Formula Sheet #2

Atomic Structure

(43) $\frac{1}{R} = 912\,Å\ (911.7\,Å)$

(44) $\frac{1}{\lambda} = RZ^2\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$

$n_1 = 1$ Lyman

$n_1 = 2$ Balmer

$n_1 = 3$ Paschen

$n_1 = 4$ Brackett

$n_1 = 5$ P-fund

(45) Time Period $= \frac{2\pi r}{v}$ $T \propto \frac{n^3}{Z^2}$

(46) Frequency $= \frac{1}{T}$ $F \propto \frac{Z^2}{n^3}$

(47) No. of spectral lines $= \frac{(n_2 - n_1)(n_2 - n_1 + 1)}{2}$

(48) No. of spectral lines if $n_1 = 1 \Rightarrow \frac{n(n-1)}{2}$

(49) No. of spectral lines in Lyman $\Rightarrow n-1$

No. of spectral lines in Balmer $\Rightarrow n-2$

No. of spectral lines in Paschen $\Rightarrow n-3$

No. of spectral lines in Brackett $\Rightarrow n-4$

No. of spectral lines in P-fund $\Rightarrow n-5$

(50) Photo-electric Effect $\Rightarrow$ E_{photon} = Work function (ϕ) + Kinetic Energy (max)

$E_{photon} \rightarrow \frac{hc}{\lambda}$ or $h\nu$

Work function $(\phi) \rightarrow \frac{hc}{\lambda_0}$ or $h\nu_0$

Kinetic Energy (max) $\rightarrow \frac{1}{2}mv^2$

(51) Stopping Potential $\Rightarrow E_{ph} - \phi = qV$

(52) De-Broglie's Eqn $\Rightarrow$ $\lambda = \frac{h}{P}$

(53) $KE = \frac{p^2}{2m}$

(54) $\lambda = \frac{h}{\sqrt{2mKE}}$

(55) $\lambda = \frac{h}{\sqrt{2mqV}}$

(56) $\lambda_e = \sqrt{\frac{150}{V}}\,\mathring{A} = \frac{12.3}{\sqrt{V}}\,\mathring{A}$ [For electron]

(57) Condition for stationary state $\Rightarrow$ $2\pi r = n\lambda$

(58) No. of waves made in n^{th} orbit $= n$