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GENERAL PHYSICAL CONSTANTS

The values of constants given in the table on the other side of this card are taken from Taylor, Parker, and Langenberg, Rev. Mod. Phys. 41, p. 375 (1969). These should be considered interim values pending completion of the work of the Task Group on Fundamental Constants of the Committee on Data for Science and Technology, International Council of Scientific Unions.

THE INTERNATIONAL SYSTEM OF UNITS (SI)

The International System of Units (SI), established in 1960 by the General Conference of Weights and Measures under the Treaty of the Metre, is based on: the metre (m) for length, defined as 1 650 763.73 wavelengths in vacuum corresponding to the transition  $2p_{10} - 5d_5$  of krypton 86; the kilogram (kg) for mass, defined as the mass of the prototype kilogram at Sèvres, France; the second (s) for time, defined as the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of cesium 133; the kelvin (K) for temperature, defined as 1/273.16 of the thermodynamic temperature of the triple point of water; the ampere (A) for electric current, defined as the current that, if flowing in two infinitely long parallel wires in vacuum separated by one metre would produce a force between the wires of  $2 \times 10^{-7}$  newton per metre of length; and the candela (cd) for luminous intensity, defined as the luminous intensity of 1/600 000 square metre of a blackbody at the temperature of freezing platinum.

DEFINED VALUES AND CONVERSION FACTORS

Atomic mass unit (u).....	1/12 the mass of an atom of the $^{12}\text{C}$ nuclide
Standard acceleration of free fall.....	9.806 65 m/s <sup>2</sup> , 980.665 cm/s <sup>2</sup>
Standard atmosphere.....	101 325 N/m <sup>2</sup> , 1 013 250 dyn/cm <sup>2</sup>
Thermochemical calorie.....	4.184 J, 4.184 $\times 10^7$ ergs
Int. Steam Table calorie.....	4.1868 J, 4.1868 $\times 10^7$ ergs
Liter.....	0.001 cubic metre
Mole (mol).....	amount of substance comprising as many elementary entities as there are atoms in 0.012 kg of $^{12}\text{C}$
Inch.....	0.0254 m, 2.54 cm
Pound, avdp.....	0.453 592 37 kg, 453.592 37 g

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Constant	Sym- bol	Value	Uncer- tainty*	Units: Système Internat. (SI)	Units: Centimetre- gram-second (cgs)
Speed of light in vacuum.....	$c$	2.997 925 0	$\pm 10$	$\times 10^8$ m/s	$\times 10^{10}$ cm/s
Elementary charge.....	$e$	1.602 191 7 4.803 250	70 21	$10^{-19}$ C	$10^{-20}$ cm <sup>1/2</sup> g <sup>1/2</sup> s <sup>-1</sup> † $10^{-10}$ cm <sup>3/2</sup> g <sup>1/2</sup> s <sup>-1</sup> ‡
Avogadro constant.....	$N_A$	6.022 169	40**	$10^{23}$ mol <sup>-1</sup>	$10^{23}$ mol <sup>-1</sup>
Atomic mass unit.....	$u$	1.660 531	11**	$10^{-27}$ kg	$10^{-24}$ g
Electron rest mass.....	$m_e$	9.109 558	54	$10^{-31}$ kg	$10^{-28}$ g
Proton rest mass.....	$m_p$	1.672 614	11**	$10^{-27}$ kg	$10^{-24}$ g
Faraday constant.....	$F$	9.648 670	54**	$10^4$ C/mol	$10^3$ cm <sup>3/2</sup> g <sup>1/2</sup> mol <sup>-1</sup> †
Planck constant.....	$h$	6.626 196	50	$10^{-34}$ J · s	$10^{-27}$ erg · s
Fine structure constant.....	$\alpha$	7.297 351	11	$10^{-3}$	$10^{-3}$
Charge to mass ratio for electron.....	$e/m_e$	1.758 802 8 5.272 759	54 16	$10^{11}$ C/kg	$10^7$ cm <sup>1/2</sup> g <sup>-1/2</sup> s <sup>-1</sup> † $10^{17}$ cm <sup>3/2</sup> g <sup>-1/2</sup> s <sup>-1</sup> ‡
Rydberg constant.....	$R_\infty$	1.097 373 12	11	$10^7$ m <sup>-1</sup>	$10^5$ cm <sup>-1</sup>
Gyromagnetic ratio of proton..... (uncorrected for diamag., H <sub>2</sub> O)	$\gamma_p$ $\gamma_p'$	2.675 196 5 2.675 127 0	82 82	$10^8$ rad · s <sup>-1</sup> T <sup>-1</sup> $10^8$ rad · s <sup>-1</sup> T <sup>-1</sup>	$10^4$ rad · s <sup>-1</sup> C <sup>-1</sup> † $10^4$ rad · s <sup>-1</sup> C <sup>-1</sup> †
Bohr magneton.....	$\mu_B$	9.274 096	65	$10^{-24}$ J/T	$10^{-21}$ erg/G†
Gas constant.....	$R$	8.314 34	35	$10^9$ J · K <sup>-1</sup> mol <sup>-1</sup>	$10^7$ erg · K <sup>-1</sup> mol <sup>-1</sup>
Boltzmann constant.....	$k$	1.380 622	59	$10^{-23}$ J/K	$10^{-16}$ erg/K
First radiation constant ( $2\pi hc^2$ ).....	$c_1$	3.741 844	28	$10^{-16}$ W · m <sup>2</sup>	$10^{-5}$ erg · cm <sup>2</sup> · s <sup>-1</sup>
Second radiation constant.....	$c_2$	1.438 833	61	$10^{-2}$ m · K	$10^0$ cm · K
Stefan-Boltzmann constant.....	$\sigma$	5.669 61	96	$10^{-8}$ W · m <sup>-2</sup> K <sup>-4</sup>	$10^{-5}$ erg · cm <sup>-2</sup> · s <sup>-1</sup> K <sup>-4</sup>
Gravitational constant.....	$G$	6.673 · 2	31	$10^{-11}$ N · m <sup>2</sup> /kg <sup>2</sup>	$10^{-8}$ dyn · cm <sup>2</sup> /g <sup>2</sup>

\*Based on 1 std. dev.; applies to last digits in preceding column. †Electromag. system. ‡Electrostatic system.

\*\*These values may be in conflict with data available since the Taylor, Parker, Langenberg review. Pending a complete new readjustment of the constants, it would be prudent to multiply the above uncertainty by 3.

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