BISHOP SCOTT BOYS' SCHOOL

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STUDY COURSE MATERIAL-5
CHEMISTRY
SESSION-2020-21
CLASS- IX

TOPIC: ATOMS AND MOLECULES

DAY-1

❖ **NCERT LINK**

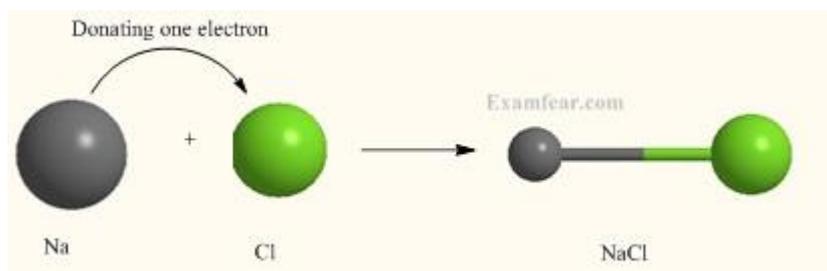http://ncert.nic.in/ncerts/l/iesc103.pdf

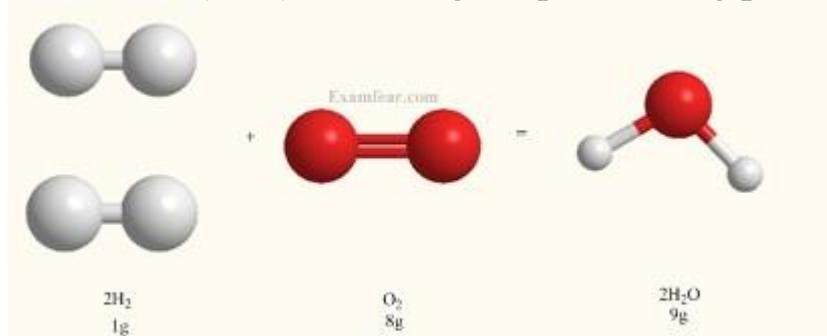❖ **TEACHING MATERIAL**

Molecules of compounds

Atoms of different elements associate in definite proportions to form molecules of different compounds.

For instance,

o In sodium chloride NaCl is 1:1.

Donating one electron

Na   Cl   NaCl

o In water (H_2O) ratio of hydrogen and oxygen is 1:8.

$2H_2$ O_2 $2H_2O$
1g   8g   9g

LINK-1 : https://www.youtube.com/watch?v=C0Qaf-UJ2XQ
LINK-2 : https://www.youtube.com/watch?v=ukyHp5W8bJY

❖ **ASSIGNMENT**

1) How many atoms are present in H_2SO_4 ?

DAY-2

❖ **TEACHING MATERIAL**

Ions
Metals and non-metals leads to the formation of Compounds that possess charged species. These charged species are called ions.

