Atomic Structure – Part I st

Atom – Atoms are made up of three Subatomic particle electron, proton and neutron.

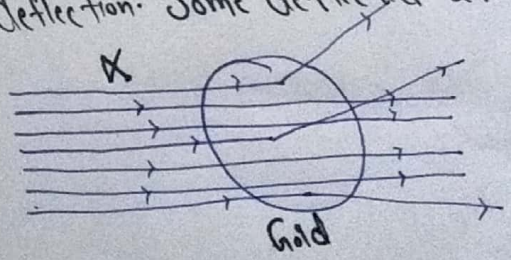
Particle	Discovered By	Charge	Mass
Electron	J.J Thomson	-1.6×10^{-19} C	9.1×10^{-31} kg
Proton	Rutherford	1.6×10^{-19} C	1.67×10^{-27} kg
Neutron	James Chadwick	NO (Neutral)	1.66×10^{-27} kg

Thomson Atomic model – According to this model the most of part of atom is hollow and electrons are distributed in it in such a way like Seeds in watermelon.

Drawback – When he give his model there were no discovery of Proton And neutron.

2014

Rutherford α-particle Scattering Experiment – In this Experiment he passes high speed α-particle over gold foil he observed most of α particle pass through it without any deflection. Some deflected at small angle and very few reflected back.

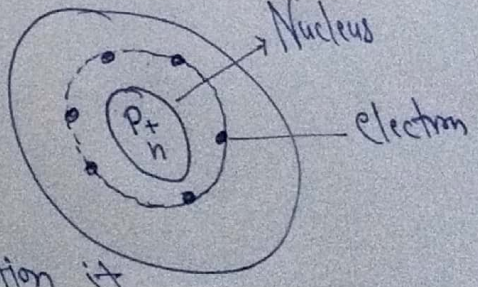


Rutherford Atomic Model –

1. Most of the part of atom is hollow.
2. There is a positive nucleus at the centre of atom.
3. The Subatomic particle proton and neutron present in the nucleus.
4. Electron revolve around the nucleus in all circular path. (Orbits)

Drawback of Rutherford atomic Model –

He can't explain the stability of atom according to electromagnetic theory when charge – particle undergoes accelerated motion it radiate energy continuously and it decreases it path and finally drop into nucleus which is not possible.



2017

Neils Bohr Atomic Model-

① Most of the part of atom is hollow.

② Protons and neutrons are present in nucleus.

③ Electron revolve around the nucleus in those orbit whose angular momentum is multiple of $h/2\pi$

Angular Momentum $mvr = \frac{nh}{2\pi}$ Where h = Plank's Constant $= 6.6 \times 10^{-34}$ (J-sec)

④ When electron revolve in these ~~by~~ orbit it does not radiate energy. This fix energy level are known as shell.

2017

Isotopes- The atom of the same element whose atomic number is same but mass number is different is known as isotopes.

Ex- Hydrogen has three isotopes $_1H^1$, $_1H^2$, $_1H^3$

$_1H^1$ — Protium, $_1H^2$ — Deutirium, $_1H^3$ — Tritium

Isobar- The atom of diffrent element has same mass no but diffrent atomic number are known as isobar.

Ex- $_{18}Ar^{40}$, $_{20}Ca^{40}$.

Isotones- The atom of diffrent element has same number of neutrons are known as isotones.

Ex- $_6C^{14}$ and $_8O^{16}$ has same neutrons.

Electronic Configuration- This is first type of Configuration how to distribute electrons in the atom. It is based on shell and Suggested by Bohr Burry According to him-

1. Each shell has maximum no of electron $= 2n^2$, n = no. of shell

$n=1$ (K Shell) Max e $= 2\times1^2 = 2$

$n=2$ (L Shell) Max e $= 2\times2^2 = 8$

$n=3$ (M Shell) Max e $= 2\times3^2 = 18$

$n=4$ (N Shell) Max e $= 2\times4^2 = 32$

2. When a shell fill then electron enter into next shell.

3. Generally any shell of atom does not have more than 8 electron.

Ex- $Na_{11} = 2,8,1$ $Ca_{20} = \overset{K}{2},\overset{L}{8},\overset{M}{8},\overset{N}{2}$

Valency- It is decided by valence electron (Outermost shell e). This rule of Bohr Burry can be applied to find Valency of lighter element (Up to Ca (at no 20) only

Rule Valency = n if $n < 4$ (Metal) n = no. of Valence electron.

Valency = n-8 if $n > 4$ (Non Metal)

Ex- (i) $Na_{11} = 2,8,1$

Valency = 1

$(n < 4)$

(ii) $Mg_{12} = 2,8,2$

Valency = 2

$(n < 4)$

(iii) $Cl_{17} = 2,8,7$

Valency = 7-8

= -1

$(n > 4)$

(iv) $O_8 = 2,6$

Valency = 6-8

= -2

$(n > 4)$

Note- Any element can be represented as ${}^{A}_{Z}X$ (A → Mass number or atomic wt; Z → atomic no)

$\boxed{Z = P = e}$ and $\boxed{A = P + n}$

Eg- find P, e, n in $_{11}Na^{23}$

Sol^n $P = e = Z = 11$ so $\boxed{P = 11}$, $\boxed{e = 11}$

And $A = P + n$

$23 = 11 + n$

$n = 23 - 11 = 12$ $\boxed{n = 12}$