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Periodic Table

Group 1 1A	1 H Hydrogen 1.008	Group 2 2A	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	13	14	15	16	17	18 8A	
Period 1																			
Period 2	3 Li Lithium 6.941	4 Be Beryllium 9.012	21 Sc Scandium 44.956	22 Ti Titanium 47.88	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.847	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Al Aluminum 26.982	32 Ga Gallium 69.723	33 Ge Germanium 72.61	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.80	
Period 3	11 Na Sodium 22.990	12 Mg Magnesium 24.305	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.94	43 Tc Technetium 98	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.757	52 Te Tellurium 127.60	53 I Iodine 126.905	54 Xe Xenon 131.29	
Period 4	19 K Potassium 39.098	20 Ca Calcium 40.078	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.94	43 Tc Technetium 98	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.757	52 Te Tellurium 127.60	53 I Iodine 126.905	54 Xe Xenon 131.29
Period 5	37 Rb Rubidium 85.468	38 Sr Strontium 87.62	56 Ba Barium 137.327	57 La Lanthanum 138.905	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.85	75 Re Rhenium 186.207	76 Os Osmium 190.2	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.967	80 Hg Mercury 200.59	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium 209	85 At Astatine 210	86 Rn Radon 222
Period 6	55 Cs Cesium 132.905	56 Ba Barium 137.327	88 Ra Radium 226.025	89 Ac Actinium 227.028	104 Rf Rutherfordium (261)	105 Db Dubnium (262)	106 Sg Seaborgium (263)	107 Bh Bohrium (264)	108 Hs Hassium (265)	109 Mt Meitnerium (266)									
Period 7	87 Fr Francium 223																		

58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium
90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium

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Formulas

Symbols	Variable (Unit)
$a = \frac{v_f - v_i}{t_f - t_i}$	Average Acceleration (m/s ²) = $\frac{\text{Change in Velocity (m/s)}}{\text{Time of Change (s)}}$
$F = \frac{mv^2}{r}$	Centripetal Force (N) = $\frac{\text{Mass (kg)} \times [\text{Velocity (m/s)}]^2}{\text{Radius (m)}}$
$I = \frac{Q}{t}$	Current (A) = $\frac{\text{Charge (coulomb)}}{\text{Time (s)}}$
$I = \frac{V}{R}$	Current (A) = $\frac{\text{Voltage (V)}}{\text{Resistance (}\Omega\text{)}}$
$D = \frac{m}{v}$	Density (g/cm ³) = $\frac{\text{Mass (g)}}{\text{Volume (cm}^3\text{)}}$
$s_f = s_i + v_i t + \frac{1}{2}at^2$	Final Displacement (m) given Initial Displacement (m), Initial Velocity (m/s), Time (s), and Acceleration (m/s ²)
$e = \frac{W_{out}}{W_{in}} \times 100$	Percentage Efficiency (%) = $\frac{\text{Work out (J)}}{\text{Work in (J)}} \times 100$
$E = mc^2$	Energy (J) = Mass (kg) × [Speed of Light (m/s)] ²
$E = Pt$	Electrical Energy (J) = Power (W) × Time (s)
$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$	Combined Gas Law: Relationship between First Pressure (Pa), Volume (cm ³), and Temperature (K) of a fixed mass of an Ideal Gas and its Second values
$PV = nRT$	Ideal Gas Law: Relationship between Pressure (Pa) and Volume (m ³), and Number of Moles, Universal Gas Constant (J/K/mol), and Temperature (K)
$F = ma$	Force (N) = Mass (kg) × Acceleration (m/s ²)
$F = mg$	Force Due to Gravity (N) = Mass (kg) × Acceleration due to Gravity (m/s ²)
$F = G \frac{m_1 m_2}{r^2}$	Gravitational Force (N) is proportional to the product of the Masses (kg), and inversely proportional to the square of the Distance (m) between the masses
$f = \frac{n \text{ of events}}{t}$	Frequency (Hz) = $\frac{\text{number of events (waves)}}{\text{time (s)}}$
$PE = mgh$	Gravitational Potential Energy (J) = Mass (kg) × Acceleration due to Gravity (m/s ²) × Height (m)

