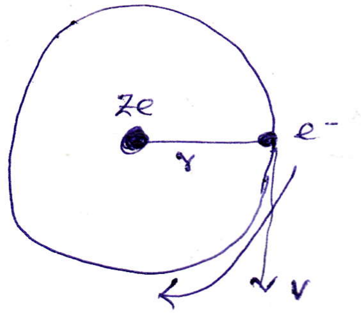

Based on the postulates Bohr derived the formulae for
(i) radius of the stationary orbits
(ii) the total energy of the electron in the orbit

Coulombic attraction force = Centrifugal force

$$\frac{mv^2}{r} = \frac{Ze^2}{r^2}$$

$$\text{or, } v^2 = \frac{Ze^2}{mr} \longrightarrow (i)$$

From Bohr's postulate we get

$$mvr = \frac{nh}{2\pi}, \text{ or } v = \frac{nh}{2\pi mr}$$

$$v^2 = \frac{n^2h^2}{4\pi^2m^2r^2} \longrightarrow (ii)$$

Equating eq.(i) and (ii)

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

$$\text{or, } r_n = \frac{n^2h^2}{4\pi^2mZe^2}$$

r_n is the radius of the nth. orbit

ε_0 = absolute permitivity of the medium. in vacuum $8.85\times10^{-12}C^2N^{-1}m^{-2}$

$r_H = 0.529 \times 10^{-8}$ cm
$= 0.529\,A^0$.

$n = 1$
$h = 6.62\times10^{-27}$ erg sec
$m = 9.10\times10^{-28}$ gm
$e = 4.8\times10^{-10}$ esu

$$\boxed{r_n = r_1\times n^2 = 0.529\times n^2\,A^0}$$

The total energy

E = P.E + K.E

$$K.E = \frac{1}{2}mv^2$$

$$P.E = \int_{\infty}^{r}\frac{e^2}{r^2}dr = -\frac{e^2}{r}$$

Thus the total energy $E = \frac{1}{2}mv^2 - \frac{e^2}{r} = \frac{1}{2}mv^2 - \frac{e^2}{r}$

$$= \frac{e^2}{2r} - \frac{e^2}{r} = -\frac{e^2}{2r}$$