solid → state of matter → collection of Atoms → + nucleus, – electrons

random motion and possess kinetic energy.

described ← Quantum mechanics

* the motion of constituents described by schrodinger eq

$$H\psi = E\psi$$

H = Hamiltonian

Total Energy oprator

P = momentum

$$KE + PE =$$

$$P = -i\hbar\nabla$$

$$\frac{P^2}{2m} + V = \Rightarrow \boxed{\left(\frac{-\hbar^2\nabla^2}{2m} + V\right)\psi = E\psi}$$

Schrodinger Equations

ψ = wave function

E = Energy Eigen values

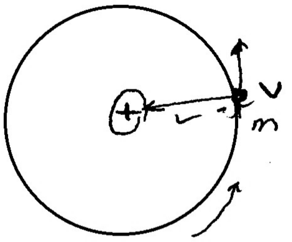
$$\hbar = \frac{h}{2\pi}$$

h=6.63*10^-34

$$\boxed{\nabla^2\psi + \frac{2m}{\hbar^2}(E-V)\psi = 0}$$

$$P = \int \psi P \psi \, dx = -\frac{\hbar^2}{2m}\frac{\delta^2}{\delta x^2}$$

Let take Isolated Atom Like Hydrogen



$$V = \frac{q_1 q_2}{r}$$

electric charge

$q_1 = 1e$

$q_2 = -1e$

$$\boxed{V = \frac{-e^2}{r}} \frac{1}{4\pi\epsilon_0}$$

(V) substitue at equ.

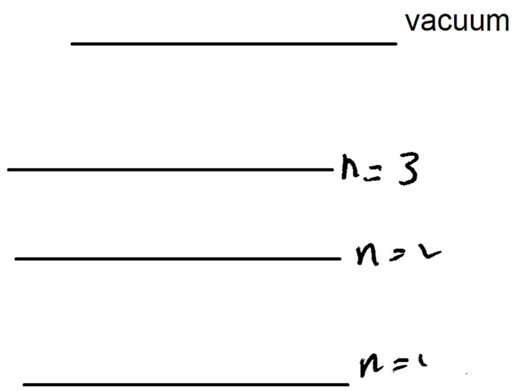
$$\boxed{\nabla^2\psi + \frac{2m}{\hbar^2}(E-V)\psi = 0}$$

$$E_n = -\left(\frac{me^4}{8\epsilon_0^2 h^2}\right)\frac{1}{n^2} \qquad n = 1, 2, 3, 4$$

energy of H Atoms $= -13.6\left(\frac{1}{n^2}\right)$ ev

$$\boxed{E_n = \frac{E_1}{n^2}}$$

-13.6 ev



max Born postulated $|\psi(x,t)|^2 dx$ is probility of finding the particles between $x + dx$ at give Time or That is a probability density function

$$|\psi(x,t)|^2 = \psi(x,t) \cdot \psi^*(x,t)$$

$\psi(x,t)$