

Equations and Constants

$$\text{Molarity} = \frac{n}{V}$$

$$E_K = \frac{1}{2}mv^2$$

$$E_K = \frac{3RT}{N_a}$$

$$E_P = mgh$$

$$E_{el} = V(\text{voltage}) = \frac{\kappa Q_1 Q_2}{d}$$

$$\Delta E = q + w$$

$$w = F \times d = F \times \Delta x$$

$$w = -P\Delta V$$

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

$$q_{cal} = C\Delta T = mC_s\Delta T$$

$$\Delta H_{rxn}^{\circ} = \Sigma_{prod.} \Delta H_f^{\circ} - \Sigma_{react.} \Delta H_f^{\circ}$$

$$PV = nRT$$

$$d = \frac{PM}{RT}$$

$$P_T = P_1 + P_2 + P_3 + P_4 + \dots$$

$$P_1 = \frac{n_1}{n_T} P_T = \chi_1 P_T$$

$$u_{rms} = \sqrt{\frac{3RT}{M}}$$

$$u_{mp} = \sqrt{\frac{2RT}{M}}$$

$$\lambda v = c$$

$$E_{photon} = hv$$

$$\lambda = \frac{h}{p} = \frac{h}{mv}$$

$$\Delta E_n = (-2.178 \times 10^{-18} \text{ J}) \left(\frac{1}{n_f^2} - \frac{1}{n_i^2} \right)$$

$$E_n = (-2.178 \times 10^{-18} \text{ J}) \left(\frac{1}{n^2} \right)$$

$$\Delta p \times \Delta x \geq \frac{h}{4\pi} \quad \text{or} \quad m\Delta v \times \Delta x \geq \frac{h}{4\pi}$$

$$R = 0.08206 \frac{\text{L atm}}{\text{mol K}} = 8.314 \frac{\text{J}}{\text{mol K}} = 8.314 \frac{\text{m}^3 \text{Pa}}{\text{mol K}}$$

$$R = 1.987 \frac{\text{cal}}{\text{mol K}} = 62.36 \frac{\text{L torr}}{\text{mol K}}$$

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

$$1 \text{ J} = 1 \text{ kg m}^2 \cdot \text{s}^{-2}$$

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

$$1 \text{ atm} = 760. \text{ mmHg} = 760. \text{ tor}$$

$$= 1.01325 \times 10^5 \text{ Pa}$$

$$= 101.325 \text{ kPa} = 1.01325 \text{ bar}$$

$$1 \text{ L} = 1.0567 \text{ qt} = 0.2642 \text{ gal}$$

$$1 \text{ kg} = 2.2046 \text{ lb}$$

$$1 \text{ amu} = 1.6605 \times 10^{-27} \text{ kg}$$

$$\text{Proton Mass: } m_p = 1.673 \times 10^{-27} \text{ kg}$$

$$\text{Neutron Mass: } m_n = 1.675 \times 10^{-27} \text{ kg}$$

$$\text{Electron Mass: } m_e = 9.10939 \times 10^{-31} \text{ kg}$$

$$K = {}^{\circ}\text{C} + 273.15 \quad {}^{\circ}\text{C} = \frac{5}{9} ({}^{\circ}\text{F} - 32)$$

$$1 \text{ km} = 0.62137 \text{ mi}$$

$$N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$$

$$\kappa = 8.99 \times 10^9 \text{ J m C}^2$$

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

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

$$c = 2.998 \times 10^8 \frac{\text{m}}{\text{s}}$$

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

$$1D = 3.336 \times 10^{-30} \text{ C m}$$

$$1 \text{ \AA} = 1 \times 10^{-10} = 0.1$$

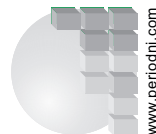
PERIODIC TABLE OF THE ELEMENTS

PERIOD	GROUP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18																																			
		IA	IIA	IIIB	IVB	VB	VIB	VIB	VIB	VIB	VIB	VIB	VIB	IIIA	IVA	VA	VIA	VIA	VIA																																			
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		RELATIVE ATOMIC MASS (1)		RELATIVE ATOMIC MASS (1)										RELATIVE ATOMIC MASS (1)		RELATIVE ATOMIC MASS (1)		RELATIVE ATOMIC MASS (1)																																				
		ELEMENT NAME		ELEMENT NAME										ELEMENT NAME		ELEMENT NAME		ELEMENT NAME																																				
1	1	1.008	H	2	4.0026	He																																																
2	3	6.94	Li	4	9.0122	Be	13	10.81	B	14	12.011	C	15	14.007	N	16	15.999	O	17	18.998	F	18	39.948	Ne																														
3	11	22.990	Na	12	24.305	Mg	13	26.982	Al	14	28.085	Si	15	30.974	P	16	32.06	S	17	35.45	Cl	18	39.948	Ar																														
4	19	39.098	K	20	40.078	Ca	21	44.956	Sc	22	47.867	Ti	23	50.942	V	24	51.996	Cr	25	54.938	Mn	26	55.845	Fe	27	58.933	Co	28	58.693	Ni	29	63.546	Cu	30	65.38	Zn	31	69.723	Ga	32	72.64	Ge	33	74.922	As	34	78.971	Se	35	79.904	Br	36	83.798	Kr
5	37	85.468	Rb	38	87.62	Sr	39	88.906	Y	40	91.224	Zr	41	92.906	Nb	42	95.95	Mo	43	98	Tc	44	101.07	Ru	45	102.91	Rh	46	106.42	Pd	47	107.87	Ag	48	112.41	Cd	49	114.82	In	50	118.71	Sn	51	121.76	Sb	52	127.60	Te	53	126.90	I	54	131.29	Xe
6	55	132.91	Cs	56	137.33	Ba	57-71	Lanthanide	72	178.49	Hf	73	180.95	Ta	74	183.84	W	75	186.21	Re	76	192.22	Os	77	196.97	Pt	78	195.08	Au	79	197.04	Hg	80	200.59	Tl	81	204.38	Pb	82	207.2	Bi	83	208.98	Po	84	209	At	85	210	Rn				
7	87	223	Fr	88	226	Ra	89-103	Actinide	104	267	Rf	105	268	Db	106	271	Sg	107	272	Bh	108	277	Hs	109	276	Mt	110	281	Ds	111	280	Rg	112	285	Cn	113	285	Nh	114	287	Fl	115	289	Mc	116	291	Lv	117	294	Ts	118	294	Og	
		LANTHANIDE		57	138.91	La	58	140.12	Ce	59	140.91	Pr	60	144.24	Nd	61	145	Pm	62	150.36	Sm	63	151.96	Eu	64	157.25	Gd	65	158.93	Tb	66	162.50	Dy	67	164.93	Ho	68	167.26	Er	69	168.93	Tm	70	173.05	Yb	71	174.97	Lu						
		ACTINIDE		89	227	Ac	90	232.04	Th	91	231.04	Pa	92	238.03	U	93	237	Np	94	244	Pu	95	243	Am	96	247	Cm	97	247	Bk	98	251	Cf	99	252	Es	100	257	Fm	101	258	Md	102	259	No	103	262	Lr						

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LANTHANIDE

ACTINIDE



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(1) Atomic weights of the elements 2013, Pure Appl. Chem., 88, 265-291 (2016)