

	1 1A																	18 8A
1	1 H 1.00794	2 2A											13 3A	14 4A	15 5A	16 6A	17 7A	2 He 4.002602
2	3 Li 6.941	4 Be 9.012182											5 B 10.811	6 C 12.0107	7 N 14.00674	8 O 15.9994	9 F 18.9984032	10 Ne 20.1797
3	11 Na 22.989770	12 Mg 24.3050	3 3B	4 4B	5 5B	6 6B	7 7B	8	9	10	11 1B	12 2B	13 Al 26.981538	14 Si 28.0855	15 P 30.973761	16 S 32.066	17 Cl 35.4527	18 Ar 39.948
4	19 K 39.0983	20 Ca 40.078	21 Sc 44.955910	22 Ti 47.867	23 V 50.9415	24 Cr 51.9961	25 Mn 54.938049	26 Fe 55.845	27 Co 58.933200	28 Ni 58.6934	29 Cu 63.546	30 Zn 65.39	31 Ga 69.723	32 Ge 72.61	33 As 74.92160	34 Se 78.96	35 Br 79.904	36 Kr 83.80
5	37 Rb 85.4678	38 Sr 87.62	39 Y 88.90585	40 Zr 91.224	41 Nb 92.90638	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.90550	46 Pd 106.42	47 Ag 107.8682	48 Cd 112.411	49 In 114.818	50 Sn 118.710	51 Sb 121.760	52 Te 127.60	53 I 126.90447	54 Xe 131.29
6	55 Cs 132.90545	56 Ba 137.327	57 La 138.9055	72 Hf 178.49	73 Ta 180.9479	74 W 183.84	75 Re 186.207	76 Os 190.23	77 Ir 192.217	78 Pt 195.078	79 Au 196.96655	80 Hg 200.59	81 Tl 204.3833	82 Pb 207.2	83 Bi 208.98038	84 Po (209)	85 At (210)	86 Rn (222)
7	87 Fr (223)	88 Ra (226)	89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)									

Lanthanoids

Actinoids

58 Ce 140.116	59 Pr 140.90765	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.964	64 Gd 157.25	65 Tb 158.92534	66 Dy 162.50	67 Ho 164.93032	68 Er 167.26	69 Tm 168.93421	70 Yb 173.04	71 Lu 174.967
90 Th 232.0381	91 Pa 231.03588	92 U 238.0289	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)

Electronegativity

Activity Series

Colour Rosette

H 2.1	
Li 1.0	Be 1.5
Na 0.9	Mg 1.2
K 0.8	Ca 1.0
Rb 0.8	Sr 1.0
Cs 0.7	Ba 0.9

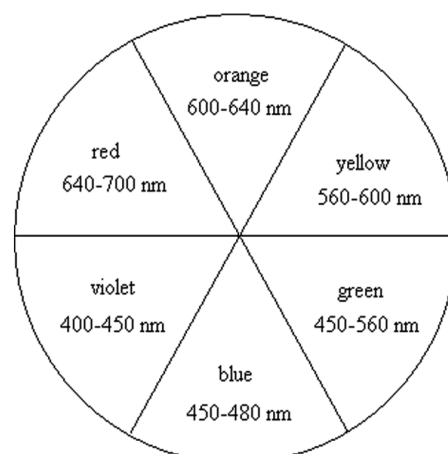
B 2.0	C 2.5	N 3.0	O 3.5	F 4.0
Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0
Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8
				I 2.4

Lithium
Potassium
Barium
Calcium
Sodium
Magnesium
Aluminum
Zinc
Iron
Nickel
Tin
Lead
Hydrogen
Copper
Mercury
Silver
Gold

Li
K
Ba
Ca
Na
Mg
Al
Zn
Fe
Ni
Sn
Pb
H
Cu
Hg
Ag
Au

Most Reactive

Oxidizing Agent Strength





Useful Constants

Avogadro Constant: 6.02×10^{23} particles/mol

$1 \text{ L} = 1 \text{ dm}^3 = 0.001 \text{ m}^3 = 1000 \text{ cm}^3 = 1000 \text{ mL}$

Molar Volume of Ideal Gas:

22.4 L/mol at STP (100.0 kPa , 0°C)

24.8 L/mol at SATP (100.0 kPa , 25°C)

$1.000 \text{ atm} = 101.3 \text{ kPa} = 760 \text{ mmHg (torr)} = 14.7 \text{ psi}$

$R = 8.314 \text{ L}\cdot\text{kPa}\cdot\text{mol}^{-1}\text{K}^{-1}$ (or $\text{J}\cdot\text{mol}^{-1}\text{K}^{-1}$)

