DATA SHEET FOR CHEM 101

1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 **H** 1.0079																		2 **He** 4.0026
3 **Li** 6.941	4 **Be** 9.0122		Atomic number **Symbol** Atomic weight										5 **B** 10.811	6 **C** 12.011	7 **N** 14.007	8 **O** 15.999	9 **F** 18.998	10 **Ne** 20.180
11 **Na** 22.990	12 **Mg** 24.305												13 **Al** 26.982	14 **Si** 28.086	15 **P** 30.974	16 **S** 32.065	17 **Cl** 35.453	18 **Ar** 39.948
19 **K** 39.098	20 **Ca** 40.078		21 **Sc** 44.956	22 **Ti** 47.867	23 **V** 50.942	24 **Cr** 51.996	25 **Mn** 54.938	26 **Fe** 55.845	27 **Co** 58.933	28 **Ni** 58.693	29 **Cu** 63.546	30 **Zn** 65.39	31 **Ga** 69.723	32 **Ge** 72.61	33 **As** 74.922	34 **Se** 78.96	35 **Br** 79.904	36 **Kr** 83.80
37 **Rb** 85.468	38 **Sr** 87.62		39 **Y** 88.906	40 **Zr** 91.224	41 **Nb** 92.906	42 **Mo** 95.94	43 **Tc** [98]	44 **Ru** 101.07	45 **Rh** 102.91	46 **Pd** 106.42	47 **Ag** 107.87	48 **Cd** 112.41	49 **In** 114.82	50 **Sn** 118.71	51 **Sb** 121.76	52 **Te** 127.60	53 **I** 126.90	54 **Xe** 131.29
55 **Cs** 132.91	56 **Ba** 137.33	57-70 †	71 **Lu** 174.97	72 **Hf** 178.49	73 **Ta** 180.95	74 **W** 183.84	75 **Re** 186.21	76 **Os** 190.23	77 **Ir** 192.22	78 **Pt** 195.08	79 **Au** 196.97	80 **Hg** 200.59	81 **Tl** 204.38	82 **Pb** 207.2	83 **Bi** 208.98	84 **Po** [209]	85 **At** [210]	86 **Rn** [222]
87 **Fr** [223]	88 **Ra** [226]	89-102 ‡	103 **Lr** [262]	104 **Rf** [261]	105 **Db** [262]	106 **Sg** [266]	107 **Bh** [264]	108 **Hs** [269]	109 **Mt** [268]	110 **Ds** [281]	111 **Rg** [272]	112 **Cn** [285]	113 **Nh** [286]	114 **Fl** [289]	115 **Mc** [289]	116 **Lv** [293]	117 **Ts** [293]	118 **Og** [294]

†lanthanides	57 **La** 138.91	58 **Ce** 140.12	59 **Pr** 140.91	60 **Nd** 144.24	61 **Pm** [145]	62 **Sm** 150.36	63 **Eu** 151.96	64 **Gd** 157.25	65 **Tb** 158.93	66 **Dy** 162.50	67 **Ho** 164.93	68 **Er** 167.26	69 **Tm** 168.93	70 **Yb** 173.04
‡actinides	89 **Ac** [227]	90 **Th** 232.04	91 **Pa** 231.04	92 **U** 238.03	93 **Np** [237]	94 **Pu** [244]	95 **Am** [243]	96 **Cm** [247]	97 **Bk** [251]	98 **Cf** [251]	99 **Es** [252]	100 **Fm** [257]	101 **Md** [258]	102 **No** [259]

Avogadro's Number (N_A)	6.02×10^{23} mol^{-1}
atomic mass unit (amu)	1.661×10^{-27} kg
electronic charge (e)	1.602×10^{-19} C
mass of an electron (m_e)	9.109×10^{-31} kg
speed of light in vacuum (c)	3.00×10^{8} m s^{-1}
Planck's constant (h)	6.63×10^{-34} J s
Debye (D)	3.34×10^{-30} C m

$\Delta E = -2.18 \times 10^{-18}\ \text{J}\ (1/n_f^2 - 1/n_i^2)$

$\nu = |3.29 \times 10^{15}\ \text{s}^{-1}\ (1/n_f^2 - 1/n_i^2)|$

$\lambda = h/mv$

$(\Delta x)(\Delta mv) \geq h/4\pi$

$c = \lambda\nu$ $\quad E_{lattice} \propto Q_1Q_2/d$

$\mu = Qr$ $\quad E = h\nu$

1 J = 1 kg m^2 s^{-2} $\quad$ 1 Å = 1×10^{-10} m

G = giga = 10^9
M = mega = 10^6
k = kilo = 10^3
m = milli = 10^{-3}
μ = micro = 10^{-6}
n = nano = 10^{-9}
p = pico = 10^{-12}

Lattice Energies (kJ mol^{-1})

LiF (s)	1037	LiCl (s)	852
NaF (s)	926	NaCl (s)	787
KF (s)	821	KCl (s)	717
CsF (s)	750	CsCl (s)	676
CaF_2 (s)	2347	$CaCl_2$(s)	2255
NaH (s)	760	MgH_2 (s)	2490
KH (s)	701	CaH_2 (s)	2195

Ionization Energies (kJ mol^{-1})

	1st	2nd		1st	2nd
Cl	1251	2296	Mg	738	1451
F	1681	3375	Ca	590	
Li	513	7298	Ba	503	965
Na	496	4562	Rb	403	
P	1012	1907			
Cs	376	2420			
H	1312				

Average Bond Energies (kJ mol^{-1})

H–H	432	H–F	565	C–Cl	328
F–F	154	H–Cl	431	C–F	485
Cl–Cl	239	H–Br	366	C–H	413
Br–Br	193	H–I	299	O–H	467
I–I	151	N–H	388	C–O	358
O–O	146	O=O	495	C=O	800
N–N	163	N=N	409	N≡N	945
C–C	348	C=C	612	C≡C	837

Average Bond Lengths (pm)

H–H	74	C–H	109	N–H	102	O–H	96
F–F	142	C–C	154	N–N	140	O–O	148
Cl–Cl	199	C=C	134	N=N	124	O=O	121
Br–Br	228	C≡C	120	N≡N	110		
I–I	267	C–N	143	N–O	136	C–O	143
H–F	92	C=N	138	N=O	122	C=O	123
H–Cl	127	C≡N	116	N≡O	106	C≡O	113
H–Br	141	C–Cl	176	S–O	168		
H–I	161	C=Cl	158	S=O	152		

Electron Affinities (kJ mol^{-1})

F -328 Cl -349 H -71 O -141 S -200 Li -60 Be >0