Structure of Atom

Charge to mass Ratio of electron $\frac{e}{m_e} = 1.758820 \times 10^{11}\ C\text{-}kg^{-1}$

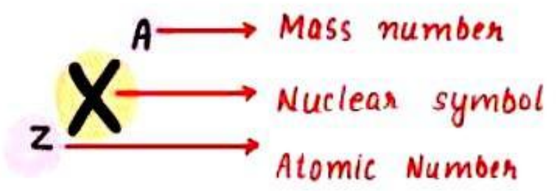
e = Magnitude of the charge on the electron, m_e = Mass of the electron

Name	Symbol	Absolute charge (C)	Relative Charge	Mass (Kg)
Electron	e	-1.6×10^{-19}	-1	9.1×10^{-31}
Proton	p	$+1.6 \times 10^{-19}$	$+1$	1.6×10^{-27}
Neutron	n	0	0	1.6×10^{-27}

Value of l	0	1	2	3	4	5
Subshell notation	s	p	d	f	g	h
no. of orbitals	1	3	5	7	9	11

Atomic no. (Z) = No. of protons in the nucleas of an atom = No. of electrons in a neutral atom

Mass number (A) = No. of protons (Z) + No. of Neutrons (n)



Relation between wavelength and frequency $C = \nu\lambda$

C = velocity of light, ν = frequency, λ = wavelength

Work function $W_0 = h\nu_0$

h = Plank's constant (6.626×10^{-34} J-sec), ν_0 = threshold frequency, v = velocity

Energy of Photon $E = h\nu$

Kinetic Energy of Electron $E = h\nu_0 + \frac{1}{2} m_e v^2$

De-Broglie Wavelength $\lambda = \frac{h}{mv} = \frac{h}{p}$

p = momentum

line spectra of Hydrogen $\bar{\nu} = R\left[\frac{1}{n_1^2} + \frac{1}{n_2^2}\right]$

$\bar{\nu}$: wave number

Bohn's frequency rule $\nu = \frac{\Delta E}{h} = \frac{E_2 - E_1}{h}$

E_2 = Energy of highly allowed energy state
E_1 = Energy of lower allowed energy state

Angular Momentum of Electron $m_e v r = \frac{nh}{2\pi}$

$n = 1, 2, 3 \ldots$
r = radius

Radii of the stationary states $r_n = n^2 a_0$

$a_0 = 52.9$ pm
$n = 1, 2, 3 \ldots$

Energy of stationary states $E_n = -R_H\left[\frac{1}{n^2}\right]$

R_H = Rydberg constant

Heisenberg Uncertainty principle $\Delta x \times \Delta p \geq \frac{h}{4\pi}$

Δx = uncertainty in Position
Δp = uncertainty in momentum

Schrodinger Equation $\nabla^2\psi + \frac{8\pi^2 m}{h^2}(E - V)\psi = 0$

E = Total Energy of system
V = Polential Energy of system

Mathematical operator: $\nabla^2 = \frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2}$

Total no. of nodes Angular node + Radial node = $l + (n - l - 1) = n - 1$

Aufbau Principle Increasing order of Energy of orbitals

1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 4f, 5d, 6p, 7s ...