

# Useful Constants and Conversion Factors

Quoted to a useful number of significant figures.

Speed of light in vacuum	$c = 2.998 \times 10^8$ m/sec
Electron charge magnitude	$e = 1.602 \times 10^{-19}$ coul
Planck's constant	$h = 6.626 \times 10^{-34}$ joule-sec $\hbar = h/2\pi = 1.055 \times 10^{-34}$ joule-sec $= 0.6582 \times 10^{-15}$ eV-sec
Boltzmann's constant	$k = 1.381 \times 10^{-23}$ joule/°K $= 8.617 \times 10^{-5}$ eV/°K
Avogadro's number	$N_0 = 6.023 \times 10^{23}$ /mole
Coulomb's law constant	$1/4\pi\epsilon_0 = 8.988 \times 10^9$ nt-m <sup>2</sup> /coul <sup>2</sup>
Electron rest mass	$m_e = 9.109 \times 10^{-31}$ kg = 0.5110 MeV/c <sup>2</sup>
Proton rest mass	$m_p = 1.672 \times 10^{-27}$ kg = 938.3 MeV/c <sup>2</sup>
Neutron rest mass	$m_n = 1.675 \times 10^{-27}$ kg = 939.6 MeV/c <sup>2</sup>
Atomic mass unit (C <sup>12</sup> ≡ 12)	$u = 1.661 \times 10^{-27}$ kg = 931.5 MeV/c <sup>2</sup>
Bohr magneton	$\mu_b = e\hbar/2m_e = 9.27 \times 10^{-24}$ amp-m <sup>2</sup> (or joule/tesla)
Nuclear magneton	$\mu_n = e\hbar/2m_p = 5.05 \times 10^{-27}$ amp-m <sup>2</sup> (or joule/tesla)
Bohr radius	$a_0 = 4\pi\epsilon_0\hbar^2/m_e e^2 = 5.29 \times 10^{-11}$ m = 0.529 Å
Bohr energy	$E_1 = -m_e e^4 / (4\pi\epsilon_0)^2 2\hbar^2 = -2.17 \times 10^{-18}$ joule = -13.6 eV
Electron Compton wavelength	$\lambda_c = h/m_e c = 2.43 \times 10^{-12}$ m = 0.0243 Å
Fine-structure constant	$\alpha = e^2/4\pi\epsilon_0\hbar c = 7.30 \times 10^{-3} \simeq 1/137$
$kT$ at room temperature	$k300^\circ\text{K} = 0.0258$ eV $\simeq 1/40$ eV
1 eV = 1.602 × 10 <sup>-19</sup> joule	1 joule = 6.242 × 10 <sup>18</sup> eV
1 Å = 10 <sup>-10</sup> m	1 F = 10 <sup>-15</sup> m
	1 barn (bn) = 10 <sup>-28</sup> m <sup>2</sup>