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These charged species can be either positively charged called cation or negatively charged called anion. For instance, In sodium chloride (NaCl), Na exist as cation Na^+ whereas Cl exist as anion Cl^-.
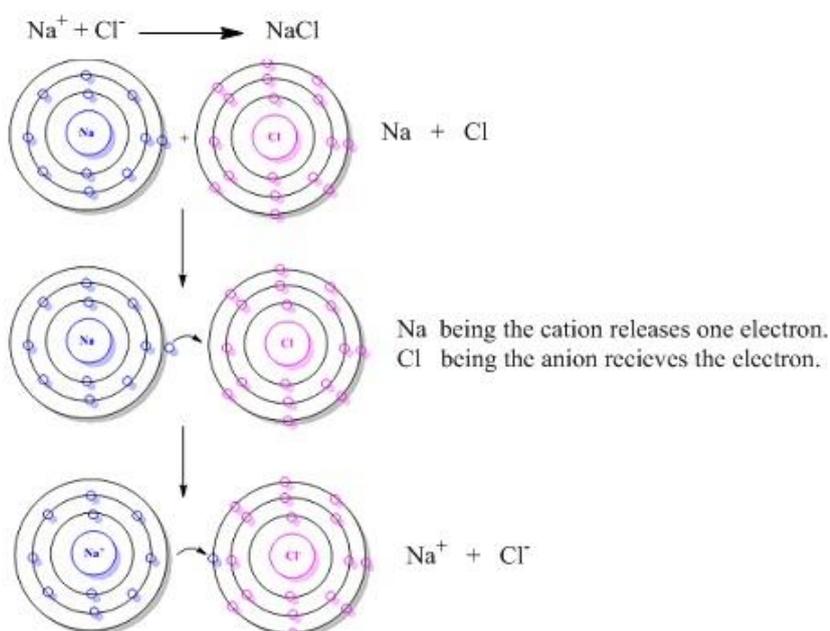
They can be further classified into following two types:
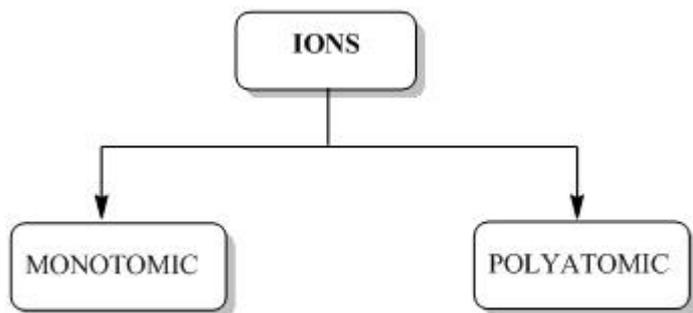
Ions possessing only one atom are termed as monoatomic ions. For instance, Na^+, K^+ etc.

Ions possessing more than one atom are termed as polyatomic ions. For example, CO_3^{2-}, NO_3^- etc.

❖ VIDEO-LINKS

LINK – 1 : https://www.youtube.com/watch?v=EIAaGHK5pjA

❖ ASSIGNMENTS

1) What are polyatomic ions? Give examples.

DAY-3

❖ TEACHING MATERIAL

Valency

It is the ability of an atom to gain or lose electron in order to achieve the noble gas configuration. It refers to the ability of an element to combine with other element. It is obtained by determining the number of electrons in the outermost shell (also called valence shell) of each atom of an element. For instance, sodium has 1 electron in its outermost shell and hence valency of sodium is 1.
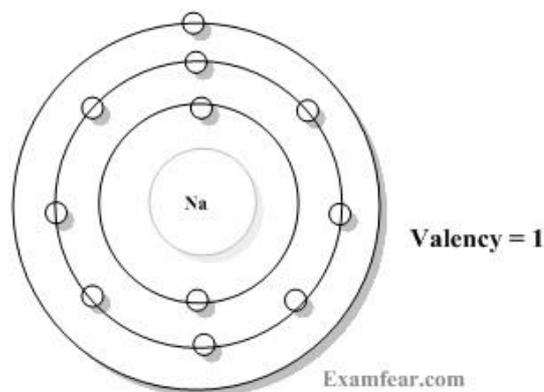
Valency = 1

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Fig. Atomic number of sodium is 11. So the electronic configuration stands out to be 2,8,1 i.e. there is one electron in the outermost shell. In order to gain inert gas configuration it is better for sodium to lose one electron and achieve the nearest noble gas configuration of neon with atomic number 10.

On the other hand atomic number of chlorine is 17. So electronic configuration stands out to be 2,8,7. In order to achieve noble gas configuration to become stable it requires one electron then it will acquire the configuration of neon (noble gas). Therefore valency of chlorine is1.

