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Electromagnetic radiation, photoelectric effect and the Bohr model

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
Wave relation	c = v x wavelength; wave number = 1/wavelength Valid when: light in vacuum (in a medium use the speed in that medium)	c = 3.00 x 10^8 m s^-1; wave number in m^-1
Photon energy	E = hv = hc/wavelength = 1240/wavelength(nm) eV Valid when: one photon; for one mole multiply by N_A	h = 6.626 x 10^-34 J s; E in J or eV (1 eV = 1.602 x 10^-19 J)
Photoelectric equation	hv = h v0 + KE max; e V0 = KE max Valid when: light frequency at least the threshold v0; V0 is the stopping potential	J or eV (V0 in volt)
Rydberg formula	wave number = R Z^2 (1/n1^2 - 1/n2^2) Valid when: hydrogen-like one-electron species only (H, He+, Li2+); n2 > n1	R = 1.097 x 10^7 m^-1
Bohr radius	r = 52.9 n^2 / Z Valid when: hydrogen-like one-electron species; Bohr model	pm
Bohr speed	v = 2.19 x 10^6 Z / n Valid when: hydrogen-like one-electron species; Bohr model	m s^-1
Bohr energy	E = -13.6 Z^2 / n^2 = -2.18 x 10^-18 Z^2 / n^2 Valid when: hydrogen-like one-electron species; zero of energy at n = infinity	eV (J)
Angular momentum	m v r = n h / (2 pi) Valid when: electron in a Bohr orbit of a one-electron species; n whole number	J s
Number of lines from level n	n (n - 1) / 2 Valid when: sample of many H atoms all excited to level n, every path used	dimensionless

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/chemistry/atomic-structure/electromagnetic-radiation-photoelectric-effect-and-th

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