

## PHYSICAL AND ASTRONOMICAL CONSTANTS

$c$	Speed of light in vacuo	$2.998 \times 10^8 \text{ m s}^{-1}$
$e$	Elementary charge	$1.602 \times 10^{-19} \text{ C}$
$m_n$	Neutron rest mass	$1.675 \times 10^{-27} \text{ kg}$
$m_p$	Proton rest mass	$1.673 \times 10^{-27} \text{ kg}$
$m_e$	Electron rest mass	$9.110 \times 10^{-31} \text{ kg}$
$h$	Planck's constant	$6.626 \times 10^{-34} \text{ J s}$
$\hbar$	Dirac's constant ( $= h/2\pi$ )	$1.055 \times 10^{-34} \text{ J s}$
$k$	Boltzmann's constant	$1.381 \times 10^{-23} \text{ J K}^{-1}$
$G$	Gravitational constant	$6.673 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$
$\sigma$	Stefan-Boltzmann constant	$5.670 \times 10^{-8} \text{ J m}^{-2} \text{ K}^{-4} \text{ s}^{-1}$
$c_1$	First Radiation Constant ( $= 2\pi hc^2$ )	$3.742 \times 10^{-16} \text{ J m}^2 \text{ s}^{-1}$
$c_2$	Second Radiation Constant ( $= hc/k$ )	$1.439 \times 10^{-2} \text{ m K}$
$\epsilon_0$	Permittivity of free space	$8.854 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$
$\mu_0$	Permeability of free space	$4\pi \times 10^{-7} \text{ H m}^{-1}$
$N_A$	Avogadro constant	$6.022 \times 10^{23} \text{ mol}^{-1}$
$R$	Gas constant	$8.314 \text{ J K}^{-1} \text{ mol}^{-1}$
$a_0$	Bohr radius	$5.292 \times 10^{-11} \text{ m}$
$\mu_B$	Bohr magneton	$9.274 \times 10^{-24} \text{ J T}^{-1}$
$\alpha$	Fine structure constant ( $= 1/137.0$ )	$7.297 \times 10^{-3}$
$M_\odot$	Solar Mass	$1.989 \times 10^{30} \text{ kg}$
$R_\odot$	Solar radius	$6.96 \times 10^8 \text{ m}$
$L_\odot$	Solar luminosity	$3.827 \times 10^{26} \text{ J s}^{-1}$
$M_\oplus$	Earth Mass	$5.976 \times 10^{24} \text{ kg}$
$R_\oplus$	Mean earth radius	$6.371 \times 10^6 \text{ m}$
1 light year		$9.461 \times 10^{15} \text{ m}$
1 AU	Astronomical Unit	$1.496 \times 10^{11} \text{ m}$
1 pc	Parsec	$3.086 \times 10^{16} \text{ m}$
1 year		$3.156 \times 10^7 \text{ s}$

**ENERGY CONVERSION :** 1 joule (J) =  $6.2415 \times 10^{18}$  electronvolts (eV)