Physics
Theory Part 17

Topics: Atomic Physics/ Electrostatics

Course: B.Sc/ Physics

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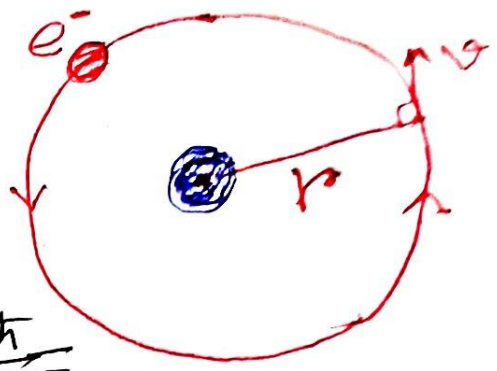
$F = Kr = \frac{mv^2}{r}$ & $mvr = n\hbar \Rightarrow v = \frac{n\hbar}{mr}$ — (2) — (1)



Putting (2) in (1) $Kr = \frac{m}{r} \times \frac{n^2\hbar^2}{m^2r^2} = \frac{n^2\hbar^2}{mr^3}$

or, $r^4 = \frac{n^2\hbar^2}{mK}$ & ~~$E = Kr^2 = K \times \frac{n\hbar}{\sqrt{mK}}$~~ $r^2 = \frac{n\hbar}{\sqrt{mK}}$

$T = \frac{1}{2}mv^2 = \frac{1}{2}m \times \frac{n^2\hbar^2}{m^2r^2} = \frac{1}{2}\frac{n^2\hbar^2}{mr^2} = \frac{1}{2}\frac{n^2\hbar^2}{m} \times \frac{\sqrt{mK}}{n\hbar} = \frac{n^2\hbar^2\sqrt{K}}{\sqrt{m} \times 2} = \frac{n\hbar}{2}\sqrt{\frac{K}{m}}$ — (3)

$V = \frac{1}{2}Kr^2 = \frac{1}{2}K \times \frac{n\hbar}{\sqrt{mK}} = \frac{n\hbar}{2}\sqrt{\frac{K}{m}}$ — (4)

Total energy of the system, $E = T + V = \frac{n\hbar}{2}\sqrt{\frac{K}{m}} + \frac{n\hbar}{2}\sqrt{\frac{K}{m}}$

$= \boxed{n\hbar\sqrt{\frac{K}{m}}}$ Ans.

Q Calculate the Total energy of an electron of mass m, rotating around nucleus in a circle of radius r, moving with velocity v. Show that it is independent of radius r and it is constant.

Crunching life savers in front of mirror in the dark

(1) When we crush life savers like Wint O Green (Hard Candy) in our mouth we can observe occurances of light flashes (like lighting phenomenon in a miniature format).

(2) Crushing hard crystalline sugar (e.g candies etc) creates static electricity and when it is discharged in air a miniature lightening. of the re-emit light (EM wave) is in visible region we can see it but in UV region we can't. It is similar to touching a metallic door knob after walking on a carpet. Here static electricity is generated but it is and then it discharge but in UV region.

(3) Static electricity created in these sugar crystal (Candies) can rip the electrons (outer) from the molecules. When the molecules recombine with the electrons, they emit light like that in LEDs & LASERS. Depending on the material & composition of the candies it can emit visible or UV light.

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