

## SOME USEFUL CONSTANTS

Quantity	Symbol	Expression	Numerical Values
Electron Charge	$e$		$1.602 \times 10^{-19}$ Coulomb
Electron Mass	$m_e$		$5.4858 \times 10^{-4}$ amu
		$m_e c^2$	$9.1094 \times 10^{-31}$ kg $0.5110$ MeV
Proton mass	$m_p$		$1836.15 \times m_e$
		$m_p c^2$	$938.28$ MeV
Neutron mass	$m_n$	$m_n c^2$	$939.57$ MeV
Planck's constant	$h$		$4.1357 \times 10^{-15}$ eV sec $6.626 \times 10^{-34}$ Joule sec
	$\hbar$	$h/2\pi$	$6.582 \times 10^{-16}$ eV sec $1.0546 \times 10^{-34}$ Joule sec
	$hc$		$12.398$ KeV Å
	$\hbar c$		$1.973$ KeV Å
Fine Structure Constant	$\alpha$	$e^2 / \hbar c$	$1/137.036$
Classical Electron Radius	$r_e$	$e^2 / m_e c^2$	$2.818 \times 10^{-13}$ cm
Boltzman's Constant	$k$		$8.617 \times 10^{-5}$ eV/Kelvin
			$1.38065 \times 10^{-23}$ Joule/Kelvin
Ideal Gas Constant	$R$	$k N_A$	$8.3145$ Joule/(mole K)
			$6.236 \times 10^4$ mmHg cm <sup>3</sup> /(mole K)
Speed of Light	$c$		$2.9979 \times 10^{10}$ cm/sec
Avogadro's number	$N_A$	$1/\text{amu}$	$6.022 \times 10^{23}$ gm <sup>-1</sup>
Bohr magneton	$\mu_B$	$e\hbar / 2m_e$ (SI)	$0.927401 \times 10^{-23}$ Joule/Tesla
		$e\hbar / 2m_e c$ (cgs)	$0.5788 \times 10^{-8}$ eV/gauss
Nuclear magneton	$\mu_p$	$e\hbar / 2m_p$ (SI)	$0.50508 \times 10^{-26}$ Joule/Tesla
			$3.1524 \times 10^{-12}$ eV/gauss
Rydberg's Constant	$R_\infty$	$\frac{m_e e^4}{2\hbar^2} = \frac{1}{2} \alpha^2 m_e c^2$	$13.6057$ eV

**SOME USEFUL NUMBERS**

Speed of light = 1 foot/nanosec.

$kT$  at room temperature ( 300 K) = 1/40 eV

Conversions:

Energy (Joule) =  $e \times$  Energy (eV)

1 amu =  $1/N_A = 1.6605 \times 10^{-27}$  kg (931.494 MeV)

1 atmosphere = 760 mm Hg =  $1.01 \times 10^5$  N/m<sup>2</sup>

1 weber/m<sup>2</sup> = 1 tesla =  $10^4$  gauss

1 Å =  $10^{-10}$  m

**ELECTROMAGNETIC (SI) NUMBERS**

$$\frac{1}{4\pi\epsilon_0} = 8.988 \times 10^9 \text{ N m}^2/\text{Coul}^2 \quad \mu_0 = 4\pi \times 10^{-7} \text{ N/Amp}^2 \quad c^2 = 1/\mu_0\epsilon_0$$