DATA SHEET

Fundamental Constants and Conversion Factors

Atomic mass unit (u)	$1.660\ 539 \times 10^{-27}$ kg	Kelvin temperature scale	0 K = -273.15 ºC
Avogadro's number (N_A)	$6.022\ 141 \times 10^{23}$ mol^{-1}	Planck's constant	$6.626\ 070 \times 10^{-34}$ J·Hz^{-1}
Bohr radius (a_0)	$5.291\ 772 \times 10^{-11}$ m	Proton mass	1.007 277 u
Electron charge (e)	$1.602\ 177 \times 10^{-19}$ C	Neutron mass	1.008 665 u
Electron mass	$5.485\ 799 \times 10^{-4}$ u	Rydberg Constant (R_H)	$2.179\ 872 \times 10^{-18}$ J
Ideal gas constant (R)	8.314 462 J·mol^{-1}·K^{-1}	Speed of light in vacuum	$2.997\ 925 \times 10^{8}$ m·s^{-1}
	8.314 462 m^3·Pa·mol^{-1}·K^{-1}	Standard atmospheric pressure	1 bar = 100 kPa
		Volume	1000 L = 1 m^3

Formulae

$$c = \lambda\upsilon \qquad E = h\upsilon \qquad p = mv \qquad \lambda = \frac{h}{p} \qquad \Delta x \cdot \Delta p > \frac{h}{4\pi} \qquad r_n = a_0 \frac{n^2}{Z} \qquad E_n = -R_H \frac{Z^2}{n^2}$$

$$\overline{E_k} = \frac{1}{2} m \overline{v^2} = \frac{3}{2} \frac{RT}{N_A} \qquad v_{rms} = \sqrt{\overline{v^2}} = \sqrt{\frac{3RT}{M}} \qquad PV = nRT \qquad \left(P + a\frac{n^2}{V^2}\right)(V - bn) = nRT$$

$$N_2 = N_1 \left(\frac{1}{2}\right)^{\Delta t / t_{1/2}} \qquad A = -\frac{\Delta N}{\Delta t} \qquad A = kN \qquad \ln\left(\frac{N_2}{N_1}\right) = -k(t_2 - t_1) \qquad \ln(2) = k \cdot t_{1/2}$$

$pK_a \approx 8 - 5p$ for oxoacids $O_pE(OH)_q$ $\qquad \Delta E = \Delta m c^2$

Chem 1000 Standard Periodic Table

1																	18
1.0079 **H** 1	2											13	14	15	16	17	4.0026 **He** 2
6.94 **Li** 3	9.0122 **Be** 4											10.81 **B** 5	12.011 **C** 6	14.0067 **N** 7	15.9994 **O** 8	18.9984 **F** 9	20.1797 **Ne** 10
22.990 **Na** 11	24.3050 **Mg** 12	3	4	5	6	7	8	9	10	11	12	26.9815 **Al** 13	28.085 **Si** 14	30.9738 **P** 15	32.066 **S** 16	35.45 **Cl** 17	39.95 **Ar** 18
39.0983 **K** 19	40.078 **Ca** 20	44.9559 **Sc** 21	47.867 **Ti** 22	50.9415 **V** 23	51.9961 **Cr** 24	54.938 **Mn** 25	55.845 **Fe** 26	58.9332 **Co** 27	58.693 **Ni** 28	63.546 **Cu** 29	65.38 **Zn** 30	69.723 **Ga** 31	72.60 **Ge** 32	74.9216 **As** 33	78.971 **Se** 34	79.904 **Br** 35	83.798 **Kr** 36
85.4678 **Rb** 37	87.62 **Sr** 38	88.9059 **Y** 39	91.224 **Zr** 40	92.9064 **Nb** 41	95.95 **Mo** 42	(98) **Tc** 43	101.07 **Ru** 44	102.906 **Rh** 45	106.42 **Pd** 46	107.868 **Ag** 47	112.411 **Cd** 48	114.82 **In** 49	118.710 **Sn** 50	121.757 **Sb** 51	127.60 **Te** 52	126.905 **I** 53	131.29 **Xe** 54
132.905 **Cs** 55	137.327 **Ba** 56	**La-Lu**	178.49 **Hf** 72	180.948 **Ta** 73	183.84 **W** 74	186.207 **Re** 75	190.2 **Os** 76	192.23 **Ir** 77	195.08 **Pt** 78	196.967 **Au** 79	200.59 **Hg** 80	204.38 **Tl** 81	207.19 **Pb** 82	208.980 **Bi** 83	(209) **Po** 84	(210) **At** 85	(222) **Rn** 86
(223) **Fr** 87	(226) **Ra** 88	**Ac-Lr**	(267) **Rf** 104	(268) **Db** 105	(271) **Sg** 106	(272) **Bh** 107	(270) **Hs** 108	(276) **Mt** 109	(281) **Ds** 110	(280) **Rg** 111	(285) **Cn** 112	(284) **Nh** 113	(289) **Fl** 114	(288) **Mc** 115	(293) **Lv** 116	(292) **Ts** 117	(294) **Og** 118

138.906 **La** 57	140.115 **Ce** 58	140.908 **Pr** 59	144.24 **Nd** 60	(145) **Pm** 61	150.36 **Sm** 62	151.965 **Eu** 63	157.25 **Gd** 64	158.925 **Tb** 65	162.50 **Dy** 66	164.930 **Ho** 67	167.26 **Er** 68	168.934 **Tm** 69	173.05 **Yb** 70	174.967 **Lu** 71
(227) **Ac** 89	232.038 **Th** 90	231.036 **Pa** 91	238.029 **U** 92	(237) **Np** 93	(244) **Pu** 94	(243) **Am** 95	(247) **Cm** 96	(247) **Bk** 97	(251) **Cf** 98	(252) **Es** 99	(257) **Fm** 100	(257) **Md** 101	(259) **No** 102	(262) **Lr** 103

Radioactive elements: mass number given for longest lived isotope: e.g. (98)

Developed by Prof. R. T. Boeré (updated 2021)

DATA SHEET

Spectrochemical Series

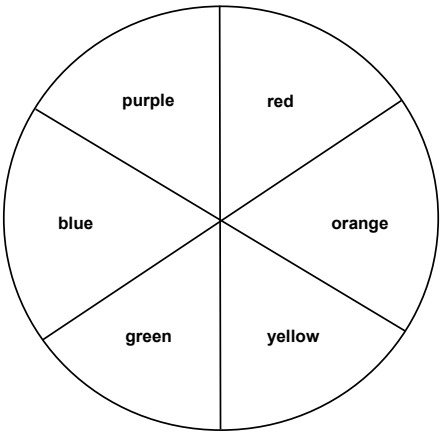
strong field weak field

$CN^- > \text{ethylenediamine} > NH_3 > EDTA^{4-} > H_2O > \text{oxalato} > OH^- > F^- > Cl^- > Br^- > I^-$

Some Useful Masses

^4_2He	4.002 603 254 u
^1_1p	1.007 276 467 u
^1_0n	1.008 664 916 u

Isotope masses would also be here.



Band of Stability Graph

The graph below shows the band of stability. The black dots represent all known stable isotopes.