THE LINE S PECTRA OF THE HYDROGEN ATOM

Creation of Photon

According to the third postulate of Bohr's model, when an atom makes a transition from the higher energy state with quantum number $\mathbf{n_i}$ to the lower energy state with quantum number $\mathbf{n_f}$ $\mathbf{(n_f < n_i)}$, the difference of energy is carried away by a photon of frequency v_{if}

That is $\mathbf{hv_{if} = E_{ni} - E_{nf}}$

Frequency of emitted Photon

$$h\nu_{if} = \frac{me^4}{8\epsilon_0^2 h^2}\left\langle \frac{1}{n_f^2} - \frac{1}{n_i^2} \right\rangle$$

$$\nu_{if} = \frac{me^4}{8\epsilon_0^2 h^3}\left\langle \frac{1}{n_f^2} - \frac{1}{n_i^2} \right\rangle$$

Rydberg Constant = $1.03 \times 10^{7}\ m^{-1}$

$$R = \frac{m e^4}{8 \epsilon_0^2 h^3 c}$$

Or

$$\bar{\nu} = \frac{1}{\lambda} = R \left\langle \frac{1}{n_f^2} - \frac{1}{n_i^2} \right\rangle$$

Is the **Wave number**

Line Spectra