

Atom :

The smallest portion of an element, that retain all of the properties of the element.

{Diameter (1/100,000,000 cm.)}

The number atoms in 1 gram- atom is 6.0235×10^{23} (Avogadro number) .

Element :

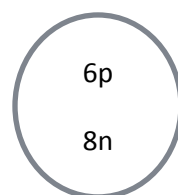
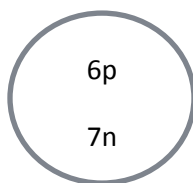
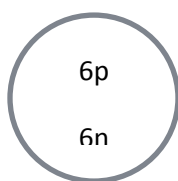
Element are the building blocks of all matter.

An element can be defined as a substance that cannot be broken down into any simpler substance by ordinary chemical means.

(E.g. oxygen, iron) .

Isotopes :

Atoms of an element having the same atomic number but different mass number .



Mass number =12 Mass number =13 Mass number =14

* Three isotopes of carbon , atomic number 6.

Radioisotopes in medicine :

Iodine -131 :

This isotopes is used in the diagnosis and treatment of thyroid conditions .

Technetium -99m :

Tc ^{99m} (m for metastable) is one of the most widely used radioisotopes for various types of scans.

Cobalt - 60:

This radioisotopes is employed in the treatment of many different types of cancer.

Radioactivity :

Radioactivity is the property of emitting radiation from the nucleus of an atom.

The three types of radiation are :

- 1- alpha particles are positively charged helium nuclei.
- 2- beta particles are high speed electrons and are negatively charged .
- 3- gamma rays are a high - energy from electromagnetic radiation and have no charge .

De Broglie equation :

De Broglie concluded that electrons might have wavelength by first combining two relationships, one derived by Einstein, the other by Planck.

Einstein showed that the total energy E of any particle is proportional to its mass M , the proportionality constant being the square of the speed of light in a vacuum, c , or

$$E = mc^2 \text{ (energy of particle of mass } m\text{)}$$

The Planck relationship relating the energy of a wave to its frequency has already

$$E = h \nu \text{ (energy of a wave of frequency)}$$

$$mc^2 = h \nu \quad \nu : \text{wave frequency}$$

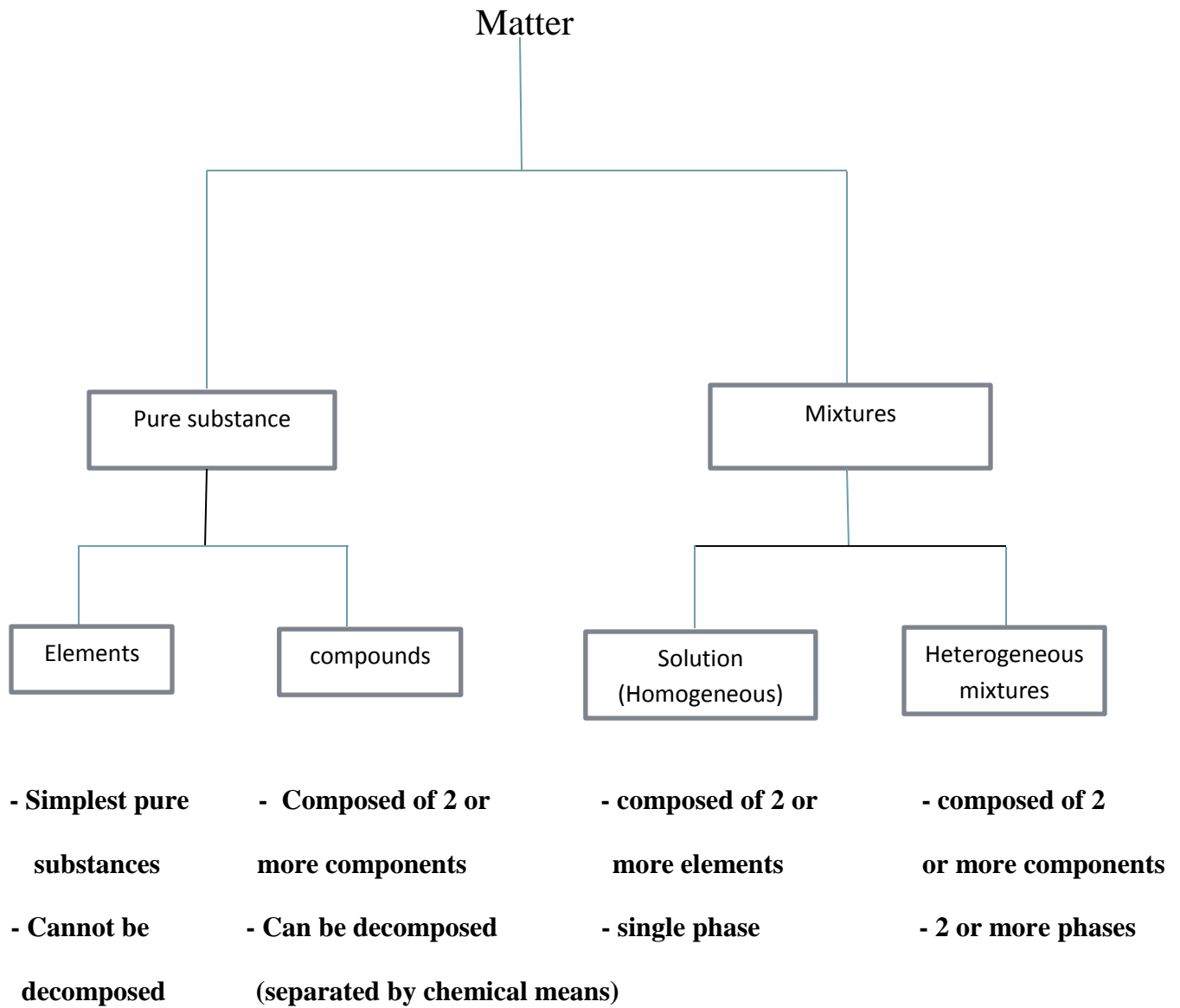
$$\nu \lambda = c \quad \lambda : \text{wave length}$$

