

Table 1.1. Reviewed 2007 by P.J. Mohr and B.N. Taylor (NIST). The set of constants excluding the last group (which come from the Particle Data Group) is recommended by CODATA 06 for international use. The 1- σ uncertainties in the last digits are given in parentheses after the values. See P.J. Mohr, B.N. Taylor, and D.B. Newell, Rev. Mod. Phys. 80 (2008) 633, and <http://physics.nist.gov/constants>.

Quantity	Symbol, equation	Value	Uncertainty (ppb)
speed of light in vacuum	c	299 792 458 m s ⁻¹	exact*
Planck constant	h	6.626 068 96(33) × 10 ⁻³⁴ J s	50
Planck constant, reduced	$\hbar \equiv h/2\pi$	1.054 571 628(53) × 10 ⁻³⁴ J s = 6.582 118 99(16) × 10 ⁻²² MeV s	50 25
electron charge magnitude	e	1.602 176 487(40) × 10 ⁻¹⁹ C = 4.803 204 27(12) × 10 ⁻¹⁰ esu	25, 25
conversion constant	$\hbar c$	197.326 9631(49) MeV fm	25
conversion constant	$(\hbar c)^2$	0.389 379 304(19) GeV ² mbarn	50
electron mass	m_e	0.510 998 910(13) MeV/c ² = 9.109 382 15(45) × 10 ⁻³¹ kg	25, 50
proton mass	m_p	938.272 013(23) MeV/c ² = 1.672 621 637(83) × 10 ⁻²⁷ kg = 1.007 276 466 77(10) u = 1836.152 672 47(80) m_e	25, 50 0.10, 0.43
deuteron mass	m_d	1875.612 793(47) MeV/c ²	25
unified atomic mass unit (u)	(mass ¹² C atom)/12 = (1 g)/(N _A mol)	931.494 028(23) MeV/c ² = 1.660 538 782(83) × 10 ⁻²⁷ kg	25, 50
permittivity of free space	$\epsilon_0 = 1/\mu_0 c^2$	8.854 187 817 ... × 10 ⁻¹² F m ⁻¹	exact
permeability of free space	μ_0	4 π × 10 ⁻⁷ N A ⁻² = 12.566 370 614 ... × 10 ⁻⁷ N A ⁻²	exact
fine-structure constant	$\alpha = e^2/4\pi\epsilon_0\hbar c$	7.297 352 5376(50) × 10 ⁻³ = 1/137.035 999 679(94) [†]	0.68, 0.68
classical electron radius	$r_e = e^2/4\pi\epsilon_0 m_e c^2$	2.817 940 2894(58) × 10 ⁻¹⁵ m	2.1
(e ⁻ Compton wavelength)/2 π	$\lambda_e = \hbar/m_e c = r_e \alpha^{-1}$	3.861 592 6459(53) × 10 ⁻¹³ m	1.4
Bohr radius ($m_{\text{nucleus}} = \infty$)	$a_\infty = 4\pi\epsilon_0 \hbar^2 / m_e e^2 = r_e \alpha^{-2}$	0.529 177 208 59(36) × 10 ⁻¹⁰ m	0.68
wavelength of 1 eV/c particle	$hc/(1 \text{ eV})$	1.239 841 875(31) × 10 ⁻⁶ m	25
Rydberg energy	$hcR_\infty = m_e e^4 / 2(4\pi\epsilon_0)^2 \hbar^2 = m_e c^2 \alpha^2 / 2$	13.605 691 93(34) eV	25
Thomson cross section	$\sigma_T = 8\pi r_e^2 / 3$	0.665 245 8558(27) barn	4.1

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