisier made the earliest attempts to classify elements. He classified the then-known elements into metals and non-metals.
Dobereiner classified the elements of similar properties into groups of three. These groups were called triads.
Newlands found that when elements were arranged in ascending order of atomic mass, each eighth element was a repetition of the first in its properties. He compared this to the seven notes in music.
A scientist named Mendeleev arranged the 63 elements known till that day in ascending order of their atomic masses and prepared a table. It was found that elements with common properties were repeated at regular intervals.
The physical and chemical properties of elements are the periodic functions of their atomic mass-**Mendeleev's Periodic Law.**

Characteristics

- Elements were arranged in the ascending order of atomic mass. Blank spaces were left for elements to be discovered and their properties were predicted.
- Elements with similar properties were grouped together to simplify the study of elements and their compounds.

Is there any difference between 2N and N_2?
2N means 2 atoms of nitrogen whereas N_2 means 1 molecule of nitrogen.
What is the total number of atoms in $2N_2$? --4.

Molecule	Number of atoms	Category
He	1	Monoatomic elements.
O_2	1	Diatomic elements.
S_8	1	Polyatomic elementss.
H_2	1	diatomic elements
P_4	1	polyatomic elements
Ne	1	monoatomic elements
Cl_2	1	diatomic elements
Ar	1	monoatomic elements
O_3	1	polyatomic elements

Chemical formula of the molecule represent one molecule of a substance.

2He → 2 Helium atoms / 2 Helium molecules

3Ne→ 3 Neon atoms / 3 Neon molecules

Substance	No. of molecules	No. of atoms
H_2	1	$1 \times 2 = 2$
$5O_2$	5	5x2=10
$6N_2$	6	6x2=12
$4Cl_2$	4	4x2=8
S_8	1	1x8=8

Complete the table given below.

Compound	No. of molecules	No. of atoms
$2HCl$	2	H – 2×1 = 2 Cl – 2×1 = 2 4
$4SO_2$	4	S=4x1=4 O=4x2=8 12
$3C_2H_5OH$	3	C=3x2=6 H=5x3=15 O=1 H=1 =23
$2C_6H_{12}O_6$	2	C=2X6=12 H=2X12=24 O=2X6=12 =48

1. Match the following.

A Element	B Symbol	C Base
Francium	Rb	continent
Curium	Eu	satellite
Rubidium	Ti	colour
Neptunium	Cm	country
Europium	Fr	planet
Titanium	Np	scientist

2.Cl is the symbol of the element chlorine. How can we represent two chlorine atoms and one chlorine molecule using this symbol?

2Cl, Cl_2

3.Find the number of atoms in each of the following and write which of them contains the most number of atoms.

$5NH_3$, $2H_2O$, $5NO_2$, $4CO_2$

$5NH_3$=20, $2H_2O$=5, $5NO_2$=15, $4CO_2$=12

4. Complete the table.

Element	Basis of nomenclature	Symbol
Indium	Indigo - colour	In
.....	Rutherford - Scientist	Rf
Germenium	germany-country.....	.....Ge.....
Silver	Argentum - Latin name	.....Ag.....

5.The names of some scientists are given.
(Dobereiner, Lavoisier, Newlands, Mendeleev)
Match the statements given below with the names given in brackets.

i.The chemical and physical properties of the elements are functions of their atomic masses---- Mendeleev

ii.Elements were divided into groups containing three elements (triads) with similar properties-- Dobereiner

iii. The elements were classified into metals and non-metals---Lavoisier.

iv. When the elements were arranged in ascending order of atomic masses, it was found that every eighth element was a repetition of the first, in terms of its properties--- Newlands.