ภาคผนวก

Important Constants

velocity of light, c	3.00×10^8 m/s
gravitational constant, G	667×10^{-11} N·m²/kg²
rest mass of electron, m_e	911×10^{-31} kg
rest mass Of proton. m_p	$1\ 67 \times 10^{-27}$ kg
rest mass Of neutron. m_n	1.67×10^{-27} kg
unified atomic mass unit, u	$1\ 66 \times 10^{-27}$ kg
energy equivalent of 1 u	931 5 Mev
Avogadro's number, N,	$6\ 02 \times 10^{23}$ mol⁻¹
Joule equivalent, J	4 184 J/cal
absolute zero. 0°K	-273 15°C
volume of 1 mole of ideal gas at STP, V_0	22 4 liters
gas constant per mole, R	8 31 J/mol·K
charge Of electron e	160×10^{-19} C
Faraday constant, 0,	9.65×10^4 C/g.e.w
Planck's constant. h	663×10^{-34} J·s
electrostatic *constant, k*	900×10^9 N·m²/C²
electromagnetic constant, k'	10^{-7} N/A²

Important Metric Prefixes

Prefix	Abbreviation	Meaning	Typical Examples
giga	G	$\times 10^9$	1 gigahertz (radar frequency) = 10^9 Hz = 10^9 cycles/s
mega	M	$\times 10^6$	1 megaton (equivalent TNT strength of nuclear weapon) = 10^6 tons
kilo	k	$\times 10^3$	1 kilogram = 1000 g
deci	d	$\times 10^{-1}$	1 decibel = 0 1 bel
centi	C	$\times 10^{-2}$	1 centimeter = 0 01 m
milli	m	$\times 10^{-3}$	1 milliampere = 0 001 A
micro	μ	$\times 10^{-6}$	1 microvolt = 10^{-6} V
nano	n	$\times 10^{-9}$	1 nanosecond = 10^{-9} s
pico	p	$\times 10^{-12}$	1 picofarad = 10^{-12} F
femto	f	$\times 10^{-15}$	1 femtometer (approximate size 01 a proton) = 10^{-15} m

* Other metric prefixes not in common use are tera (T) for 10^{12}, peta (P) for 10^{15}, exa (E) for 10^{18}, and atto (a) for 10^{-18}. The micron, a unit of length used in older literature, is 1 μm = 10^{-6} m = 0 001 mm.

Greek Alphabet

A	α	alpha	H	η	eta	N	ν	nu	T	τ	tau
B	β	beta	Θ	θ	theta	Ξ	ξ	xi	Υ	υ	upsilon
I	γ	gamma	I	ι	iota	O	o	omicron	Φ	ϕ	phi
Δ	δ	delta	K	κ	kappa	Π	π	pi	X	χ	chi
E	ϵ	epsilon	Λ	λ	lambda	P	ρ	rho	Ψ	ψ	psi
Z	ζ	zeta	M	μ	mu	Σ	σ	sigma	Ω	ω	omega

Equivalents and Conversion Factors*

Length

1 ft = 30 48 cm = 0.3048 m
1 mi = 5280 ft = 1.609 km
1 yd = 0 9144 m
1 in = 2 540 cm
1 angstrom (A) = 10^{-10} m = 10^{-8} cm
1 fermi = 1 femtometer (fm) = 1 0 ^{15} m = 1 0 ^{13} cm
1 muon (p) = 1 μm = 10^{6} m = 10 ' cm = 10^{4} Å
1 light-year = 9 461 × 10^{12} km = 5 88 × 10^{12} mi

Area

1 ft^2 = 929 0 cm^2 = 0 09290 m^2
1 in^2 = 6 452 cm^2 = 645 2 mm^2
1 barn(b) = 10^{-28} m^2 = 10 ^{24} cm^2

Volume

1 liter = 1000 ml = 1000 cm^3 = 0 001 m^3 = 1 0576 qt = 61 03 in^3 = 0 0353 ft^3
1 ft^3 = 7.481 gal = 28 32 liters = 0 02832 m^3
1 m^3 = 1000 liters = 10^6 cm^3 = 1 308 yd^3 = 35.31 ft^3

Velocity

60 mi/h = 88 ft/s = 26 82 m/s = 96.5 km/h
1 mi/h = 04470 m/s = 1609 km/h = 147 ft/s = 085 knot

Mass

1 metric ton = 1 tonne = 1000 kg = 10^6 g

Force

1 newton (N) = 10' dynes = 0 2248 lb
1 lb = 4 448 N
1 ton = 2000 lb = 8 896 × 10^3 N
An object of mass 1 kg weighs* 9 807 N = 2.205 lb
An object of weight* 1 lb has mass 453 6 g = 0 4536 kg

Pressure

1 bar = 10^6 dyn/cm^2 = 10^5 N/m^2 = 10^5 Pa = 14 50 lb/$in.^2$
1 lb/in^2 = 6 69 × 10^4 dyn/cm^2 = 6.89 × 10' N/m^2
1 atm = 760 torr = 760 mm Hg = 76 0 cm Hg = 14.70 lb/$in.^2$ = 2116 lb/ft^2
= 1013 × 10^5 N/m^2 = 101.3 kPa = 1.013 bar = 1013 mbar = 1013 × 10^6 dyn/cm^2

Work and energy

1 joule (J) = 10' ergs = 0 239 cal = 0 7376 ft · lb
1 cal = 4.184 J = 3.086 ft · lb
1 Btu = 252 cal = 778 ft · lb = 1054 J = 2.93 × 10^{-4} kWh
1 kilowatt · hour (kWh) = 3 60 × 10^6 J = 860 kcal
1 electron volt (eV) = 1 60 × 10^{-19} J

Power

1 horsepower (hp) = 0 746 kilowatt (kW) = 550 ft · lb/s = 3 30 × 10^4 ft · lb min
1 watt (W) = 1 J/s = 0.736 ft · lb/s

Specific heat

1 cal/g · °C = 1 Btu/lb · °F = 4.184 J/g · °C = 4184 J/kg · °C

Latent heat and heat of combustion

1 cal/g = 4 184 J/g = 4 1 8 4 J/kg = 1 80 Btu/lb

Gas constant

R = 6 3 1 4 J/mol · K = 1 9 9 cal/mol · K = 0 0 8 2 1 (atm · liter/mol · K)

* See also Table 2 for metric prefixes.
* All weights are at a point on the surface of the earth where g has the standard value 9.80665 m/s^2.