Now eqⁿ $r = \frac{n^2h^2}{4\pi^2 m Ze^2 K}$ enabled Bohr to calculate the radii of the various orbits which the electron in the hydrogen atom is permitted to occupy. Evidently, the greater the value of $n$, i.e. farther the energy level from the nucleus, the greater is its radii.

Since for hydrogen atom, $Z = 1$, the above relation becomes

$$r = \frac{n^2 h^2}{4\pi^2 m e^2 K} \quad \text{i.e. eq}^n (9)$$

Hence for the radius of the first orbit, where $n = 1$

$$r = \frac{h^2}{4\pi^2 m e^2 K} \qquad (10)$$

Now putting the values,

we get,

$$r = \frac{(6.625 \times 10^{-34})^2}{4 \times (3.14)^2 \times 9 \times 10^{-31} \times (1.6 \times 10^{-19})^2 \times 9 \times 10^9}$$

$$= 5.29 \times 10^{-11} \text{ m} = 0.529 \text{ Å}$$

Thus, the radius of first orbit of hydrogen atom is $0.529$ Å.

Now the radius of the first orbit of hydrogen like species is represented by $r_0$ and it is called Bohr's radius.

So, the Bohr's radius of hydrogen is $0.529$ Å

Since radius of an orbit is directly proportional to the square of orbit number, the radius of nth orbit for hydrogen atom can be calculated as,

$$r_n = 0.529 \times n^2 \text{ Å}$$

$$\text{or } r_n = r_0 \times n^2 \text{ Å}$$

Now we can calculate the radius of the 2nd & 3rd orbit as

Radius of 2nd Orbit, $r_2 = r_0 \times (2)^2 = r_0 \times 4$ Å $= 0.529 \times 4$ Å

$r_3 = r_0 \times (3)^2 = r_0 \times 9$ Å $= 0.529 \times 9$ Å

So we can say Radius of of 2nd orbit is four times of 1st orbit and 3rd orbit's radius is 9th times of the radius of 1st orbit.

2. Calculation of velocity of electron in an orbit:-

Now the velocity with which electron is revolving in an orbit can be calculated by the relation, $u = \frac{2\pi e^2}{nh}$

Thus the velocity of electron in 1st orbit

$$\text{i.e. } u = \frac{2 \times 3.14 \times (1.6 \times 10^{-19})^2}{1 \times 6.625 \times 10^{-34}} = 2.19 \times 10^8 \text{ cm sec}^{-1}$$