(2) $KE = qV$

(i) $KE_i = 2 \times 2 \times 10^6 \, eV$

(iii) $KE = 4 \times 10^6 \, eV = \dfrac{K(2e)(47e)}{r}$

(ii) $= KE_i - PE$

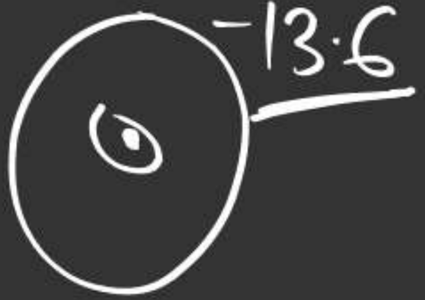
$= 4 \times 10^6 \, eV - \dfrac{K(2e)(47e)}{5 \times 10^{-14}}$

(4) $v = \dfrac{1}{275} \times 3 \times 10^8 \; m/sec$

$= 2.188 \times 10^6 \times \dfrac{1}{n}$

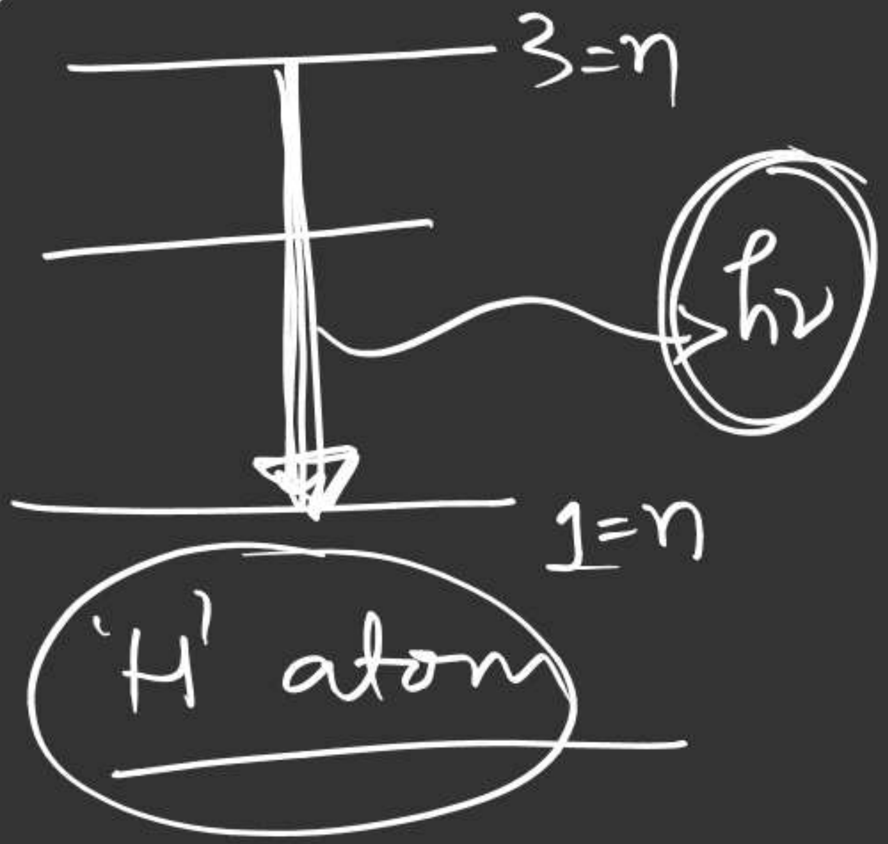
$\bar{\nu} = \dfrac{1}{\lambda}$

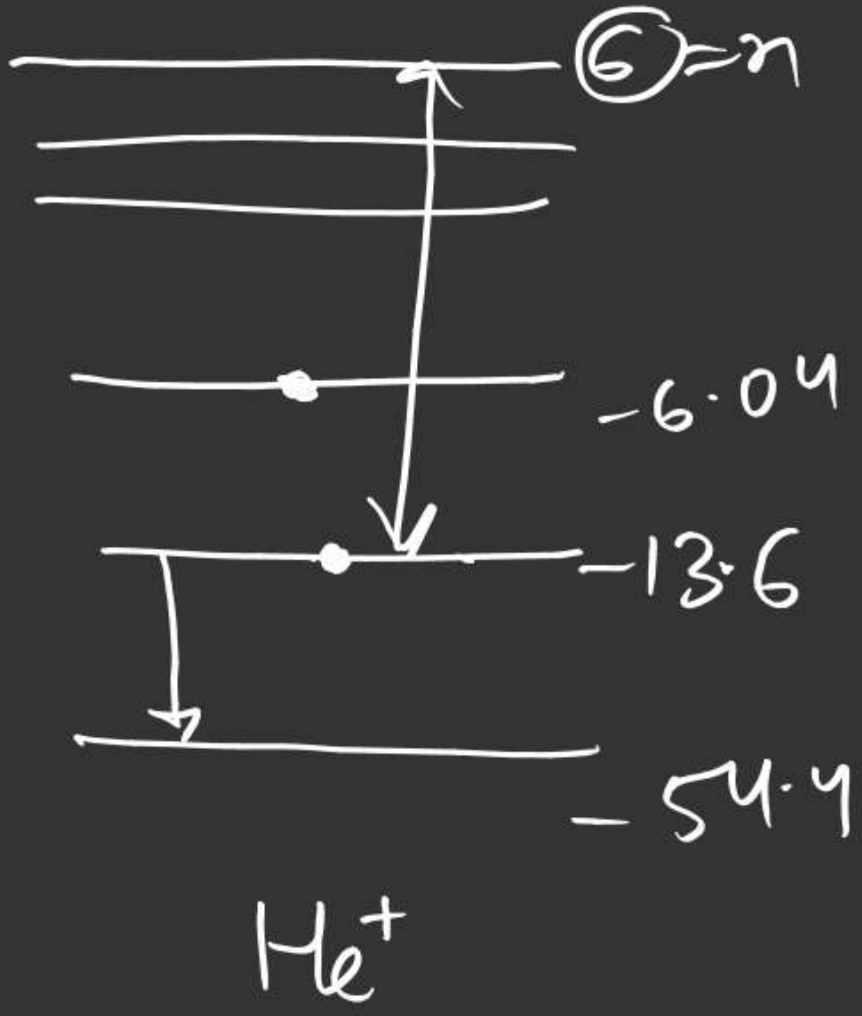
(6)

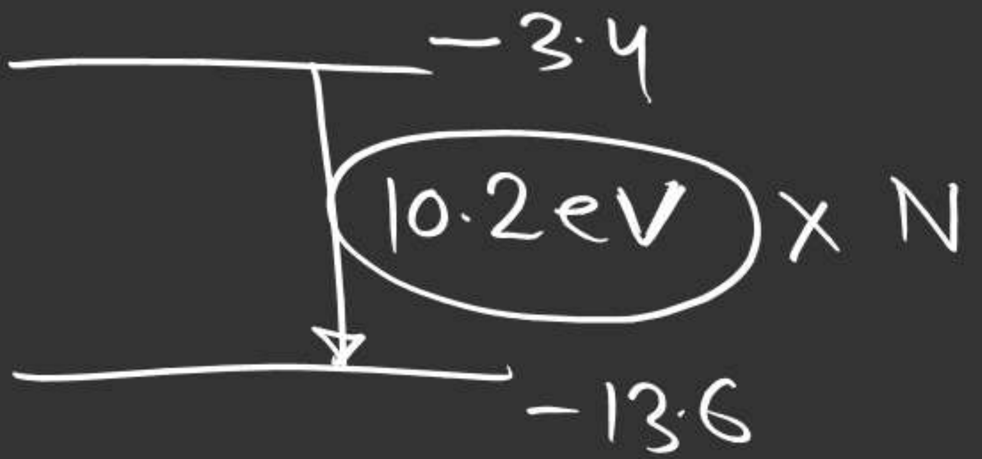


$13.6 \, eV = \dfrac{hc}{\lambda}$

8







$Z = 1$

E_{3-1}

E_{6-2}

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$$4 \times 2.18 \times 10^{-18}\ J$$

