2. Atomic Structure

1. No. of **subshells** in main shell **= n**
2. Total no.of **orbitals** in main shell **= (n)²**
3. Total no. of **orbitals** in **subshell - 2*l* + 1**
4. Total no. of **electrons** in **main shell - 2n²**
5. Total no. of **electrons** in **sub shell = 2(2*l* + 1)**
6. No. of **radial** or **spherical** nodes **= n – *l* – 1**

7. Nodal plane :

It is a plane passing through nucleus where probability of finding of electrons is zero.

No. of nodel plane = *l*

8. **Angular momentum of electron, mvr =** $\frac{nh}{2\pi}$
9. **Orbital angular momentum of electron.**

$\mu = \sqrt{\ell(\ell+1)}\frac{h}{2\pi}$,

$\mu = \sqrt{\ell(\ell+1)}\hbar$

10. **Magnetic moment =** $\sqrt{n(n+2)}$ **B.M.**

Where n = no. of unpaired electrons.

11. **Spin angular momentum =** $\sqrt{S(S+1)}\frac{h}{2\pi}$
12. **Maximum no. of lines produced when electron falls to ground level, =** $\frac{n(n-1)}{2}$
13. When electron returns from n_2 **to** n_1 **state, maximum no. of lines produced**

$= \frac{(n_2 - n_1)(n_2 - n_1 + 1)}{2}$

- $\bar{v} = \frac{1}{\lambda} = RZ^2\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$,

[R = 1.0968 × 10^7 m^{-1}];

$E = hv = \frac{hc}{\lambda}, \lambda = \frac{h}{\sqrt{2m \times K.E.}}$

- No. of spectral lines produced when an electron drops from n^{th} level to ground level

$= \frac{n(n-1)}{2}$

- Heisenberg's Uncertainty Principle = (Δx) (Δp) ≥ h/4π

- Nodes (n–1) = total nodes, *l* = angular nodes, (n – *l* –1) = Radial nodes
- **Orbital angular momentum :**

$\sqrt{\ell(\ell+1)}\frac{h}{2\pi} = \sqrt{\ell(\ell+1)}\hbar$

14. Bohr's model formulae

- **Radius of nth shell**

$r_n = 0.529 \times \frac{n^2}{Z}Å \Rightarrow r \propto \frac{n^2}{Z}$

- **Velocity of nth shell**

$v_n = \frac{Z}{n} \times 2.185 \times 10^8 cm/s \Rightarrow V \propto \frac{Z}{n}$

- **No of revolutions made by nth shell** $v = \frac{Z^2}{n^3}s^{-1}$

$\Rightarrow V \propto \frac{n^2}{n^3}$

- **No. of wave made by e⁻ in nth shell**

$T_n = 1.5 \times 10^{-16} \times \frac{n^3}{Z^2}s \Rightarrow v \propto \frac{n^3}{Z^2}$

- $IE = E_\infty - E_1$

IE = –E_1

IE = 0 – E_1 = –E_1

- **$IE_{\text{H-like atom}} \times Z^2 = I.E_{\text{H atom}} \times Z^2$**
- **KE =** $13.6 \times \frac{Z^2}{n^2} eV/atom$
- **P.E. =** $-27.2 \times \frac{Z^2}{n^2}$ **eV/atom**
- **IE and TE = – 13.6 ×** $\frac{Z^2}{n^2}$ **eV/atom**
- **KE and TE =** $\frac{KE}{TE} = \frac{Ze^2}{2r} \times -\frac{2r}{Ze^2} = -1$
- **Angular momentum in orbit mvr =** $\frac{nh}{2\pi}$