Inorganic Chemistry 1

BOHR THEORY

Formula for Hydrogen atom & Hydrogen-like ions for r_n , E_n and Energy Difference (3 forms)

Formula for Hydrogen atom	Formula for hydrogen-like atoms (ie He^+, Li^{2+}, Be^{3+} ...)
$r_n = \frac{n^2 h^2 \epsilon_0}{\pi e^2 m}$ $r_n = a_0 n^2$	$r_n = \frac{n^2 h^2 \epsilon_0}{\pi e^2 m Z}$ $r_n = \frac{a_0 n^2}{Z}$
$E_n = -\frac{e^4 m}{8 \epsilon_0^2 h^2 n^2}$ $E_n = -\frac{e^2}{8 \pi \epsilon_0 n^2 a_0}$	$E_n = -\frac{e^4 m Z^2}{8 \epsilon_0^2 h^2 n^2}$ $E_n = -\frac{e^2 Z^2}{8 \pi \epsilon_0 n^2 a_0}$
$\Delta E = (2.178 \times 10^{-18} J)\left[\frac{1}{n_x^2} - \frac{1}{n_y^2}\right]$ (energy term) $\bar{\nu} = \frac{1}{\lambda} = (109678 cm^{-1})\left[\frac{1}{n_x^2} - \frac{1}{n_y^2}\right]$ (wavelength term) $\nu = (3.29 \times 10^{15} Hz)\left[\frac{1}{n_x^2} - \frac{1}{n_y^2}\right]$ (frequency term)	$\Delta E = (2.178 \times 10^{-18} J) Z^2 \left[\frac{1}{n_x^2} - \frac{1}{n_y^2}\right]$ $\bar{\nu} = \frac{1}{\lambda} = (109678 cm^{-1}) Z^2 \left[\frac{1}{n_x^2} - \frac{1}{n_y^2}\right]$ $\nu = (3.29 \times 10^{15} Hz) Z^2 \left[\frac{1}{n_x^2} - \frac{1}{n_y^2}\right]$

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