$$= \frac{8.72 \times 10^{-18}\ J}{1.6 \times 10^{-19}}$$

$$= 54.4\ eV$$

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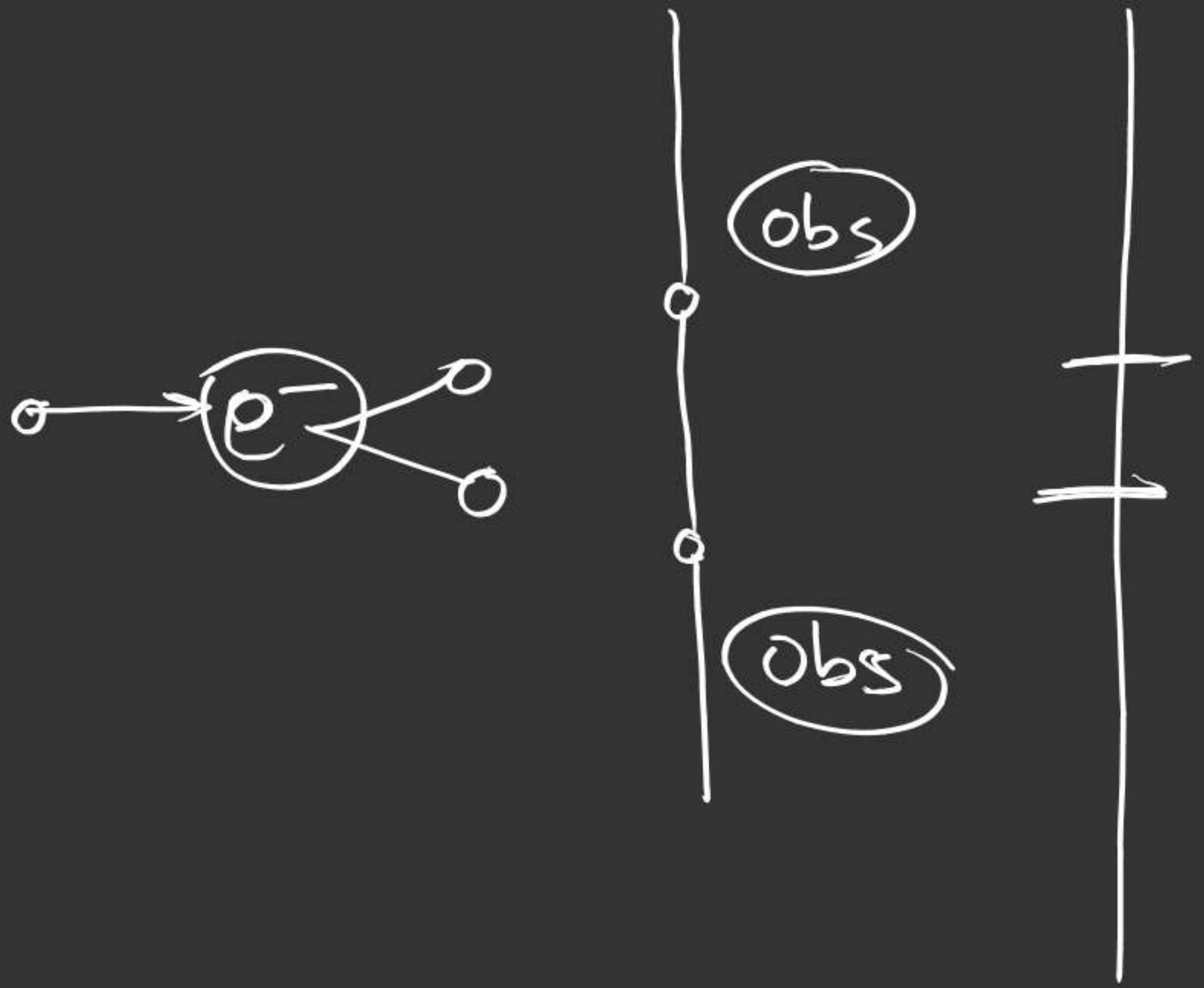