$$mc^2 = h \left(\frac{c}{\lambda} \right) \text{ and } m = \frac{h}{\lambda c}$$

Matter :

Matter is anything that occupies space and has weight. States of Matter are solid, liquid, and gas.

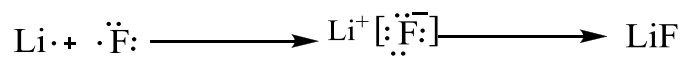
Classification of Matter



Chemical Bonds

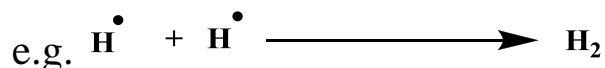
Chemical Bonds can be divided into :

- 1. Ionic bond** : An ionic bond occurs when one or more electrons are transferred from one to another



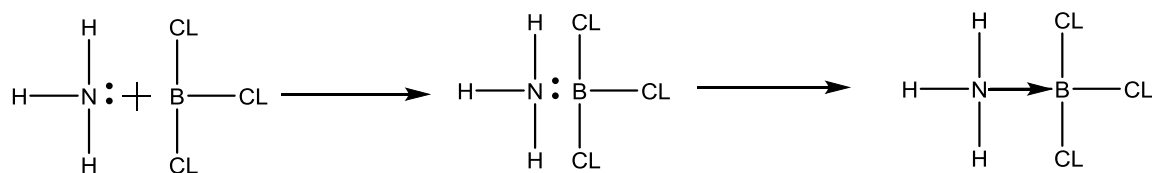
e.g. CaCl_2 , NaCl , AgCl etc.

- 2. Covalent bond** : A covalent bond results from sharing of a pair of electrons between atoms.



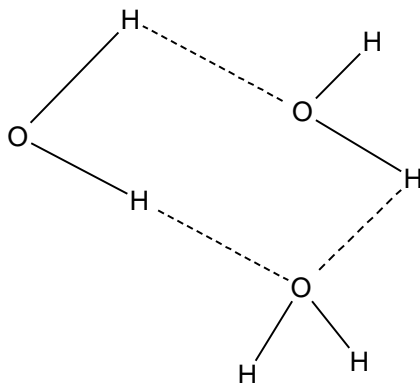
e.g. C_2H_6 , C_2H_4 , C_2H_2 etc.

- 3 - Coordinate covalent bond** : where a pair of electrons from one atom is shared by two atoms.



e.g. NH_3BF_3

4 - Hydrogen bonding : A particularly strong dipole attraction occurs when hydrogen is covalently bonded to a very small highly electronegative element such as fluorine, oxygen or nitrogen.



CH₃OH , CH₃COOHetc.