Chemistry Study Materials for Class 9
(NCERT Based notes of Chapter -03)

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Atoms and Molecules

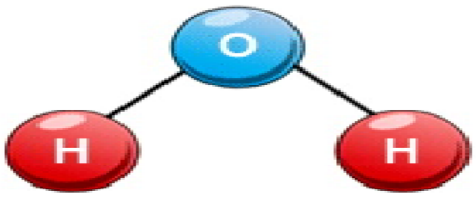
MOLECULES OF COMPOUNDS

When molecule is formed by the combination of two or more atoms of different elements, it is called the molecule of compound.

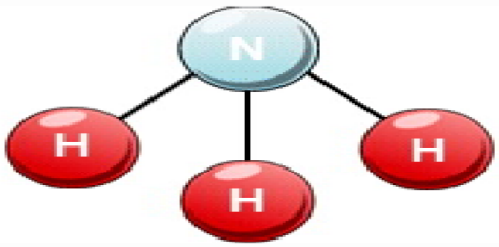
Example: Molecule of water (H_2O). Molecule of water is formed by the combination of two hydrogen and one oxygen atoms.

Molecules of some compounds	
Compound	**Combining Elements**
Water (H_2O)	Hydrogen, Oxygen
Ammonia (NH_3)	Nitrogen, hydrogen
Carbon dioxide(CO_2)	Carbon, oxygen
Hydrogen Chloride (HCl)	Hydrogen, Chlorine
Methane (CH_4)	Carbon, Hydrogen
Ehtane (C_2H_6)	Carbon, hydrogen
Sodium chloride (NaCl)	Sodium, chlorine.
Copper oxide (CuO)	Copper and oxygen

water

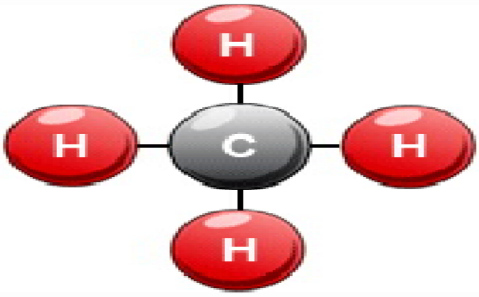


ammonia



carbon dioxide

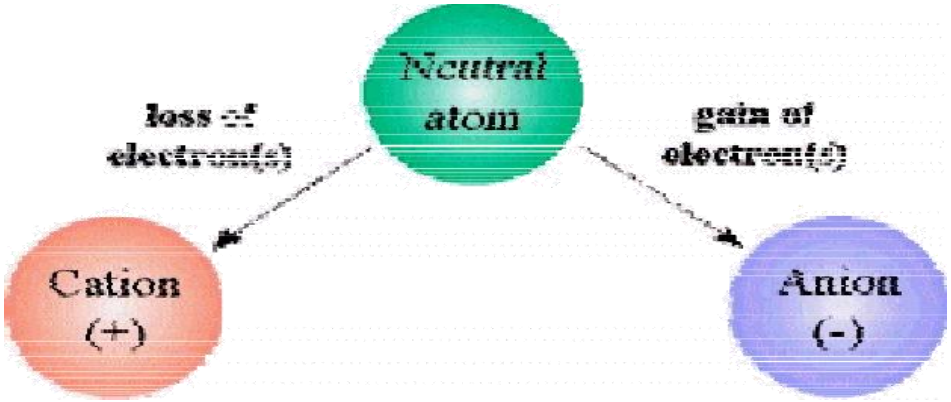
methane



IONS

Atoms of several elements exist in the form of ion. Atoms or molecule with negative or positive charge over them are called ions.

For example: Sodium ion (Na^+), postassiun ion (K^+), Chlorine ion (Cl^-), Fluoride ion (F^-)etc.



Cations: Ions having positive charge over them are called cations.

For example: sodium ion (Na^+), potassium ion (K^+), etc

Anions: Ions having negative charge over them are called anions.

For example: Chloride ion (Cl^-), Fluoride ion (F^-), etc

Monoatomic ions: Ions formed by one atom are called monoatomic ions.

For example: sodium ion (Na^+), potassium ion (K^+), Chloride ion (Cl^-), Fluoride ion (F^-), etc.

Polyatomic ions: Ions formed by two or more atoms are called polyatomic ions. These are group of atoms of different elements which behave as single units, and are known as polyatomic ions.

For example: Ammonium ion (NH_4^+), Hydroxide ion (OH^-), etc

Some Common ions					
Cations		**Anions**		**Polyatomic ions**	
Lithium ion	Li^+	Chloride ion	Cl^-	Hydroxide	OH^-
Sodium ion	Na^+	Fluorine	F^-	Ammonium	NH_4^+
Potassium ion	K^+	Iodide	I^-	Nitrate	NO_3^-
Silver ion	Ag^+	Hydride	H^-	Bicarbonate or Hydrogen carbonate	HCO_3^-
Copper ion	Cu^+	Oxide ion	O^{2-}		
Hydrogen ion	H^+	Sulphide	S^{2-}		
Magnesium ion	Mg^{++}	Nitride	N^{3-}	Sulphate	SO_4^{2-}
Calcium ion	Ca^{++}			Carbonate	CO_3^{2-}
Iron ion	Fe^{++}			Sulphite	SO_3^{2-}
Zinc ion	Zn^{++}			Phosphate	PO_4^{2-}
Copper ion	Cu^{++}				
Aluminium ion	Al^{+++}				

WRITING CHEMICAL FORMULA

Chemical formula of the compound is the symbolic representation of its composition. To write chemical formula of a compound, symbols and valencies of constituent elements must be known. The valency of atom of an element can be thought of as hands or arms of that atom.

Points to remember

- The symbols or formulas of the component radicals of the compound are written side by side.
- Positive radicals are written left and negative radicals on the right.
- The valencies of the radicals are written below the respective symbols.
- The criss-cross method is applied to exchange the numerical value of valency of each radical. It is written as subscript of the other radical.

- The radical is enclosed in a bracket and the subscript is placed outside the lower right corner.
- The common factor is removed.
- If the subscript of the radical is one, it is omitted.

The rules that you have to follow while writing a chemical formula are as follows:

- the valencies or charges on the ion must balance.
- when a compound consists of a metal and a non-metal, the name or symbol of the metal is written first. For example: calcium oxide (CaO), sodium chloride (NaCl), iron sulphide (FeS), copper oxide (CuO) etc., where oxygen, chlorine, sulphur are non-metals and are written on the right, whereas calcium, sodium, iron and copper are metals, and are written on the left.
- in compounds formed with polyatomic ions, the ion is enclosed in a bracket before writing the number to indicate the ratio.

The simplest compounds, which are made up of two different elements are called binary compounds. While writing the chemical formulae for compounds, we write the constituent elements and their valencies as shown below. Then we must crossover the valencies of the combining atoms.

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