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Debroglie hypothesis :→ like light, particles also show dual nature i.e wave and particles

$$\boxed{\lambda = \frac{h}{mv}}$$

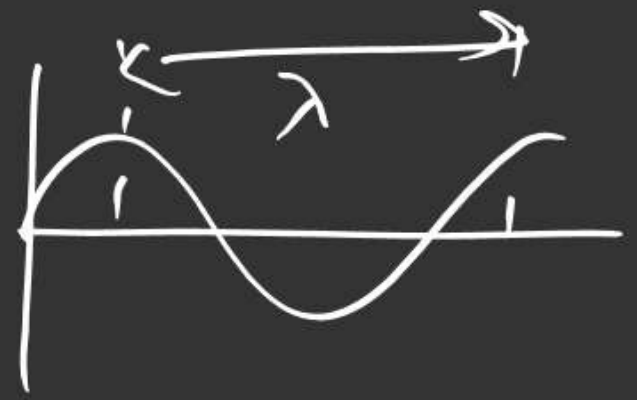
λ → debroglie wavelength

m → mass of particle

v → speed

$$\boxed{E = \frac{hc}{\lambda}}$$

↑ photon



$$\frac{1}{2}mv^2 = KE$$

$$(mv)^2 = 2.m.KE$$

$$\rightarrow \boxed{\lambda = \frac{h}{\sqrt{2.m.KE}}} = \frac{h}{\sqrt{2.m.qV}}$$

for e^-

$$\lambda = \sqrt{\frac{150}{V}}\ A^{\circ}$$

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Q. Find debroglie λ for

(i) A particle of mass 66.2 gm moving at a speed

$\left(\frac{180}{5}\right)$ km/hr

$$\lambda = \frac{h}{mv}$$

10^{-32}

10^{-34}

3.6×10^{-37}

$$\lambda = \frac{\cancel{6.62} \times 10^{-34}}{\left(\frac{\cancel{66.2}}{10} \times 10^{-3}\right) \times \left(\frac{\cancel{180}}{\cancel{5}} \times \frac{\cancel{5}}{\cancel{18}}\right) \text{ m/sec}}$$

$10 \quad\quad 10$

$$\boxed{\begin{aligned} 1\ \text{km/hr} &= \frac{1000}{3600}\ \text{m/sec} \\ 1\ \text{km/hr} &= \frac{5}{18}\ \text{m/sec} \end{aligned}}$$

$$\lambda = 10^{-33}\ \text{m}$$

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Q. find debroglies wavelength of

① $\bar{e}$ moving with $\frac{6.62}{9.1} \times 10^7$ m/sec.

$$\lambda = \frac{\cancel{6.62} \times \cancel{10^{-34}}\ 10^{-3}}{\cancel{9.1} \times \cancel{10^{-31}} \times \frac{\cancel{6.62}}{\cancel{9.1}} \times 10^7}$$

$$= 10^{-10}\ m$$

② $\bar{e}$ accelerated by 6 volt

③ $\bar{e}$ moving with 6eV KE.

$$\boxed{\lambda = \sqrt{\frac{150}{6}}\ A^\circ = 5\ A^\circ}$$

$$\lambda = 5 A^\circ$$

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$$\lambda = \frac{h}{\sqrt{2 \cdot m \cdot KE}} \qquad E = \frac{hc}{\lambda}$$

Q. find the energy of photon emitted and its wavelength if an e^- moving with 310 eV Kinetic energy is brought to rest.

Energy of photon = KE of e^- = 310 eV

$$310\text{ eV} = \frac{1240\text{ eV}\cdot\text{nm}}{\lambda}$$

$$\lambda = 4\text{ nm}$$

find λ of e^- when it was moving $\lambda = \sqrt{\frac{150}{310}} = \sqrt{\frac{15}{31}}\ A^\circ$

Nishant Jindal

Derivation of quantization of angular momentum by debroglie hypothesis :→

O – I   Upto 50

S – I

Standing wave