Constants and Conversions

Natural Constants

Circle Circumference to Diameter	$\pi = 3.141592653589793238462\ldots$
Speed of Light in Vacuum	$c = 299,792,458$ m/s
Avogadro Constant	$1\ \text{mol} = N_A = 6.0221367 \times 10^{23}$
Planck Constant	$h = 6.6260755 \times 10^{-34}$ J · s
Boltzmann Constant	$k = 1.380658 \times 10^{-23}$ J/K
Faraday Constant	$F = 9.6485309 \times 10^{4}$ C/mol
Molar Gas Constant	$R = 0.08205783\ \text{L} - \text{atm/mol} - \text{K} = 8.314510\ \text{J/mol} - \text{K}$
Gravitational Constant	$G = 6.67259 \times 10^{-11}\ \text{N m}^2\ \text{kg}^{-2}$
Earth Gravitational Acceleration	$g = 9.80665\ \text{m s}^{-2}$
Atomic Mass Unit (amu)	$u \equiv \frac{m_{^{12}C}}{12} = 1.6605402 \times 10^{-27}$ kg
Proton Rest Mass	$m_p = 1.6726231 \times 10^{-27}$ kg
Neutron Rest Mass	$m_n = 1.6749286 \times 10^{-27}$ kg
Electron Rest Mass	$m_e = 9.1093897 \times 10^{-31}$ kg
Elementary Charge (acu)	$q_e \equiv e = 1.6021773 \times 10^{-19}\ \text{C} = 1.5189073 \times 10^{-14}\ \text{kg}^{1/2}\ \text{m}^{3/2}\ \text{s}^{-1}$
First Bohr Radius	$a_1 = \frac{(h/2\pi e)^2}{m_e} = 0.5291771 \times 10^{-10}$ m
Rydberg Constant	$R_H = \frac{e^2}{2a_1 hc} = 1.09678 \times 10^{7}\ \text{m}^{-1}$

Conversions

Mass

$1\ \text{g} \equiv N_A$ amu 1 ton ≡ 2000 lb 1 pound = 453.5927 g

Time

1 hertz (Hz) $\equiv \text{s}^{-1}$ 1 min ≡ 60 s 1 hr ≡ 60 min 1 day ≡ 24 hr 1 year ≡ 365 day

Length

1 in ≡ 2.54 cm 1 ft ≡ 12 in 1 yd ≡ 3 ft 1 mi ≡ 5280 ft 1 Angstrom $\equiv 10^{-10}$ m

Volume

$1\ \text{mL} \equiv 1\ \text{cm}^3$ 1 gallon ≡ 4 quarts 1 quart ≡ 2 pint = 0.94635925 liter $\tilde{V}_{\text{ideal gas}} \equiv 22.414096$ L/mol (STP)

Temperature

$\text{K} = °\text{C} + 273.15$ $°\text{F} = \frac{9}{5}\,°\text{C} + 32$ STP ≡ 0°C, 1 atm

Force

1 newton (N) $\equiv 1\ \text{kg m s}^{-2}$

Pressure

1 pascal (Pa) $\equiv 1\ \text{N/m}^2$ 1 atm ≡ 760 torr = 76 cm Hg ≡ 101325 Pa = 14.70 pound/in^2

Energy

1 joule (J) $\equiv 1\ \text{N m} = 1\ \text{kg m}^2\ \text{s}^{-2} \equiv 10^7$ erg 1 cal ≡ 4.184 J $1\ \text{eV} = 1.6021773 \times 10^{-19}$ J

Charge

1 coulomb (C) $\equiv 1\ \text{A s}$

Electrical potential

1 volt (V) $\equiv 1\ \text{J C}^{-1}$