

Periodic Table of the Elements

1A																	8A
1															2		
H 1.008															He 4.003		
	2A											3A	4A	5A	6A	7A	
	2											13	14	15	16	17	
3	4											5	6	7	8	9	10
Li 6.941	Be 9.012											B 10.81	C 12.01	N 14.01	O 16.00	F 19.00	Ne 20.18
11	12	3B	4B	5B	6B	7B	8B	8B	8B	1B	2B	13	14	15	16	17	18
Na 22.99	Mg 24.31	3	4	5	6	7	8	9	10	11	12	Al 26.98	Si 28.09	P 30.97	S 32.07	Cl 35.45	Ar 39.95
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
K 39.10	Ca 40.08	Sc 44.96	Ti 47.87	V 50.94	Cr 52.00	Mn 54.94	Fe 55.85	Co 58.93	Ni 58.69	Cu 63.55	Zn 65.38	Ga 69.72	Ge 72.64	As 74.92	Se 78.96	Br 79.90	Kr 83.80
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Rb 85.47	Sr 87.62	Y 88.91	Zr 91.22	Nb 92.91	Mo 95.94	Tc (98)	Ru 101.07	Rh 102.91	Pd 106.42	Ag 107.87	Cd 112.41	In 114.82	Sn 118.71	Sb 121.76	Te 127.60	I 126.90	Xe 131.29
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
Cs 132.91	Ba 137.33	La 138.91	Hf 178.49	Ta 180.95	W 183.84	Re 186.21	Os 190.23	Ir 192.22	Pt 195.08	Au 196.97	Hg 200.59	Tl 204.38	Pb 207.20	Bi 208.98	Po (209)	At (210)	Rn (222)
87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
Fr (223)	Ra (226)	Ac (227)	Rf (261)	Db (262)	Sg (266)	Bh (264)	Hs (277)	Mt (268)	Ds (281)	Rg (281)	Cn (285)	Nh (286)	Fl (289)	Mc (289)	Lv (293)	Ts (293)	Og (294)

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce 140.12	Pr 140.91	Nd 144.24	Pm (145)	Sm 150.36	Eu 151.96	Gd 157.25	Tb 158.93	Dy 162.50	Ho 164.93	Er 167.26	Tm 168.93	Yb 173.04	Lu 174.97
90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th 232.04	Pa 231.04	U 238.03	Np (237)	Pu (244)	Am (243)	Cm (247)	Bk (247)	Cf (251)	Es (252)	Fm (257)	Md (258)	No (259)	Lr (262)

constants

$$R = 8.314 \text{ J/mol K}$$

$$R = 0.08206 \text{ L}\cdot\text{atm/mol}\cdot\text{K}$$

$$R = 62.36 \text{ L}\cdot\text{torr/mol}\cdot\text{K}$$

$$N_A = 6.022 \times 10^{23} / \text{mol}$$

$$h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$$

Planck's constant

$$k = 1.38 \times 10^{-23} \text{ J/K}$$

Boltzmann constant

$$c = 3.00 \times 10^8 \text{ m/s}$$

$$F = 96485 \text{ C/mol } e^-$$

$$e = 1.602 \times 10^{-19} \text{ C}$$

charge on one electron

$$g = 9.81 \text{ m/s}^2$$

$$\mathcal{R} = 2.18 \times 10^{-18} \text{ J}$$

$$\mathcal{R} = 3.29 \times 10^{15} \text{ s}^{-1}$$

$$\mathcal{R} = 1.097 \times 10^7 \text{ m}^{-1}$$

Rydberg constants

conversions

$$1 \text{ atm} = 760 \text{ torr}$$

$$1 \text{ atm} = 101325 \text{ Pa}$$

$$1 \text{ atm} = 1.01325 \text{ bar}$$

$$1 \text{ atm} = 14.7 \text{ psi}$$

$$1 \text{ bar} = 10^5 \text{ Pa}$$

$$1 \text{ L}\cdot\text{atm} = 101.325 \text{ J}$$

$$1 \text{ cal} = 4.184 \text{ J}$$

$$1 \text{ eV} = 1.602 \times 10^{-19} \text{ J}$$

$$1 \text{ W} = 1 \text{ J/s}$$

$$1 \text{ in} = 2.54 \text{ cm}$$

$$1 \text{ ft} = 12 \text{ in}$$

$$1 \text{ yd} = 3 \text{ ft}$$

$$1 \text{ mi} = 5280 \text{ ft}$$

$$1 \text{ \AA} = 10^{-10} \text{ m}$$

$$1 \text{ lb} = 453.6 \text{ g}$$

$$1 \text{ gal} = 3.785 \text{ L}$$

$$1 \text{ gal} = 231 \text{ in}^3$$

H₂O water data

$$C_{s,\text{ice}} = 2.09 \text{ J/g K}$$

$$C_{s,\text{water}} = 4.184 \text{ J/g K}$$

$$C_{s,\text{steam}} = 2.03 \text{ J/g K}$$

$$\rho_{\text{water}} = 1.000 \text{ g/mL}$$

$$\rho_{\text{saltwater}} = 1.024 \text{ g/mL}$$

$$\rho_{\text{ice}} = 0.9167 \text{ g/mL}$$

$$\Delta H_{\text{fus}} = 334 \text{ J/g}$$

$$\Delta H_{\text{vap}} = 2260 \text{ J/g}$$

Average Bond Energies (kJ/mol)					
C-H	413	C-C	347	C-Cl	339
C-O	358	C-N	305	C-Br	276
H-H	432	H-Cl	427	O-H	467
H-I	295	N-H	391	S-H	347
H-F	565	F-F	154	N-F	272
H-Br	363	Cl-Cl	239	Br-Br	193
I-I	149	C=O	799	C=C	614
O=O	495	N=N	418	C≡O	1072
C≡C	839	N≡N	941	C≡N	891