Commonly Used Constants and Values

Properties of the Earth

angular velocity: $\Omega = 7.292\times10^{-5}$ radians s^{-1}
mass: 5.9742×10^{24} kg
radius: 6371 km (mean)
6378 km (Equatorial)
6357 km (Polar)
sidereal day: 23.93447 hr
solar constant: $S = 1368$ W m^{-2}
standard gravity: $g_0 = 9.80665$ m s^{-2}
gravity by latitude, φ (from FMH-3, Appendix D):

$$g = \left(9.80616 \text{ m s}^{-2}\right)\left[1 - 0.002637\cos(2\varphi) + 0.0000059\cos^2(2\varphi)\right]$$

standard sea-level pressure: 1013.25 mb = 29.92 in-Hg

Parameters of Earth's orbit

semi-major axis: $a \equiv 1$ AU (149,597,870 km)
semi-minor axis: $b = 0.99986$ AU
eccentricity: $\varepsilon = \sqrt{a^2 - b^2}\,/\,a = 0.0167$
average Earth/Sun distance: 1 AU
distance at aphelion: 1.0167 AU
distance at perihelion: 0.9833 AU

Properties of the Sun

mass = 1.9891×10^{30} kg
radius = 6.9599×10^{5} km
surface gravity = 27.398 m s^{-2}
effective temperature = 5780K
radiant power = 3.86×10^{26} W
wavelength of peak emission = 0.46μm

Properties of Air and Water

$R_d = 287.1$ J kg^{-1} K^{-1} (dry air specific gas constant)
$R_v = 461.5$ J kg^{-1} K^{-1} (water vapor specific gas constant)
$\varepsilon = R_d/R_v = 0.622$
$\kappa = R_d/c_p = 0.285$

Some properties of air at sea-level

Specific heats	c_v (J kg^{-1} K^{-1})	719
	c_p (J kg^{-1} K^{-1})	1007
Dynamic viscosity (see note*)	μ (kg m^{-1} s^{-1})	1.79×10^{-5}

***Note: Kinematic viscosity, ν, is the dynamic viscosity divided by density.**

Some properties of water

		0°C	**100°C**
Density	ρ_L (kg m^{-3})	1000 (916 *ice*)	960
Latent heat of fusion	L_f (J kg^{-1})	3.34×10^{5}	-
Latent heat of vaporization	L_v (J kg^{-1})	2.50×10^{6}	2.26×10^{6}
Specific heat	c_p (J kg^{-1} K^{-1})	4218 (2100 *ice*)	4216

	Surface Tension	γ (N m^{-1})	0.07564	0.05891
	Dynamic viscosity (see note*)	μ (kg m^{-1} s^{-1})	1.793×10^{-3}	2.818×10^{-4}

Note: Kinematic viscosity, ν, is the dynamic viscosity divided by density.

Refractive index at 1013 mb

Wavelength (μm)	Air (20°C)	Water (20°C)	Ice (–7°C)
0.4	1.00278	1.344	1.319
0.7	1.00271	1.331	1.307

Fundamental Physical Constants

R = 8.3145 J mol^{-1} K^{-1} (universal gas constant)
c = 2.9979×10^{8} m s^{-1} (speed of light in a vacuum)
k = 1.38×10^{-23} J K^{-1} (Boltzmann constant)
h = 6.626×10^{-34} J s (Planck's constant)
σ = 5.67×10^{-8} W m^{-2} K^{-4} (Stefan-Boltzmann constant)
G = 6.672×10^{-11} N m^{2} kg^{-2} (Universal gravitational constant)
N_A = 6.02214×10^{23} mol^{-1} (Avogadro's number)

Visible Spectrum Wavelengths

color	wavelength (μm)
violet	0.380 – 0.450
blue	0.450 – 0.495
green	0.495 – 0.570
yellow	0.570 – 0.590
orange	0.590 – 0.620
red	0.620 – 0.750

Units and Conversions

1 cal = 4.184 J
1 mb = 1 hPa = 100 Pa = 0.0295 in-Hg
1 m s^{-1} ≅ 2 kt
1 liter = 1.0×10^{-3} m^{3}

Temperature Conversions

F = (9/5)K – 459.7 K = (5/9)(F + 459.7)
F = (9/5)C + 32 C = (5/9)(F – 32)
C = K – 273.15 K = C + 273.15