

CONSTANTS

$$R = 8.3145 \text{ J mol}^{-1}\text{K}^{-1}$$

$$R = 0.08206 \text{ L atm mol}^{-1}\text{K}^{-1}$$

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

CONVERSION FACTORS

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

$$1 \text{ L atm} = 101.3 \text{ J}$$

$$C_{H_2O} = 4.18 \text{ J g}^{-1} \text{ K}^{-1}$$

EQUATIONS

$$\Delta E = q + w$$

$$w = -P_{\text{ext}}\Delta V$$

$$w_{\text{rev}} = -nRT \ln(V_2/V_1)$$

$$\Delta S = q_{\text{rev}}/T$$

$$\Delta S_{\text{vap}} = \Delta H_{\text{vap}}/T_b$$

$$\Delta S_{\text{fus}} = \Delta H_{\text{fus}}/T_m$$

$$\Delta S = nR \ln(V_2/V_1)$$

$$\Delta S = nC_v \ln(T_2/T_1)$$

$$\Delta S = nC_p \ln(T_2/T_1)$$

$$\Delta S_{\text{surr}} = -\Delta H/T$$

$$PV = nRT$$

$$\Delta H = nC_p\Delta T$$

$$\Delta E = nC_v\Delta T$$

$$q = nC\Delta T$$

$$q_p = nC_p\Delta T$$

$$q_v = nC_v\Delta T$$

$$C_p = C_v + R$$

$$C_{v_ideal} = 3/2 R$$

$$\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$$

$$\Delta G = \Delta G^\circ + RT \ln Q$$

$$\Delta G^\circ = -RT \ln K$$

$$\Delta G = \Delta H - T\Delta S$$

$$\Delta H = \Delta E + \Delta(PV)$$

$$\Delta H = \Delta E + P\Delta V$$

$$\ln K = \frac{-\Delta H^\circ}{R} \left(\frac{1}{T} \right) + \frac{\Delta S^\circ}{R}$$

$$\ln \left(\frac{K_2}{K_1} \right) = \frac{-\Delta H^\circ}{R} \left[\frac{1}{T_2} - \frac{1}{T_1} \right]$$

PERIODIC TABLE

	1A															8A		
	1															2		
	H															He		
	1.008															4.003		
	1A 2A												3A	4A	5A	6A	7A	8A
2	3	4											5	6	7	8	9	10
	Li	Be											B	C	N	O	F	Ne
	6.941	9.012											10.81	12.01	14.01	16.00	19.00	20.18
3	11	12											13	14	15	16	17	18
	Na	Mg											Al	Si	P	S	Cl	Ar
	22.99	24.30											26.98	28.09	30.97	32.07	35.45	39.95
4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
	39.10	40.08	44.96	47.88	50.94	52.00	54.94	55.85	58.93	58.69	63.55	65.39	69.72	72.61	74.92	78.96	79.90	83.80
5	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
	85.47	87.62	88.91	91.22	92.91	95.94	(98)	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3
6	55	56	La-Lu	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
	Cs	Ba		Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
	132.9	137.3		178.5	180.9	183.8	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	(209)	(210)	(222)
7	87	88	Ac-Lr	104	105	106	107	108	109	110	111	112		114		116		118
	Fr	Ra		Rf	Db	Sg	Bh	Hs	Mt	Uun	Uuu	Uub		Uuq		Uuh		Uuo
	(223)	(226)		(261)	(262)	(263)	(264)	(265)	(268)	(269)	(272)	(269)						

s block	d block	p block
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Lanthanides	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
	138.9	140.1	140.9	144.2	(145)	150.4	152.0	157.2	158.9	162.5	164.9	167.3	168.9	173.0	175.0
Actinides	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
	(227)	232.0	231.0	238.0	(237)	(244)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(262)

f block
