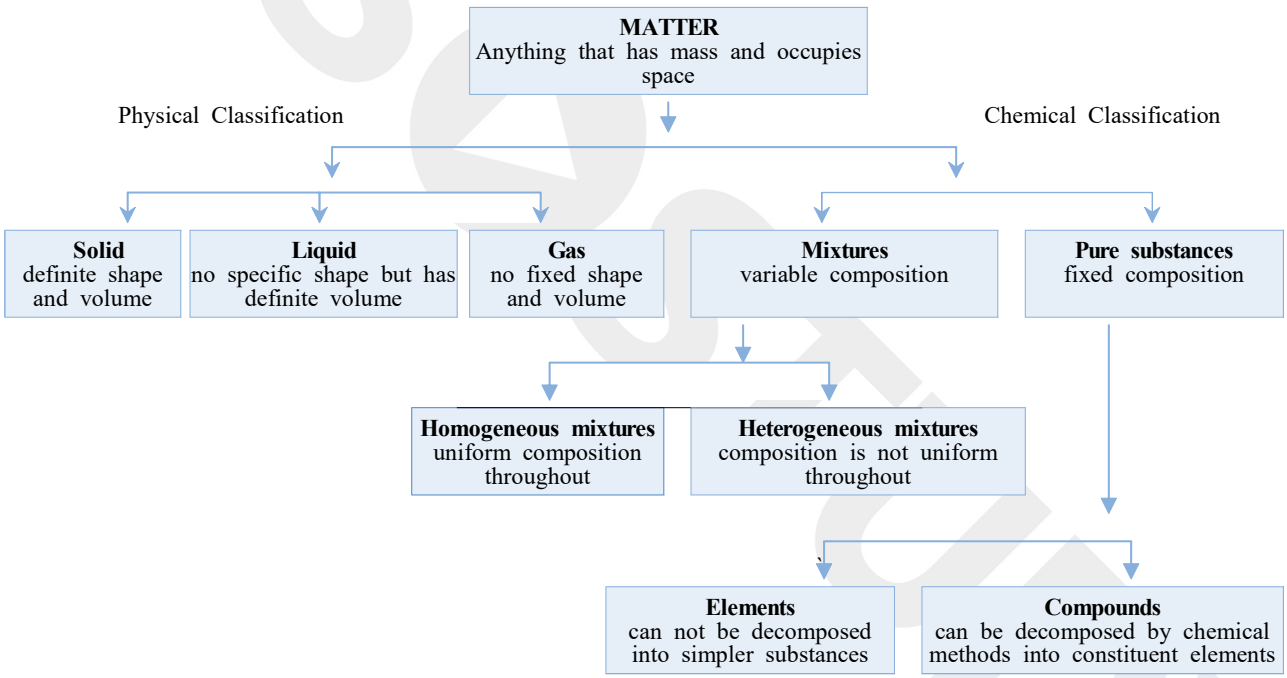
CHEMISTRY

CLASS NOTES FOR CBSE

Chapter 01. Some Basic Concepts of Chemistry

01. Classification of matter

Chemistry deals with the composition, structure and properties of matter. These aspects can be best described and understood in terms of basic constituents of matter: **atoms** and **molecules.** That is why chemistry is called the science of atoms and molecules.



Matter

The thing which occupy space and have mass, which can be felt by our five sense is called as matter. Matter is further classified into two categories :

a. Physical classification
b. Chemical classification

02. Prefixed Used With Units

The S.I. system recommends the multiples such as 10^3, 10^6, 10^9 etc. and fraction such as 10^{-3}, 10^{-6}, 10^{-9} etc. i.e. the powers are the multiples of 3. These are indicated by special

prefixes. These along with some other fractions or multiples in common use, along with their prefixes are given below in Table and illustrated for length (m).

