PERIODIC TABLE OF THE ELEMENTS

1 I A																	18 Inert gas
1 H 1.01	2 II A											13 III A	14 IV A	15 V A	16 VI A	17 VII A	2 He 4.00
3 Li 6.94	4 Be 9.01						TRANSITION ELEMENTS					5 B 10.8	6 C 12.0	7 N 14.0	8 O 16.0	9 F 19.0	10 Ne 20.2
11 Na 23.0	12 Mg 24.3	3 III B	4 IV B	5 V B	6 VI B	7 VII B	8	9 VIII	10	11 I B	12 II B	13 Al 27.0	14 Si 28.1	15 P 31.0	16 S 32.1	17 Cl 35.5	18 Ar 39.9
19 K 39.1	20 Ca 40.1	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.7	29 Cu 63.5	30 Zn 65.4	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.9	36 Kr 83.8
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (98)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.7	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.8	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (210)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89 Ac (227)															

Lanthanum Series	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.2	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
Actinium Series	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (254)	100 Fm (257)	101 Md (256)	102 No (259)	103 Lr (257)

(Based on a mass of C^{12} at 12.00. Values in parentheses are the mass of the most stable or best known isotopes for elements which do not occur naturally.)

TABLE OF CONSTANTS	
Avogadro's Constant	6.02×10^{23}/mol
Planck's Constant	6.63×10^{-34} J · s
Faraday's Constant	9.65×10^{4} C/mol e^-
Speed of Light	3.00×10^{8} m/s
K_w at 25°C	1.00×10^{-14}

RELATIVE STRENGTHS FOR SELECTED ACIDS (AT 25°C)

Acid	Reaction	K_a
Perchloric acid	$HClO_4 + H_2O \longrightarrow H_3O^+ + ClO_4^-$	very large
Hydriodic acid	$HI + H_2O \longrightarrow H_3O^+ + I^-$	very large
Hydrobromic acid	$HBr + H_2O \longrightarrow H_3O^+ + Br^-$	very large
Hydrochloric acid	$HCl + H_2O \longrightarrow H_3O^+ + Cl^-$	very large
Nitric acid	$HNO_3 + H_2O \longrightarrow H_3O^+ + NO_3^-$	very large
Sulphuric acid	$H_2SO_4 + H_2O \longrightarrow H_3O^+ + HSO_4^-$	very large
Iodic acid	$HIO_3 + H_2O \longrightarrow H_3O^+ + IO_3^-$	1.6×10^{-1}
Sulphurous acid	$H_2SO_3 + H_2O \longrightarrow H_3O^+ + HSO_3^{2-}$	1.3×10^{-2}
Nitrous acid	$HNO_2 + H_2O \longrightarrow H_3O^+ + NO_2^-$	4.6×10^{-4}
Hydrofluoric acid	$HF + H_2O \longrightarrow H_3O^+ + F^-$	3.5×10^{-4}
Formic acid	$HCHO_2 + H_2O \longrightarrow H_3O^+ + CHO_2^-$	1.8×10^{-4}
Benzoic acid	$HC_6H_5CO_2 + H_2O \longrightarrow H_3O^+ + C_6H_5CO_2^-$	6.5×10^{-5}
Acetic acid	$CH_3COOH + H_2O \longrightarrow H_3O^+ + CH_3COO^-$	1.8×10^{-5}
Carbonic acid	$H_2CO_3 + H_2O \longrightarrow H_3O^+ + HCO_3^-$	4.4×10^{-7}
Hypochlorous acid	$HOCl + H_2O \longrightarrow H_3O^+ + OCl^-$	3.0×10^{-8}
Boric acid	$H_3BO_3 + H_2O \longrightarrow H_3O^+ + H_2BO_3^-$	5.8×10^{-10}
Ammonium ion	$NH_4^+ + H_2O \longrightarrow H_3O^+ + NH_3$	5.6×10^{-10}
Hydrocyanic acid	$HCN + H_2O \longrightarrow H_3O^+ + CN^-$	4.0×10^{-10}
Water	$H_2O + H_2O \longrightarrow H_3O^+ + OH^-$	1.0×10^{-14}

STANDARD REDUCTION POTENTIALS	
Ionic concentrations 1 mol/L water at 298 K and 101.3 kPa	
Half-reaction	**E^0 Volts**
$F_{2(g)} + 2e^- \rightarrow 2F^-$	+2.87
$8H^+ + MnO_4^- + 5e^- \rightarrow Mn^{2+} + 4H_2O$	+1.51
$Au^{3+} + 3e^- \rightarrow Au_{(s)}$	+1.50
$Cl_{2(g)} + 2e^- \rightarrow 2Cl^-$	+1.36
$14H^+ + Cr_2O_7^{2-} + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$	+1.23
$4H^+ + O_{2(g)} + 4e^- \rightarrow 2H_2O$	+1.23
$4H^+ + MnO_{2(s)} + 2e^- \rightarrow Mn^{2+} + 2H_2O$	+1.22
$Br_{2(l)} + 2e^- \rightarrow 2Br^-$	+1.09
$Hg^{2+} + 2e^- \rightarrow Hg_{(l)}$	+0.85
$Ag^+ + e^- \rightarrow Ag_{(s)}$	+0.80
$Hg_2^{2+} + 2e^- \rightarrow 2Hg_{(l)}$	+0.80
$Fe^{3+} + e^- \rightarrow Fe^{2+}$	+0.77
$I_{2(s)} + 2e^- \rightarrow 2I^-$	+0.54
$Cu^+ + e^- \rightarrow Cu_{(s)}$	+0.52
$Cu^{2+} + 2e^- \rightarrow Cu_{(s)}$	+0.34
$4H^+ + SO_4^{2-} + 2e^- \rightarrow SO_{2(g)} + 2H_2O$	+0.17
$Sn^{4+} + 2e^- \rightarrow Sn^{2+}$	+0.15
$2H^+ + 2e^- \rightarrow H_{2(g)}$	0.00
$Pb^{2+} + 2e^- \rightarrow Pb_{(s)}$	−0.13
$Sn^{2+} + 2e^- \rightarrow Sn_{(s)}$	−0.14
$Ni^{2+} + 2e^- \rightarrow Ni_{(s)}$	−0.26
$Co^{2+} + 2e^- \rightarrow Co_{(s)}$	−0.28
$Fe^{2+} + 2e^- \rightarrow Fe_{(s)}$	−0.45
$Cr^{3+} + 3e^- \rightarrow Cr_{(s)}$	−0.74
$Zn^{2+} + 2e^- \rightarrow Zn_{(s)}$	−0.76
$2H_2O + 2e^- \rightarrow 2OH^- + H_{2(g)}$	−0.83
$Mn^{2+} + 2e^- \rightarrow Mn_{(s)}$	−1.19
$Al^{3+} + 3e^- \rightarrow Al_{(s)}$	−1.66
$Mg^{2+} + 2e^- \rightarrow Mg_{(s)}$	−2.37
$Na^+ + e^- \rightarrow Na_{(s)}$	−2.71
$Ca^{2+} + 2e^- \rightarrow Ca_{(s)}$	−2.87
$Sr^{2+} + 2e^- \rightarrow Sr_{(s)}$	−2.89
$Ba^{2+} + 2e^- \rightarrow Ba_{(s)}$	−2.91
$Cs^+ + e^- \rightarrow Cs_{(s)}$	−2.92
$K^+ + e^- \rightarrow K_{(s)}$	−2.93
$Rb^+ + e^- \rightarrow Rb_{(s)}$	−2.98
$Li^+ + e^- \rightarrow Li_{(s)}$	−3.04