Valency = 1

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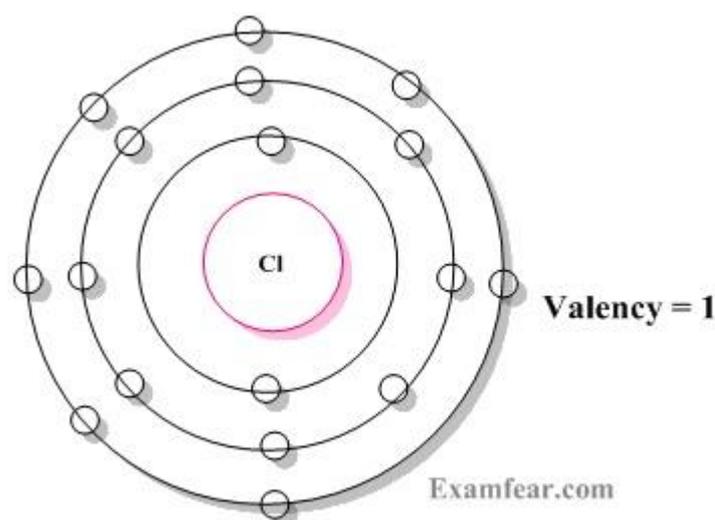
That means the every element tries attain stability by acquiring noble gas configuration for which it tries to either gain electron or donate electron. Na donates 1 electron in its outermost shell to attain noble gas configuration whereas chlorine acquires 1 electron in its outermost shell to acquire noble gas configuration.

Metals are electropositive because they have tendency to lose electrons. E.g. Na^+ whereas non-metals are electronegative since they have a tendency to gain electrons. E.g. Cl^-.
We can find the valency of an element through its atomic number and its electronic configuration. For instance,

o In Boron with atomic number 5, the configuration stands out to be 2,3 and it has 3 electrons in its outermost shell. Being a metal Boron has a tendency to lose its electrons to gain noble gas configuration and shows its valency 3.

- o Whereas in Fluorine with atomic number 9, the configuration stands out to be 2,7 and it has 7 electrons in its valence shell and needs to gain 1 more electron to achieve noble gas configuration and hence its valency is 1.

❖ **VIDEO-LINKS**

LINK-1: https://www.youtube.com/watch?v=EIAaGHK5pjA
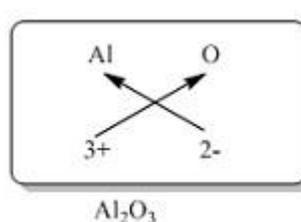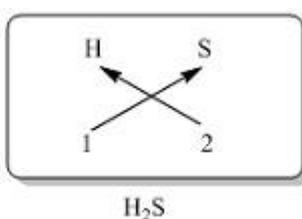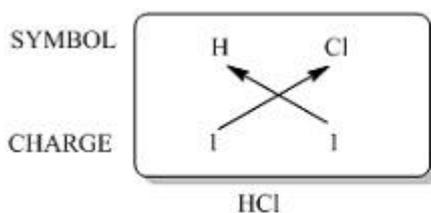LINK-2 : https://www.youtube.com/watch?v=tVH6XpPj8-I&t=35s
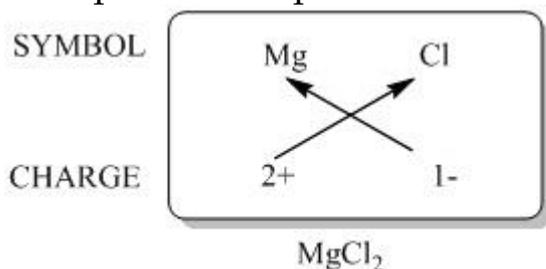
❖ **ASSIGNMENT**

1. Calculate the valency of Magnesium and aluminium .

DAY-4

❖ **TEACHING MATERIAL**

## Writing chemical formula

- o **RULE I**: Cross multiply the valencies of the elements to form the formula of the respective compound.

$MgCl_2$

HCl H_2S Al_2O_3

In the above formulas Rule I is followed i.e. cross multiply the valencies of the elements to form the formula of the respective compound.

- o **RULE II**: If a compound consists of both metallic as well non-metallic elements then name or symbol of the metal is considered first.