$= 0.0821 \text{ L}\cdot\text{atm}\cdot\text{mol}^{-1}\text{K}^{-1}$

$= 62.4 \text{ L}\cdot\text{mmHg}\cdot\text{mol}^{-1}\text{K}^{-1}$

density of $\text{H}_2\text{O}_{(l)}$: $1.00 \text{ g}\cdot\text{mL}^{-1}$

$0^\circ\text{C} = 273 \text{ K}$

Faraday Constant: $96,485 \text{ C/mol electrons}$

Vapour Pressure of Water

Temperature ($^\circ\text{C}$)	Pressure (kPa)
10	1.23
11	1.31
12	1.40
13	1.50
14	1.60
15	1.70
16	1.92
17	1.94
18	2.06
19	2.20
20	2.34
21	2.49
22	2.64
23	2.81
24	2.98
25	3.17
26	3.36
27	3.56
28	3.78
29	4.00
30	4.24

bond energies

Bond	Bond Length (nm)	Bond Energy (kJ/mol)
H-H	0.074	436
H-Cl	0.127	431
Cl-Cl	0.198	243
H-C	0.109	413
C-Cl	0.177	328
C-C	0.154	347
C=C	0.134	607
C \equiv C	0.120	812
C-O	0.143	351
C=O	0.120	803
C \equiv O	0.113	1075
N-N	0.145	159
N=N	0.125	473
N \equiv N	0.110	941

Formulae

density = mass/volume

$C_1V_1 = C_2V_2$

Gases: $PV = nRT$; $P_1V_1/T_1 = P_2V_2/T_2$

$K_w = [\text{H}_3\text{O}^+][\text{OH}^-] = 1.00 \times 10^{-14}$ @ 25°C

$\text{pH} + \text{pOH} = 14$

$\text{pH} = -\log_{10}[\text{H}_3\text{O}^+]$; $[\text{H}_3\text{O}^+] = 10^{-\text{pH}}$

$A = -\log (\%T/100) = l \cdot c \cdot \epsilon$

$\Delta T_{\text{fp}} = K_f \cdot cm \cdot i$ (similarly for ΔT_{bp})

$[A]_t = -kt + [A]_0$ (zero order)

$t_{1/2} = [A]_0/2k$ (zero order)

$\ln[A]_t/[A]_0 = -kt$ (first order)

$t_{1/2} = 0.693/k$ (first order)

$1/[A]_t = kt + 1/[A]_0$ (second order)

$t_{1/2} = 1/(k[A]_0)$ (second order)

$k = Ae^{-E_a/RT}$

$\ln(k_2/k_1) = (E_a/R)(1/T_1 - 1/T_2)$

$K_c = K_{\text{eq}} = ([C]^c[D]^d)/([A]^a[B]^b)$

(similarly for Q or K_c^{trial} , but use initial conds.)

$K_a \cdot K_b = K_w$

$\text{pH} = \text{pK}_a + \log_{10}[\text{A}^-]/[\text{HA}]$

$\Delta H_r = \Sigma \text{ bonds broken} - \Sigma \text{ bonds formed}$

$= \Sigma \Delta H_f^\circ \text{ products} - \Sigma \Delta H_f^\circ \text{ reactants}$

$\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ = -RT\ln(K_{\text{eq}}) = -nF\mathcal{E}_{\text{cell}}^\circ$

Solubility at 25°C and 101.3

	acetate	bromide	carbonate	chlorite	chloride	hydroxide	iodite	nitrate	oxide	perchlorate	phosphate	sulfate	sulfide
aluminum	S	S	—	S	S	I	S	S	I	S	I	S	d
ammonium	S	S	S	S	S	—	S	S	—	S	S	S	S
barium	S	S	I	S	S	S	S	S	sS	S	I	I	d
calcium	S	S	I	S	S	S	S	S	sS	S	I	sS	I
copper(II)	S	S	—	S	S	I	S	S	I	S	I	S	I
iron(II)	S	S	I	S	S	I	S	S	I	S	I	S	I
iron(III)	S	S	—	S	S	I	S	S	I	S	I	sS	d
lithium	S	S	sS	S	S	S	S	S	S	S	sS	S	S
magnesium	S	S	I	S	S	I	S	S	I	S	I	S	d
potassium	S	S	S	S	S	S	S	S	S	S	S	S	S
silver	sS	I	I	S	I	—	I	S	I	S	I	sS	I
sodium	S	S	S	S	S	S	S	S	S	S	S	S	S
strontium	S	S	I	S	S	S	S	S	S	S	I	I	I
zinc	S	S	I	S	S	I	S	S	I	S	I	S	I

Key: S = soluble

sS = slightly soluble

I = insoluble

d = decomposes in water

= no such compound