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Basic Chemistry

Matter

Has weight and occupies space	Can be Solid, Liquid or Gas

Atoms

Smallest unit that makes up the matter	There are 92 different kinds of atoms in nature.

Element

A simple single material made up of atoms of the same kind.	All the elements that we find in nature are arranged into a table called the Periodic Table.
	- Each element is represented by unique symbol. Each element has its own atomic number.

Molecules

*** A substance can exist in nature either as a single atom or by joining with 2 or more atoms.** *** When 2 or more atoms join together they are called a Molecule.** *** Every element and molecule has a chemical formula which shows how many atoms it has.**	These 2 or more atoms that combine to form a molecule could be of the same element or could be of different elements.	
	For e.g. Oxygen, Nitrogen and Chlorine exist as molecles made up of more than one atom of the same element.	Oxygen has a molecular formula O_2, Hydrogen has it H_2, and Chloring has Cl_2
	For e.g. 1. Water exists as molecules made up of more than 1 atom of different elements that is Hydrogen and Oxygen. (2 Hydrogen and and 1 Oxygen atoms) 2. Carbon dioxide molecule has 1 atom of Carbon and 2 atoms of Oxygen.	1. Water has a molecular formula H_2O. 2. Carbon dioxide has a molecular formula CO_2.

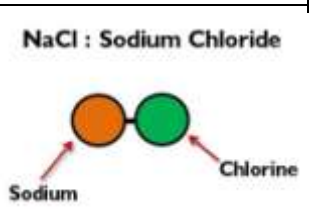
Compounds

*** A compound is a brand new material / substance form when 2 or more elements join chemically.**

*** This compound formed has totally new properties than the elements which it is made up of.**

*** Every compound has its own name and chemical formula which tells us atoms of which elements and how many of those atoms are present in the compound.**

For e.g. Common Salt or NaCl is made when Sodium and Chlorine combine chemically. However, if we just mix Sodium and Chlorine together without any chemical reaction between them, then this will not be called compound but will be called a Mixture.

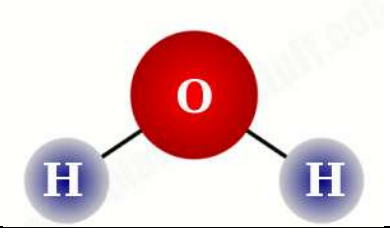


For e.g. Oxygen, Nitrogen and Chlorine exist as molecules made up of more than one atom of the same element.

A Hydrogen molecule exists as H2 (with two atoms of Hydrogen) and an Oxygen molecule exists as O2 (with two atoms of Oxygen).

Water is a compound made up of 2 elements Hydrogen and Oxygen.

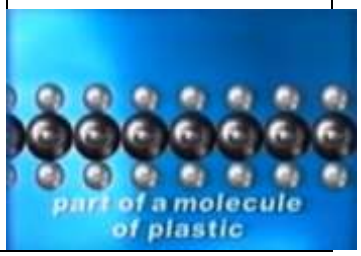
2 atoms which are present in a molecule of Hydrogen combine with one of the two atoms in the molecule of Oxygen to form a molecule of water.



The other atom of Oxygen which is left again combines with another two atoms of Hydrogen.

*** At times compound can contain hundreds or thousands of atoms chemically joined to form huge molecules.**

Plastic is an example of an compound whose molecule contains lots of atoms joint chemically.



NOTE:

1. Since Molecules made of 2 same atoms are called Elements, hence Nitrogen (N_2) and Oxygen (O_2) are also elements like Argon (Ar) and Neon (Ne)

2. However carbon dioxide and water vapor are compounds since there molecules are made up of two different atoms chemically joint together.

3. Hence we see that all compounds are molecules (as they are made by combining 2 or more same or different atoms). However all molecules need not be compounds as they could be made up of 2 or more atoms of the same element.

Formula

A formula represents the no. of atoms of the elements present in molecules.	e.g. In a molecules of Hydrogen, 2 Atoms of hydrogen join together and it is written as H_2, Here 2 is the subscript and represents the no. of atoms in the molecule.

Atomicity

The no. of atoms in a single molecule of an element is called its atomicity	**Monoatomic :** A molecule having only 1 atom of the same element.	e.g. Helium --> He (Monoatomic)
	Diatomic : A molecule having 2 atoms of the same element.	e.g. Oxygen --> O_2 (Diatomic)
	Triatomic : A molecule having 4 atoms of the same element.	e.g. Ozone --> O_3 (Triatomic)
	Tetraatomic : A molecule having 4 atoms of the same element.	e.g. Phosphorus --> P_4 (Tetraatomic)

Valency

Valency of an element is a measure of its combining capacity with other atoms when it forms chemical compounds or molecules.	Depending on their Valency element could be Monovalent, Bivalent, Trivalent.	
	Monovalent Or Univalent Elements	Elements with Valency 1 are called monovalent elements.
		E.g. Hydrogen, Chlorine, Potassium, Sodium.
	Bivalent Or Divalent Elements	Elements with Valency 2 are called Bivalent or Divalent elements.
Valency is determined by the number of atoms that an element needs to join with in order to gain stability. For e.g. the valency of aluminium is 3. This means that aluminium needs to join with 3 atoms of another element to gain stability.		E.g. Oxygen, Magnesium, Manganese, Calcium
	Trivalent Elements	Elements with Valency 3 are called Trivalent Elements.
		E.g. Nitrogen, Aluminium
	NOTE: Some elements have variable valencies.. e.g.Iron (It has valencies of 2 & 3) Copper (has valencies of 1 & 2)	

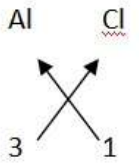
FORMULA MAKING USING VALENCIES

Steps

1. Write the symbols
2. Write the valencies below each symbol
3. Exchange / criss – cross / interchange the valencies

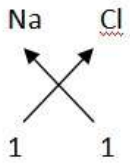
For e.g.

Al has valency of 3 and Chlorine has valency of 1. Therefore, we first write 3 below Al and 1 below Chlorine.
Next we draw interchanging arrows starting from the Number to the Atomic Name.
Then we write the Formula with Al and Cl as follows:



$\therefore AlCl_3$

(Aluminium Chloride)



∴ NaCl

(Sodium Chloride)

Valencies of a few elements are as follows:

SYMBOL	ELEMENT	VALENCE
H	Hydrogen	**1**
He	Helium	**0**
Li	Lithium	**1**
Be	Beryllium	**2**
B	Boron	**3**, 2, 1
O	Oxygen	2
F	Fluorine	0
Ne	Neon	**0**
Na	Sodium	**1**
Mg	Magnesium	**2**
Al	Aluminum	**3**, 1
Ar	Argon	**0**
K	Potassium	**1**, -1
Ca	Calcium	**2**
Cl	Chlorine	**1**