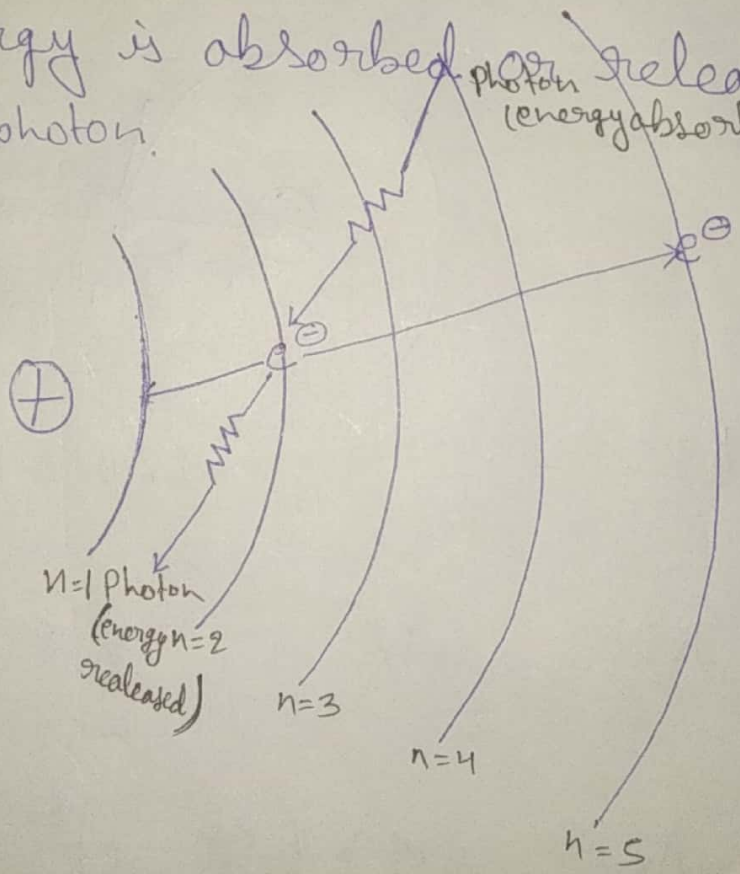
D. B. College (Jaynagar) lect 1– 21
Akhilesh Kumar Singh
Guest leactuere chemistry department
Mobile no. 1– 8750390927

Part – I

Atomic Structure.

→ when energy is absorved by an $e^{\ominus}$ it high energy level to lower energy level and when it comes back energy is released.

Energy is absorbed or released in form of photon.



$n = 1 \xrightarrow{h\nu} n = 2 \xrightarrow{h\nu} n = 5$ 2 photons absorbed

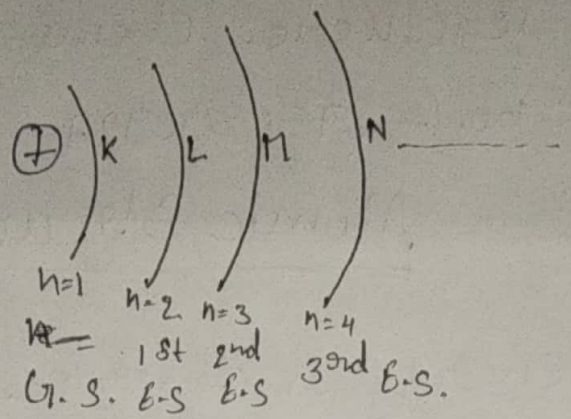
$n = 2 \xrightarrow{h\nu} n = 4 \xrightarrow{h\nu} n = 5 \xrightarrow{h\nu} n = 7$
3 Photons absorbed

$n = 6 \xrightarrow{h\nu} n = 5 \xrightarrow{h\nu} n = 3 \xrightarrow{h\nu} n = 2$
3 Photons released

Ground state: Lowest energy level. (n=1)

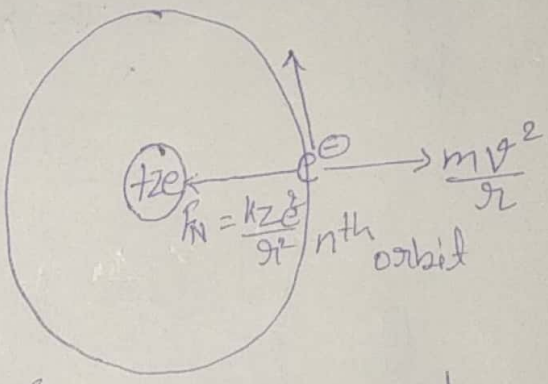
Excited state: higher energy level

n = 2, 3, 4 ----



Application of ~~Bohr~~ Bohr Model :-

1. Calculation of Radius :- r



$$\frac{KZe^2}{r^2} = \frac{mv^2}{r} \qquad mVr = \frac{nh}{2\pi}$$

$$\frac{KZe^2}{r} = mv^2 \qquad v = \frac{nh}{2\pi rm}$$

$$\frac{KZe^2}{r} = m \times \left(\frac{nh}{2\pi rm}\right)^2$$

$$\frac{KZe^2}{r} = \frac{n^2h^2}{4\pi^2 r^2 m}$$

$$\boxed{r = \frac{n^2h^2}{4\pi^2 mKZe^2}}$$

$K = 9 \times 10^9 \ N m^2/C^2$

$$r = \frac{n^2 \times (6.62 \times 10^{-34})^2}{4 \times (3.14)^2 \times 9.1 \times 10^{-31} \times 9 \times 10^9 \times 2 \times (1.6 \times 10^{-19})^2}$$

$$r = 0.529 \times 10^{-10} \frac{n^2}{Z} m$$

$$r = 0.529 \frac{n^2}{Z} \text{Å}$$

$$r \propto \frac{n^2}{Z}$$

$$r = 0.529 \frac{n^2}{Z} \text{Å}$$

diameter $= 2r$
$= 2 \times 0.529 \frac{n^2}{Z} \text{Å}$

Circumference $= 2\pi r$
$= 2 \times 3.14 \times 0.529 \frac{n^2}{Z} \text{Å}$

$A = \pi r^2$
$= 3.14 \left(0.529 \frac{n^2}{Z}\right)^2 \text{Å}$

$A \propto \frac{n^4}{Z^2}$

Ques Find the radius of 3rd orbit of H?

$$r_1 = 0.529 \times \frac{n^2}{Z} \text{Å}$$

$$= 0.529 \times \frac{9}{1} = 4.761 \text{ Å}$$