

## RELATIONSHIPS AMONG UNITS

(Values in boldface are exact.)

**Length**1 in. = **2.54** cm1 ft = **30.48** cm1 yd = **91.44** cm1 mi = **5280** ft1 ft = **12** in.1 yd = **36** in.**Mass**1 oz = **28.349523125** g1 lb = **453.59237** g1 lb = **16** oz**Pressure**1 atm = **760** torr1 atm = **101,325** Pa1 atm = 14.696 psi (lb/in.<sup>2</sup>)

1 atm = 29.921 in. Hg

**Volume**1 liq. oz = **29.57353** mL1 qt = **946.352946** mL1 gallon = **3.785411784** L1 gallon = **4** qt = **8** pt1 qt = **2** pt = **32** liq. oz**Energy**1 cal = **4.184** J1 ev =  $1.6022 \times 10^{-19}$  J

1 ev/molecule = 96.49 kJ/mol

1 ev/molecule = 23.06 kcal/mol

1 J = 1 kg m<sup>2</sup> s<sup>-2</sup> =  $10^7$  erg

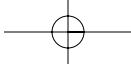
## PHYSICAL CONSTANTS

Rest mass of electron	$m_e = 5.485799094 \times 10^{-4}$ u ( $9.1093821 \times 10^{-28}$ g)
Rest mass of proton	$m_p = 1.0072764668$ u ( $1.67262164 \times 10^{-24}$ g)
Rest mass of neutron	$m_n = 1.0086649160$ u ( $1.67492721 \times 10^{-24}$ g)
Electronic charge	$e = 1.60217649 \times 10^{-19}$ C
Atomic mass unit	$u = 1.66053878 \times 10^{-24}$ g
Gas constant	$R = 0.0820575$ L atm mol <sup>-1</sup> K <sup>-1</sup> = 8.31447 J mol <sup>-1</sup> K <sup>-1</sup> = 1.98721 cal mol <sup>-1</sup> K <sup>-1</sup>
Molar volume, ideal gas	= 22.4140 L (at STP)
Avogadro's number	= $6.0221418 \times 10^{23}$ things/mol
Speed of light in a vacuum	$c = 2.99792458 \times 10^8$ m s <sup>-1</sup> (Exactly)
Planck's constant	$h = 6.6260690 \times 10^{-34}$ J s
Faraday constant	$F = 9.6485340 \times 10^4$ C mol <sup>-1</sup>

## LABORATORY REAGENTS

(Values are for the average concentrated reagents available commercially.)

Reagent	Percent	Mole Solute	Gram Solute
	(w/w)	Liter Solution	100 mL Solution
NH <sub>3</sub>	29	15	26
HC <sub>2</sub> H <sub>3</sub> O <sub>2</sub>	99.7	17	105
HCl	37	12	44
HNO <sub>3</sub>	71	16	101
H <sub>3</sub> PO <sub>4</sub>	85	15	144
H <sub>2</sub> SO <sub>4</sub>	96	18	177



### SOURCES OF USEFUL INFORMATION

Activity series for metals	191
Atomic and ionic radii	286
Bond energies	App C.3
Density of water as a function of temperature	26
Electron affinities	291
Electron configurations of the elements	App A
Electronegativities of the elements	315
Entropies (25 °C, 1 atm)	App C.1
Formation and instability constants of complexes	App C.6
Free energies of formation (25 °C, 1 atm)	App C.1
Gases formed in metathesis reactions	152
Half-lives, radionuclides	829
Heats of formation (25 °C, 1 atm)	App C.1
Heats of formation of gaseous atoms (25 °C, 1 atm)	App C.2
Indicators, acid–base	630
Ionization energies of first 20 elements	287
Ions formed by representative elements	65
Ions formed by transition and post-transition elements	68
$K_a$ values for monoprotic acids (25 °C)	App C.7
$K_a$ values for polyprotic acids	App C.7
$K_b$ values for bases (25 °C)	App C.7
$K_{sp}$ values for insoluble salts	App C.5
$K_w$ values at various temperatures	627
Lewis structures, rules for drawing	318
Non-SI units used in chemistry	13
Oxidation numbers, rules for calculating	178
Organic compounds, families of	903
Polyatomic ions	69
Reduction potentials, standard	App C.8
SI base units	10
SI prefixes and multiplication factors	12
Solubility rules	147
Strong acids	140

### PERIODIC TRENDS

(Trends in the following properties that can be correlated with the periodic table are discussed in the given sections.)

Metallic versus nonmetallic properties	2.4
Electrical charges on ions	2.6
Oxidation numbers	5.1
Reactivities of metals	5.4
Electron configurations of atoms	7.6
Atomic sizes	7.9
Electron affinities	7.9
Ionization energies	7.9
Electronegativities	8.5
Strengths of binary acids	15.2
Strengths of oxoacids	15.2
Covalent/Ionic Nature of Metal Compounds	20.2
Crystal field splitting	20.7