※TABLE : SOME COMMONLY USED PREFIXES WITH THE BASE UNIT

Prefix	Symbol	Multiplication Factor	Example
deci	d	10^{-1}	1 decimetre (dm) = 10^{-1} m
centi	c	10^{-2}	1 centimetre (cm) = 10^{-2} m
milli	m	10^{-3}	1 millimetre (mm) = 10^{-3} m
micro	μ	10^{-6}	1 micrometre (μm) = 10^{-6} m
nano	n	10^{-9}	1 nanometre (nm) = 10^{-9} m
pico	p	10^{-12}	1 picometre (pm) = 10^{-12} m
femto	f	10^{-15}	1 femtometre (fm) = 10^{-15} m
atto	a	10^{-18}	1 attometre (am) = 10^{-18} m
deka	da	10^{1}	1 dekametre (dam) = 10^{1} m
hecto	h	10^{2}	1 hectometre (hm) = 10^{2} m
kilo	k	10^{3}	1 kilometre (km) = 10^{3} m
mega	M	10^{6}	1 megametre (Mm) = 10^{6} m
giga	G	10^{9}	1 gigametre (Gm) = 10^{9} m
tera	T	10^{12}	1 teremetre (Tm) = 10^{12} m
peta	P	10^{15}	1 petametre (Pm) = 10^{15} m
exa	E	10^{18}	1 exametre (Em) = 10^{18} m

As volume is very often expressed in litres, it is important to note that the equivalence in S.I. units for volume is as under: 1 litre (1 L) = 1 dm^3 = 1000 cm^3 and 1 millilitre (1 ml) = 1 cm^3 = 1 cc

03. Different types of masses

One mole

Avogadro's Number (N_A)=6.023×10^{23}. It is the number of atoms present in exactly 12 g of (C^{12}) isotope.

Atomic Weight (*A*)

Atomic weight is the relative weight of one atom of an element with respect to a standard weight.

$$A = \frac{\text{Weight of one atom of an element}}{\frac{1}{12}\text{th part by weight of an atom of } (C^{12}) \text{ isotope}}$$

amu (atomic mass unit)

$$1 \text{ amu} = \frac{1}{12}\text{th part by weight of an atom of } (C^{12}) \text{ isotope}$$

$$= \frac{1}{N_A} g = 1.66\times10^{-24} g$$

Atomic weight (*A*)×amu =Absolute atomic weight.

NOTE ☞ Atomic weight is a relative weight that indicates the relative heaviness oof one atom of an element with respect to amu weight. Atomic weight has no unit because it is the ratio of weights. One mole of an amu = 1.00 g.

Change of Scale for Atomic Weight

If an amu is defined differently as (1/x)th part by weight of an atom of (C^{12})isotope rather (1/12)th part then the atomic weight (A') can be derived as:

$$A' = A\left(\frac{x}{12}\right)$$

Where, A = conventional atomic weight

Molecular Weight (MW)

Like atomic weight, it is the relative weight of a molecule or a compound with respect to amu weight.

$$\text{Molecular Weight} = \frac{\text{Weight of one molecule of a compound}}{\frac{1}{12}\text{th part by weight of an atom of } C^{12} \text{ isotope}}$$

Gram Atomic, Gram Molecular Weight (M)

It is the weight of 1.0 mole (Avogadro's numbers) of atoms, molecules or ions in gram unit. $M = A$ amu $\times$ Avogadro number = A gram Hence, gram molecular weight (M) is numerically equal to the atomic weight or (molecular weight) in gram unit because 1.0 mole of amu is 1.0 g.

04. Law of conservation of mass (Lavoisier-1774):

In any physical or chemical change, mass can neither be created nor be destroyed.

It means:

Total mass of the reactants = total mass of the products.
This relationship holds good when reactants are completely converted into products.
In case the reacting material are not completely consumed the relationship will be-
Total mass of the reactants = Total mass of the products + mass of unreacted reactants.

05. Law of constant composition : [proust 1799]

A chemical compound always contains the same element combined together in fixed proportion by mass.