10+2 PCM NOTES

BY

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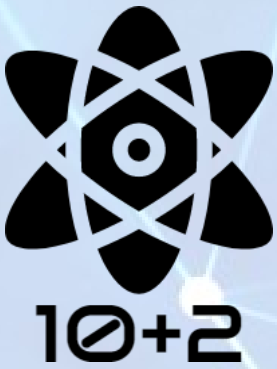
(PDF version handwritten notes of Maths, Physics and Chemistry for 10+2 competitive exams like JEE Main, WBJEE, NEST, IISER Entrance Exam, CUCET, AIPMT, JIPMER, EAMCET etc.)



With best wishes from Joyoshish Saha

Atomic Structure.

1. α-particle approach, $R = \frac{4KZe^2}{m_\alpha V_\alpha^2}$.

2. $R = R_0 A^{1/3}$ $[R_0 = 1.4 \times 10^{-13}$ cm & $A \rightarrow$ mass number$]$

3. $m' = \frac{m_0}{\sqrt{1-(v/c)^2}}$

4. Energy / Photon, $E = h\nu - \frac{hc}{\lambda} = \frac{12375}{\lambda}$ eV $[\lambda$ is in Å$]$

5. $r_n = \frac{n^2h^2}{4\pi^2 mZe^2}$ | $r_n = 0.529 \cdot n^2$ | $r_n = \frac{0.529}{Z}$ [in cgs,]

$r_1 = 0.529$ Å.

6. $v_n = \frac{2\pi Ze^2}{nh}$ | $v_n = 2.1847 \times 10^8 \cdot Z$ | $v_n = \frac{2.1847 \times 10^8}{n}$ [in cgs].

$v_1 = 2.1847 \times 10^8$ cm/s

7. $E_n = -\frac{2\pi^2 Z^2 e^4 m}{n^2h^2}$ | $E_n = -13.6 \cdot Z^2$ eV | $E_n = -13.6/n^2$ eV

$E_1 = -21.72 \times 10^{-12}$ erg $= -13.6$ eV.

8. $\bar{\nu} = \frac{1}{\lambda} = R_H\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$. [in cgs]. $[R_H = 109677\ cm^{-1}]$.

9. $E = h\nu$ | $h\nu = h\nu_0 + \frac{1}{2}m_e v_{max}^2 = \phi + \frac{1}{2}m_e v_{max}^2$

10. $mvr = mr^2\omega = n\frac{h}{2\pi}$ | orbital angular momentum $\rightarrow \sqrt{l(l+1)}\frac{h}{2\pi}$ | $S = \sqrt{s(s+1)}\frac{h}{2\pi}$

11. $\lambda = \frac{h}{mv} = \frac{h}{p}$

12. $eV = \frac{1}{2}mv^2$

$\Rightarrow v = \sqrt{\frac{2eV}{m}} = \sqrt{\frac{2E}{m}} = \frac{h}{m\lambda}$.

$\Rightarrow \lambda = \frac{h}{\sqrt{2meV}} = \frac{h}{\sqrt{2mE}}$.

$\Rightarrow \lambda = \frac{12.26 \times 10^{-10}}{\sqrt{V}}$ m

$= \frac{1.226}{\sqrt{V}}$ nm.

13. $\Delta x \cdot \Delta p \geq \frac{h}{4\pi}$.

14. radial node $= n-l-1$
angular node $= l$
total node $= n-1$.

15. $n = 1, 2, 3, \ldots$
$l = 0, 1, 2, \ldots (n-1)$
$m = (-l) \ldots 0 \ldots (+l)$.
$s = \pm 1/2$.

16. $\mu_B = \frac{eh}{4\pi m}$ — number of unpaired electrons.

$\mu = \sqrt{n(n+2)}$ BM.

17. No. of orbitals in subshell = $2l+1$.

18. Spectral lines > Lyman (UV), Balmer (Visible), Paschen (IR), Brackett (IR), Pfund (Far IR), Humphrey (Far IR)

19. h, plauck's constant = 6.63×10^{-27} erg·s.

$m_e = 9.11 \times 10^{-28}$ g

$q_e = 4.8 \times 10^{-10}$ esu

$N_A = 6.022 \times 10^{23}$.

$1\ eV = 1.602 \times 10^{-12}$ erg

$\pi = 3.14$.

$c = 3 \times 10^8$ m/s.

For SI,

$$E = -\frac{Z^2 e^4 m}{8\varepsilon_0^2 n^2 h^2}$$

$\varepsilon_0 = 8.854 \times 10^{-12}$ coulomb^2/newton·m^2 $|m^{-2}N|$