Symbols	Variable (Unit)
$KE = \frac{1}{2}mv^2$	Kinetic Energy (J) = $\frac{1}{2} \times \text{Mass (kg)} \times [\text{Velocity (m/s)}]^2$
$[m_1v_1+m_2v_2]_i = [m_1v_1+m_2v_2]_f$	Initial Momentum (kgm/s) = Final Momentum (kgm/s)
$p = mv$	Momentum (kgm/s) = Mass (kg) \times Velocity (m/s)
$P = \frac{W}{t}$	Power (W) = $\frac{\text{Work (Nm)}}{\text{Time (s)}}$
$P = IV$	Power in DC Circuit (W) = Current (A) \times Voltage (V)
$P = I^2R$	Power in Resistor (W) = $[\text{Current (A)}]^2 \times \text{Resistance } (\Omega)$
$p = \frac{F}{A}$	Pressure (Pa) = $\frac{\text{Force (N)}}{\text{Area (m}^2\text{)}}$
$Q = m\Delta tC_p$	Heat Energy (J) = Mass (g) \times Temperature Change ($^{\circ}\text{C}$) \times Specific Heat ($\text{J/g}^{\circ}\text{C}$)
$Q = mLH_{fus}$	Heat Energy (J) = Mass (g) \times Latent Heat of Fusion (J/g)
$Q = mLH_{vap}$	Heat Energy (J) = Mass (g) \times Latent Heat of Vaporization (J/g)
$\Delta U = Q - W_{(\text{by the system})}$	First Law of Thermodynamics : When heat is converted to work, the process is never totally efficient
$V = IR$	Ohm's Law: Voltage (V) = Current (A) \times Resistance (Ω)
$v = \frac{s}{t}$	Average Speed (m/s) = $\frac{\text{Displacement (m)}}{\text{Time (s)}}$
$v_f = v_i + at$	Final Velocity (m/s) = Initial Velocity (m/s) + $[\text{Acceleration (m/s}^2\text{)} \times \text{Time (s)}]$
$v = f\lambda$	Wave Speed (m/s) = Frequency (Hz) \times Wavelength (m)
$\lambda = \frac{v}{f}$	Wavelength (m) = $\frac{\text{Velocity (m/s)}}{\text{Frequency (Hz)}}$
$W = Fs$	Work (J) = Force (N) \times Displacement (m)
$W = Q_i - Q_f$	Work done by a Heat Engine (J) = Initial Heat Energy - Final Heat Energy

Units of Measure

m = meter

kg = kilogram

s = second

N = newton

J = joule

W = watt

cm = centimeter

g = gram

L = liter

1 N = 1 kgm/s²

1 J = 1 Nm

1 W = 1 J/s

AU = Astronomical Unit = Distance between the Earth and the Sun, approximately 150 million kilometers.

Constants

Acceleration Due to Gravity : $g = 9.8 \text{ m/s}^2$

Universal Gas Constant : $R = 8.3145 \text{ J/K/mol}$

Volume of Ideal Gas at STP : 22.4 L/mol

Gravitational Constant : $G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$

Speed of Light in a Vacuum : $c = 3.0 \times 10^8 \text{ m/s}$

Speed of Sound at 20°C : 343 m/s

Specific Heat of Water : $C_p(\text{H}_2\text{O}) = 1.00 \text{ cal/g}^\circ\text{C} = 4.18 \text{ J/g}^\circ\text{C}$

Latent Heat of Fusion of Water : $LH_{\text{fus}}(\text{H}_2\text{O}) = 80 \text{ cal/g} = 334 \text{ J/g}$

Latent Heat of Vaporization of Water : $LH_{\text{vap}}(\text{H}_2\text{O}) = 540 \text{ cal/g} = 2,260 \text{ J/g}$

Conversions

1 cm³ = 1 mL

1 calorie = 4.18 joules

1 $\frac{\text{wave}}{\text{second}}$ = 1 hertz (Hz)

1,000 calories = 1 Calorie (Cal) = 1 kilocalorie (kcal)

Absolute Temperature : $K = ^\circ\text{C} + 273$

1 newton (N) = 1 kgm/s²

1 joule = 1 Nm

1 watt (W) = 1 J/s = 1 Nm/s

Pressure : 1 atm = 760 mm Hg = 760 Torr = 101.325 kPa = 14.7 lbs/in² = 29.92 in. Hg