CLASS 11th

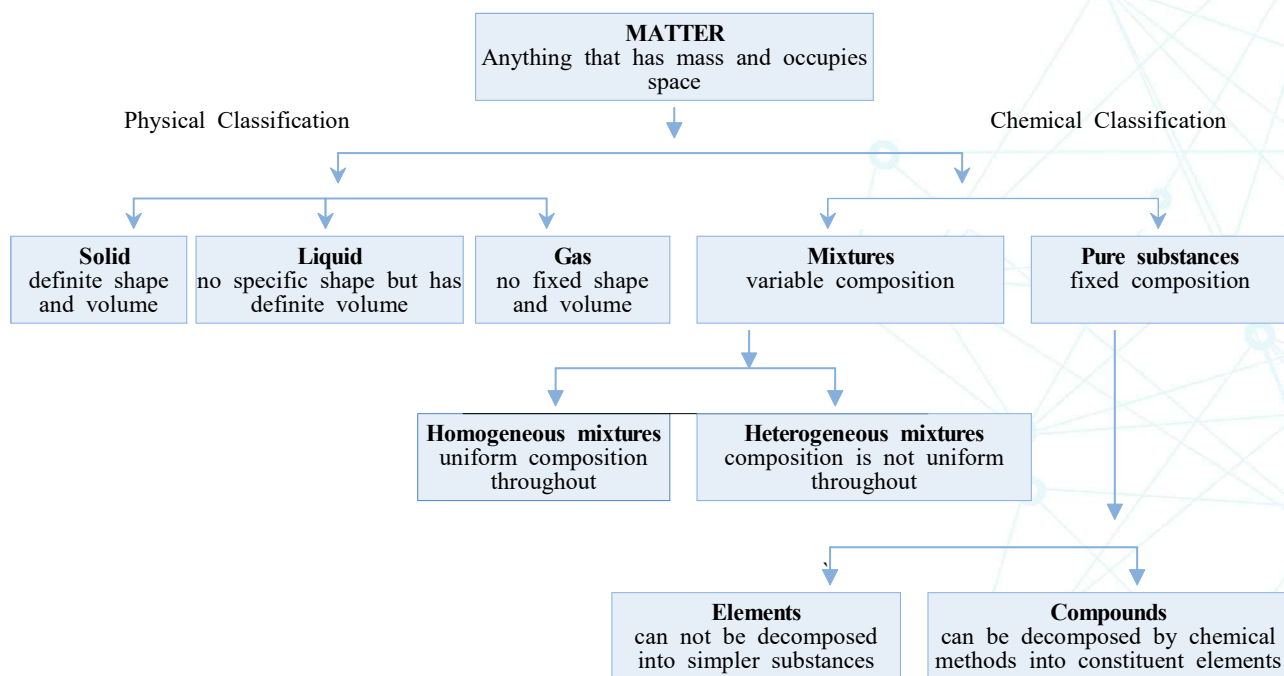# Mole Concept

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.

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                          │          MATTER             │
                          │ Anything that has mass and  │
                          │     occupies space          │
                          └─────────────────────────────┘
    Physical Classification                          Chemical Classification
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Solid	Liquid	Gas	Mixtures	Pure substances
definite shape and volume	no specific shape but has definite volume	no fixed shape and volume	variable composition	fixed composition

Homogeneous mixtures	Heterogeneous mixtures
uniform composition throughout	composition is not uniform throughout

Elements	Compounds
can not be decomposed into simpler substances	can be decomposed by chemical methods into constituent elements

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

Example   Convert 2 atm into cm of Hg.

Solution   2 atm = 2 × 76 cm of Hg = 152 cm of Hg   {1 atmosphere = 76 cm of Hg

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

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

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