Physical Constants

Acceleration of gravity at sea level and equator	g=9.806 m s^{-2}
Atomic mass unit	1 amu = 1.660566×10^{-24} g = $(6.022045 \times 10^{23})^{-1}$ g
Avogadro's number	$N = 6.022045 \times 10^{23}$ $mole^{-1}$ or amu g^{-1}
Bohr radius	$a_\circ = 0.529177\text{Å} = 5.29177 \times 10^{-11}$ m
Boltzmann's Constant	$k = 1.38066 \times 10^{-23} JK^{-1} molecule^{-1}$
Electron charge	$e = 1.602189 \times 10^{-19}$ C
Faraday's constant	$F = 96{,}484.6$ C $mole^{-1}$
Gas constant	$R = 8.31441$ J K^{-1} $mole^{-1}$
	$R = 0.082057$ L atm K^{-1} $mole^{-1}$
Mass of electron	$m_e = 9.109534 \times 10^{-31}$ kg = 0.0005486 amu
Mass of proton	$m_p = 1.672649 \times 10^{-27}$ kg = 1.007276 amu
Mass of neutron	$m_n = 1.674954 \times 10^{-27}$ kg = 1.008665 amu
Mass of proton plus electron	$m_{p+e} = 1.673560 \times 10^{-27}$ kg
Planck's constant	$h = 6.626176 \times 10^{-34}$ J s
	$\frac{h}{2\pi} = \hbar = 1.054589 \times 10^{-34}$ J s
Rydberg Constant	$R_\infty = 109{,}737.32$ cm^{-1}
Speed of light	$c = 2.9979246 \times 10^8$ m s^{-1}
Mass of an alpha particle	6.6×10^{-27} kg

Conversion Factors

1 atm = 101.3 kPa = 760 mm Hg = 760 torr
$0°C = 273.15$ K
$x°F = (9°F/5°C)\ y°C + 32°F$
1 electron volt (eV) = 1.602189×10^{-19} J
1 calorie = 4.184 J
1 liter atm = 101.325 J
$2.303\ RT = 5.7061$ kJ mol^{-1} at 298 K
1 kJ $mole^{-1} = 83.593$ cm^{-1} (from $E = hc\bar{\nu}$)
1 amu = 1.49244×10^{-10} J = 931.502 MeV
1 curie (Ci) = 3.7×10^{10} Becquerel (Bq) = 3.7×10^{10} disintegrations s^{-1}

SI Scale Prefixes

Tera(T)	10^{12}	Kilo (k)	10^3	Milli (m)	10^{-3}
Giga(G)	10^9	Deci (d)	10^{-1}	Micro (μ)	10^{-6}
Mega(M)	10^6	Centi (c)	10^{-2}	Nano (n)	10^{-9}
				Pico (p)	10^{-12}

Fundamental Units

1 Joule = 1 J = 1 m^2 kg s^{-2}
1 Newton = 1 N = 1 m kg s^{-2}
1 Pascal = 1 Pa = 1 N m^{-2} = 1 J m^{-3} = 1 kg m^{-1} s^{-2}

Formulae

Properties of Light: $E = hf = hc/\lambda$, $c = f\lambda$
DeBroglie Wavelength: $\lambda = h/p$
Ideal Gases: $PV = nRT$, $\rho = \frac{P(\text{molar mass})}{RT}$

Geometric Formulae

Circumference of a Circle = $2\pi r$
Area of a Circle = πr^2
Volume of a Sphere = $\frac{4}{3}\pi r^3$
Surface area of a Sphere = $4\pi r^2$

Differentials

$$\frac{dx}{dx} = 1$$

$$\frac{dx^n}{dx} = nx^{n-1}$$

$$\frac{d\ln x}{dx} = 1/x$$

$$\frac{df(x)}{dy} = \frac{df(x)}{dx}\frac{dx}{dy}$$

Integrals

$$\int_{x_1}^{x_2} f(x)dx = -\int_{x_2}^{x_1} f(x)dx$$

$$\int_{x_1}^{x_2} dx = x_2 - x_1$$

$$\int_{x_1}^{x_2} x^n dx = \frac{x_2^{n+1} - x_1^{n+1}}{n+1}$$

$$\int_{x_1}^{x_2} \frac{dx}{x} = \ln\frac{x_2}{x_1}$$

Quadratic Formula

if $ax^2 + bx + c = 0$ then

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$