LC 1

Dalton :

(*) Based on conservation of mass and constant composition

(1) composed of minute particles atoms

(2) One element - one kind of atom (same properties)

(3) Diff substance - diff atom (diff properties)

(4) Compound → multiple elements in fixed proportion (law of constant comp)

(5) chemical reaction → rearrange atoms [mass law]

(6) Deduced by this theory :

Law of multiple proportions - H_2O 2:1, H_2O_2 1:1

H peroxide 1:16

James chadwik - nutron

Ruthenford - radioactive substance

Thompson - electricity by gas

Isotopes : Same proton, diffrent mass, diff nutrone

$^{1}_{1}H$, $^{2}_{1}H$, $^{3}_{1}H$

Isobar : same mass, diffrent proton, diff element

$^{58}_{26}Fe$ $^{58}_{27}Ne$

Isotone : same nutron, diff element, diff mass, diff proton.

$^{16}_{8}O$, $^{15}_{7}N$, $^{14}_{6}C$

Dalton limit : (1) Atom divisible (2) Same element atom diffrent mass (Isotope)

③ Diff element same mass (Isobar)

④ Element smallest part - atom
Compound " " - molecules
↳ multiple atoms

Dalton - Multiple prop
Atoms of an element have same mass and indivisible
↓
A fixed mass
b diff mass

Atom mass - Avg of isotopes

L-3

① Centripital force $= \frac{Ze^2}{r^2}$ ② centrifugal $= \frac{mv^2}{r}$

③ $mvr = \frac{nh}{2\pi}$ ④ $r = \frac{n^2h^2}{4\pi^2 me^2}$

⑤ $r = n^2 \times 0.529 \times 10^{-8}$ cm

⑥ Kinetic $E = \frac{1}{2}mv^2$, e potential $E = -\frac{e^2}{r}$

⑦ $E = \frac{-313.3}{n^2}$ kcal per mole

Nuclus diameter 10^{-15} m
Atom diameter 10^{-10} m

	e	M
E	-1.6×10^{-19} C	9.1×10^{-28} g
P	1.6×10^{-19} C	1.67×10^{-24} g
N	0	1.67×10^{-24} g

L-1

L-2

① Constant composition :

mass of cal, C, O → Calcium carbonate 20g

Cal in 20g → 8 g

∴ Percentage $\frac{8}{20} \times 100$

② Multiple proportion :

C, O → I, II

① O → 57.1 g/100g (C,O)

② C → 42.9g/100g (C,O)

ratio = $\frac{57.1}{42.9}$ = 1.33

(II) similarly, ratio 2 = 2.66

∴ ($\frac{2.66}{1.33} = \frac{2}{1}$ whole num)

Q) compounds properties differ from its components

Mixture's " don't " " " "

Rutherford gold foil observ/ atom model : (Nuclear atom/ Solar system model)

① Most of atom empty

② Max mass of atom at center (99.95%)

L nucleus (+) charged

(3) e move around nucleus (solar system)

(4) e = pos charge in nucleus (nutral atom)

(5) centripetal = centrifugal force.

Limitation :

① Netwon's law can't be used for charged e

② maxwell

③ e rotating - continues spectra but actual is line

④ shape of orbit?

⑤ multiple e rotation

Bohr did — why e did not collaps (maxwell)
— atom spectra - emission / absorption

Electromagnatic waves -
- Travels through space w speed of light
- It can be transmitted by there

$A^\circ = 10^{-8}$ cm $c = \lambda\nu$ $c = 3\times10^{8}$ m/s

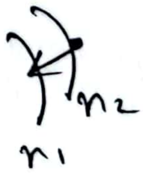
$\bar{\nu}$, wave number = $1/\lambda$ cm^{-1}
(num of wavelength per unit).

Emission spectrum:
- High heat
- Emit energy
- back to previous orbit
- bright lines

Absorption spectrum:
- light is passed
- absorp energy
- go to higher orbits
- black lines

Balmer wave len of H spectrum:

$$\frac{1}{\lambda} = R_H\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right) \quad n_2 > n_1$$



$R_H = 109677$ cm^{-1}

L-3

$$\Delta E = -R_H\left(\frac{1}{n_f^2} - \frac{1}{n_i^2}\right)$$

Absorb ΔE (+)
Emit ΔE (−)

$$|\Delta E| = h\nu = \frac{hc}{\lambda} \quad \therefore \lambda = \frac{hc}{|\Delta E|}$$

$h = 6.626\times10^{-34}$ Js
$R_H = 2.18\times10^{-18}$ J

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