

Useful Physical Constants and Conversion Factors

Table 1 Physical constants (rounded). Symbols for units: C = Coulomb, J = Joule, K = Kelvin.

<i>Quantity</i>	<i>Symbol</i>	<i>Value</i>	<i>SI Units</i>	<i>Cgs Units</i>
Electron charge	e	1.6022	10^{-19} C	10^{-20} emu
Electron mass	m_e	9.1095	10^{-31} kg	10^{-28} g
Bohr radius (atomic units)	a_0	5.2918	10^{-11} m	10^{-9} cm
Rydberg constant	R_∞	1.09737	10^7 m $^{-1}$	10^5 cm $^{-1}$
Speed of light in vacuum	c	2.99792	10^8 m s $^{-1}$	10^{10} cm s $^{-1}$
Planck's constant	h	6.6261	10^{-34} Js	10^{-27} erg s
$h/2\pi$	\hbar	1.05459	10^{-34} Js	10^{-27} erg s
Gas constant	R	8.3144	10^3 J kmol $^{-1}$ K $^{-1}$	10^7 erg mol $^{-1}$ K $^{-1}$
Avogadro's number	N_A	6.0221	10^{26} kmol $^{-1}$	10^{23} mol $^{-1}$
Boltzmann's constant (R/N_A)	k	1.38066	10^{-23} J K $^{-1}$	10^{-16} erg K $^{-1}$

Table 2 General conversion factors.

Length

1 Ångström (Å) = 10^{-10} m = 10^{-1} nm; 1 micrometer (μ m) = 10^{-6} m

Force

1 Newton (N) = 1 kg m s $^{-2}$ = 10^5 dyn = 10^5 g cm s $^{-2}$

Pressure

1 Pascal (Pa) = 1 N m $^{-2}$ = 10^{-5} bar = 10 dyn cm $^{-2}$

1.01325×10^5 Pa = 1 atm = 1.01325×10^6 dyn cm $^{-2}$ = 760 torr

Energy

1 Joule (J) = 1 kg m 2 s $^{-2}$ = 10^7 erg = 0.239 cal

1 Electronvolt (eV) = 96.485 kJ mol $^{-1}$

Table 3 Energy conversion factors. Numbers in parentheses denote powers of 10 by which the entry is to be multiplied.

	<i>erg</i>	<i>J</i>	<i>cal</i>	<i>eV</i>	<i>cm⁻¹</i>	<i>Hz</i>	<i>K</i>	<i>kJ mol⁻¹</i>	<i>kcal mol⁻¹</i>
1 erg =	1	1.0000(-7)	2.390(-8)	6.241(+11)	5.034(+15)	1.5092(+15)	7.243(+15)	6.022(+13)	1.4393(+13)
1 J =	1.0000(+7)	1	2.390(-1)	6.241(+18)	5.034(+22)	1.5092(+22)	7.243(+22)	6.022(+20)	1.4393(+20)
1 cal =	4.1840(+7)	4.1840	1	2.611(+19)	2.106(+23)	6.315(+23)	3.031(+23)	2.520(+21)	6.022(+20)
1 eV =	1.6022(-12)	1.6022(-19)	3.829(-20)	1	8.0651+3)	2.418(+14)	1.1605(+4)	9.648(+1)	2.306(+1)
1 cm ⁻¹ =	1.9865(-16)	1.9865(-23)	4.748(-24)	1.2399(-4)	1	2.998(+10)	1.4388	1.1963(-2)	2.859(-3)
1 Hz =	6.626(-27)	6.626(-34)	1.5837(-34)	4.136(-15)	3.336(-11)	1	4.799(-11)	3.990(-13)	9.537(-14)
1 K =	1.3807(-16)	1.38071(-23)	3.300(-24)	8.6171(-5)	6.950(-1)	2.084(+10)	1	8.314(-3)	1.9871(-3)
1 kJ mol ⁻¹ =	1.6606(-14)	1.6606(-21)	3.969(-22)	1.0364(-2)	8.359(+1)	2.506(+12)	1.2027(+2)	1	2.390(-1)
1 kcal mol ⁻¹ =	6.948(-14)	6.948(-21)	1.6606(-21)	4.3371(-2)	3.498(+2)	1.0486(+13)	5.032(+2)	4.184	1