MgCl$_2$
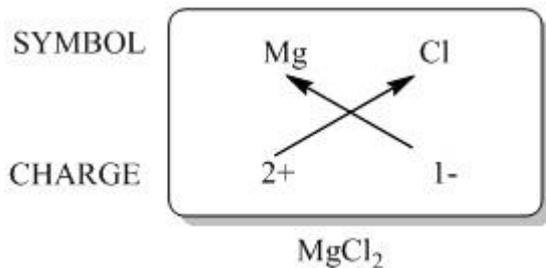
Where Mg (magnesium) is a metal and Cl (chlorine) is a non-metal.

- **RULE III**: In case compounds are formed from polyatomic ions then the ion is enclosed in a bracket before writing the number to indicate the ratio. But in case the number of polyatomic ion is one then there is no need for bracket.

NaNO$_3$
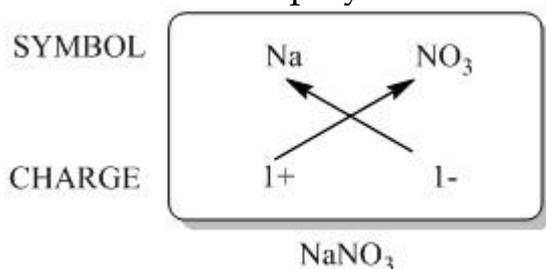
Since the number of polyatomic ion is one therefore no brackets are required.
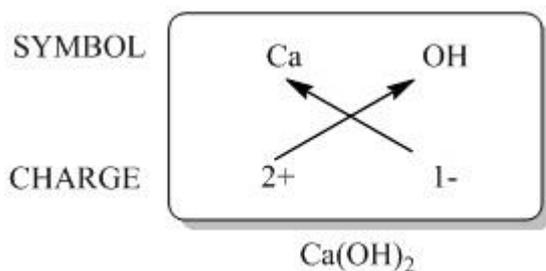
Ca(OH)$_2$

The formula for calcium hydroxide is Ca(OH)$_2$. The brackets around oh with subscript 2 implies the presence of two hydroxyl group joined to one calcium atom.
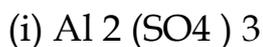
❖ **VIDEO-LINKS**

LINK – 1 : https://www.youtube.com/watch?v=B-qsoJzWSF0
LINK-2: https://www.youtube.com/watch?v=gIkxhOgoRok

❖ **ASSIGNMENT**

1. Write down the formulae of
(i) sodium oxide
(ii) aluminium chloride
(iii) sodium suphide
(iv) magnesium hydroxide
2. Write down the names of compounds represented by the following formulae:

(i) Al 2 (SO4) 3
 (ii) CaCl2
 (iii) K2 SO4
 (iv) KNO3
(v) CaCO3 .
3. What is meant by the term chemical formula?
4. How many atoms are present in a
(i) H2 S molecule and (ii) PO4 3– ion?

DAY-5

❖ TEACHING MATERIAL

Molecular mass
Molecular mass of a substance is defined as the sum of the atomic masses of all the atoms present in a molecule of a substance. Therefore the relative mass of a molecule is expressed as atomic mass units (amu).

Let us calculate the molecular mass of H_2O. we will find it out by following process.
o   We know the atomic mass of hydrogen is 1u and that of oxygen is 16u.
o   Molecular mass of H_2O containing two hydrogen atoms and single oxygen atom is
$2 \times 1 + 1 \times 16 = 18u$

Formula unit mass
Formula unit mass of a substance is the sum of the atomic masses of all the atoms present in the formula of a respective compound.

Let us calculate the formula unit mass of NaCl. we will find it out by following process
o   We know atomic mass of Na is 23 and that of Cl is 35.5
o   Formula unit mass of NaCl is $1 \times 23 + 1 \times 35.5 = 58.5$ u

❖ VIDEO-LINKS
 LINK -1 : https://www.youtube.com/watch?v=LBmIUWBMw2k

1. Calculate the molecular masses of H_2, O_2, Cl_2, CO_2, CH_4, C_2H_6, C_2H_4, NH_3, $CH_3 OH$.

2. Calculate the formula unit masses of ZnO, Na_2O, K_2CO_3, given atomic masses of $Zn = 65$ u, $Na = 23$ u, $K = 39$ u, $C = 12$ u, and $O = 16$ u.