Chemistry Formula Sheet

Chapter by chapter, topic by topic. Written by the PadhoNa team for quick revision.

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CHAPTER 2

Structure of Atom

Bohr's model for hydrogen-like species

$$r_n = 0.529\frac{n^2}{Z}\ \text{Å}, \qquad v_n = 2.18\times10^6\frac{Z}{n}\ \text{m s}^{-1}, \qquad E_n = -13.6\frac{Z^2}{n^2}\ \text{eV}$$

RYDBERG

$$\bar{\nu} = \frac{1}{\lambda} = R_H Z^2\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right), \qquad R_H = 1.097\times10^7\ \text{m}^{-1}$$

NUMBER OF LINES

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

Dual nature and uncertainty

$$E = h\nu = \frac{hc}{\lambda}; \qquad \lambda = \frac{h}{p} = \frac{h}{mv}; \qquad \Delta x\,\Delta p \geq \frac{h}{4\pi}$$

PHOTOELECTRIC EFFECT

$$h\nu = h\nu_0 + \tfrac{1}{2}mv^2$$

Quantum mechanical model

QUANTUM NUMBERS

$$n \geq 1; \qquad l = 0\ldots n-1; \qquad m_l = -l\ldots+l; \qquad m_s = \pm\tfrac{1}{2}$$

NODES

$$\text{radial nodes} = n - l - 1, \qquad \text{angular nodes} = l, \qquad \text{total} = n - 1$$

ORBITAL ANGULAR MOMENTUM

$$L = \sqrt{l(l+1)}\,\frac{h}{2\pi}$$

MAGNETIC MOMENT

$$\mu = \sqrt{n(n+2)}\ \text{BM}\ \ (n = \text{unpaired electrons})$$

FILLING ORDER

$$(n+l)\ \text{rule; Aufbau, Pauli, Hund}$$

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