

APPENDIX A

SELECTED CONSTANTS

I. Fundamental Constants		<u>Cgs</u>	<u>Mks</u>
Speed of light (c)	2.99792458*	$\times 10^{10} \text{ cm} \cdot \text{s}^{-1}$	$10^8 \text{ m} \cdot \text{s}^{-1}$
Gravitational constant (G)	6.67	$\times 10^{-8} \text{ dyn} \cdot \text{cm}^2 \cdot \text{g}^{-2}$	$10^{-11} \text{ N} \cdot \text{m}^2 \cdot \text{kg}^{-2}$
Permeability constant (μ_0)	1.26	$\times \text{—}$	$10^{-6} \text{ Henry} \cdot \text{m}^{-1}$
Permittivity constant (ϵ_0)	8.85	$\times \text{—}$	$10^{-12} \text{ Farad} \cdot \text{m}^{-1}$
Electron charge (e)	1.60219	$\times \text{—}$	10^{-19} Coulomb
	4.80325	$\times 10^{-10} \text{ esu}$	
Planck's constant (h)	6.6262	$\times 10^{-27} \text{ erg} \cdot \text{s}$	$10^{-34} \text{ J} \cdot \text{s}$
	4.1357	$\times 10^{-15} \text{ eV} \cdot \text{s}$	
Planck's constant ($\hbar = h/2\pi$)	1.05459	$\times 10^{-27} \text{ erg} \cdot \text{s}$	$10^{-34} \text{ J} \cdot \text{s}$
	6.5822	$\times 10^{-16} \text{ eV} \cdot \text{s}$	
Avogadro's number (N_A)	6.022	$\times 10^{23} \text{ mol}^{-1}$	10^{23} mol^{-1}
Boltzmann's constant (k_B)	1.3807	$\times 10^{-16} \text{ erg} \cdot \text{K}^{-1}$	$10^{-23} \text{ J} \cdot \text{K}^{-1}$
	8.617	$\times 10^{-5} \text{ eV} \cdot \text{K}^{-1}$	
Gas constant (R)	8.314	$\times 10^7 \text{ erg} \cdot \text{K}^{-1} \text{ mol}^{-1}$	$1 \text{ J} \cdot \text{K}^{-1} \cdot \text{mol}^{-1}$
Bohr radius (a_0)	0.529177	$\times 10^{-8} \text{ cm}$	10^{-10} m
Rydberg (R)	1.09737	$\times 10^5 \text{ cm}^{-1}$	10^7 m^{-1}
	13.6058	$\times \text{eV}/hc$	
II. Other Physical Constants		<u>Cgs</u>	<u>Mks</u>
Acceleration of gravity (g)	9.80665	$\times 10^2 \text{ cm} \cdot \text{s}^{-2}$	$\text{m} \cdot \text{s}^{-2}$
local	9.809	$\times 10^2 \text{ cm} \cdot \text{s}^{-2}$	$\text{m} \cdot \text{s}^{-2}$
at equatorial sea level	9.78	$\times 10^2 \text{ cm} \cdot \text{s}^{-2}$	$\text{m} \cdot \text{s}^{-2}$
at polar sea level	9.83	$\times 10^2 \text{ cm} \cdot \text{s}^{-2}$	$\text{m} \cdot \text{s}^{-2}$
Earth's radius (r_{Earth})	6.38	$\times 10^8 \text{ cm}$	10^6 m
Earth's mass (m_{Earth})	5.98	$\times 10^{27} \text{ g}$	10^{24} kg
Electron rest mass (m_e)	9.1095	$\times 10^{-28} \text{ g}$	10^{-31} kg
Proton rest mass (m_p)	1.6726	$\times 10^{-24} \text{ g}$	10^{-27} kg
Neutron rest mass (m_n)	1.6748	$\times 10^{-24} \text{ g}$	10^{-27} kg
Speed of sound in dry air at STP	3.31	$\times 10^4 \text{ cm} \cdot \text{s}^{-1}$	$10^2 \text{ m} \cdot \text{s}^{-1}$

* This number is exact as the meter is now *defined* in terms of c and the second.

II. Other Physical Constants

(continued)

	<u>Cgs</u>	<u>Mks</u>
Heat capacity of water	$4.19 \times 10^7 \text{ erg} \cdot \text{g}^{-1} \cdot \text{K}^{-1}$	$10^3 \text{ J} \cdot \text{kg}^{-1} \cdot \text{K}^{-1}$
Heat of fusion of water (at 100°C)	$3.34 \times 10^9 \text{ erg} \cdot \text{g}^{-1}$	$10^5 \text{ J} \cdot \text{kg}^{-1}$
Heat of vaporization of water (at 0°C)	$2.27 \times 10^{10} \text{ erg} \cdot \text{g}^{-1}$	$10^6 \text{ J} \cdot \text{kg}^{-1}$
Index of refraction (n) of		
water (589.2 nm)	1.33	
crown glass (589.2 nm)	1.52	
air (590.0 nm)	1.0002765	

III. Conversion Factors

1 Electron volt (eV)	$1.60219 \times 10^{-19} \text{ J}$
1 angstrom (Å)	0.1 nm
1 Pascal (Pa)	$1 \text{ N} \cdot \text{m}^{-2}$
1 Torr	1 mm Hg = 133 Pa
1 atmosphere (atm)	760 Torr = 101.3 kPa
1 erg	10^{-7} J
1 calorie	4.18 J
1 Tesla	$1 \text{ Weber} \cdot \text{m}^{-2} = 10^4 \text{ Gauss}$

IV. Standard Resistor Color Code

first three bands				fourth band	tolerance
black	0	green	5	unmarked	20%
brown	1	blue	6	silver	10%
red	2	violet	7	gold	5%
orange	3	gray	8		
yellow	4	white	9		

V. Temperatures of Substances (at a pressure of one atmosphere)

Boiling point of water	$100^\circ\text{C} = 373.15 \text{ K}$
Melting point of ice	$0^\circ\text{C} = 273.15 \text{ K}$
Dry ice + methanol	$-78.5^\circ\text{C} = 194.7 \text{ K}$
Boiling point liquid nitrogen	$-195.8^\circ\text{C} = 77.4 \text{ K}$
Boiling point liquid helium	$-269.0^\circ\text{C} = 4.2 \text{ K}$

VI. Color as Function Of Wavelength

400 - 450 nm	Violet
450 - 500 nm	Blue
500 - 575 nm	Green
575 - 595 nm	Yellow
595 - 620 nm	Orange
620 - 700 nm	Red