

PERIODIC TABLE OF THE ELEMENTS

1+												2																								
Alkali Metals												Noble Gases																								
1	2											5	6	7	8	9	10																			
H	Li											B	C	N	O	F	Ne																			
Hydrogen 1.01	Lithium 6.94											Boron 10.81	Carbon 12.01	Nitrogen 14.01	Oxygen 16.00	Fluorine 19.00	Neon 20.18																			
2+												3+					4+					3-					2-					1-				
Alkaline Earth Metals												Halogens																								
3	4											13	14	15	16	17	18																			
Li	Be											Al	Si	P	S	Cl	Ar																			
Lithium 6.94	Beryllium 9.01											Aluminum 26.98	Silicon 28.09	Phosphorus 30.97	Sulfur 32.06	Chlorine 35.45	Argon 39.95																			
11	12																																			
Na	Mg																																			
Sodium 22.99	Magnesium 24.31																																			
3																																				
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																			
Potassium 39.10	Calcium 40.08	Scandium 44.98	Titanium 47.87	Vanadium 50.94	Chromium 52.00	Manganese 54.94	Iron 55.85	Cobalt 58.93	Nickel 58.69	Copper 63.55	Zinc 65.41	Gallium 69.72	Germanium 72.64	Arsenic 74.92	Selenium 78.96	Bromine 79.90	Krypton 83.80																			
5																																				
6																																				
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																			
Rubidium 85.47	Strontium 87.62	Yttrium 88.91	Zirconium 91.22	Niobium 92.91	Molybdenum 95.94	Technetium 96.91	Ruthenium 101.07	Rhodium 102.91	Palladium 106.42	Silver 107.87	Cadmium 112.41	Indium 114.81	Tin 118.71	Antimony 121.76	Tellurium 127.60	Iodine 126.90	Xenon 131.29																			
7																																				
8																																				
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86																			
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn																			
Cesium 132.91	Barium 137.32	Lanthanum 138.91	Hafnium 178.49	Tantalum 180.95	Tungsten 183.94	Rhenium 186.21	Osmium 190.23	Iridium 192.21	Platinum 195.08	Gold 196.97	Mercury 200.59	Thallium 204.38	Lead 207.20	Bismuth 208.98	Polonium (210)	Astatine (210)	Radon (222)																			
87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118																			
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og																			
Francium 223.02	Radium 226.02	Actinium 227.03	Rutherfordium 256.10	Dubnium (262)	Seaborgium (266)	Bohrium (264)	Hassium (277)	Meitnerium (268)	Darmstadtium (271)	Roentgenium (272)	Copernicium (277)	Nihonium (284)	Flerovium (289)	Moscovium (288)	Livermorium (293)	Tennesine (294)	Ognesson (294)																			

Atomic Number → 23

Common Charges → 5+, 4+

Symbol → V

Name → Vanadium

Atomic Mass → 50.94

Phase Key

Solid

Liquid

Gas

Diatomic Elements

Bromine Oxygen

Fluorine Iodine

Nitrogen Hydrogen

Chlorine

| - s-block - | | - - - - - d-block - - - - - | | - - - - - p-block - - - - - |

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Cerium 140.12	Praesodymium 140.91	Neodymium 144.24	Promethium 144.91	Samarium 150.36	Europium 151.96	Gadolinium 157.25	Terbium 158.93	Dysprosium 162.50	Holmium 164.93	Erbium 167.26	Thulium 168.93	Ytterbium 173.04	Lutetium 174.97
90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
Thorium 232.04	Protactinium 231.04	Uranium 238.00	Neptunium 237.05	Plutonium 244.06	Americium 243.06	Curium (247)	Berkelium (249)	Californium (251)	Einsteinium (252)	Fermium (257)	Mendelevium (258)	Nobelium (259)	Lawrencium (262)

| - - - - - f-block - - - - - |

s = Soluble i = Insoluble si = Slightly Sol. d = Decomposes * = Does not exist	Acetate	Bromide	Carbonate	Chlorate	Chloride	Hydroxide	Iodide	Nitrate	Oxide	Phosphate	Sulfate	Sulfide
Aluminum	s	s	*	s	s	i	s	s	i	i	*	d
Ammonium	s	s	s	s	s	s	s	s	*	s	s	s
Barium	s	s	i	s	s	s	s	s	s	i	i	s
Cadmium	s	s	i	s	s	i	s	s	i	i	s	i
Calcium	s	s	i	s	s	i	s	s	i	i	i	i
Copper (I)	*	si	i	*	i	i	i	*	i	*	d	i
Copper (II)	s	s	d	s	s	i	*	s	i	i	s	i
Hydrogen	s	s	s	s	s	H ₂ O	s	s	s	s	s	s
Iron (II)	s	s	i	*	s	i	s	s	i	i	s	i
Iron (III)	i	s	*	*	s	i	*	s	i	i	si	i
Lead (II)	s	si	i	s	si	i	i	s	i	i	i	i
Lead (IV)	d	*	*	*	d	*	*	*	i	*	*	*
Magnesium	s	s	i	s	s	i	s	s	i	i	s	d
Manganese	s	s	i	*	s	i	s	s	i	*	s	i
Mercury (I)	si	i	i	si	i	*	si	sd	i	id	i	i
Mercury (II)	s	si	i	s	s	i	i	s	i	si	d	i
Nickel	s	s	i	s	s	i	s	s	i	i	s	i
Potassium	s	s	s	s	s	s	s	s	d	s	s	s
Silver	s	i	i	s	i	*	i	s	i	i	si	i
Sodium	si	s	s	s	s	s	s	s	d	s	s	s
Tin (II)	*	*	*	*	s	i	s	*	i	*	s	i
Tin (IV)	*	sd	*	*	sd	*	sd	*	i	i	sd	i
Zinc	s	s	i	s	s	i	s	d	i	i	s	i

Solubility is relative. This chart tells whether a recognizable precipitate will form in a Double Replacement Reaction with 1 M concentrations.

Activity Series

Lithium
Potassium
Barium
Calcium
Sodium
Magnesium
Aluminum
Manganese
Zinc
Chromium
Iron
Cadmium
Cobalt
Nickel
Tin
Lead
Hydrogen
Antimony
Bismuth
Arsenic
Copper
Mercury
Silver
Platinum
Gold

1 MOLE =

Atomic Mass in Grams of a Substance

6.02×10^{23} particles (atoms, etc)

22.4 L of an Ideal Gas at STP

Temperature Conversions

$$^{\circ}\text{C} = ^{\circ}\text{K} - 273$$

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

Wave Equations

$$c = \lambda\nu \quad E = h\nu \quad E = mc^2$$

$$c = 3 \times 10^8 \text{ m/s} \quad h = 6.626 \times 10^{-34} \text{ Js}$$

$$1 \times 10^9 \text{ nm} = 1 \text{ m}$$

Acids and Bases

$$\text{pH} = -\log [\text{H}^+] \quad \text{pOH} = -\log [\text{OH}^-]$$

$$10^{-\text{pH}} = [\text{H}_3\text{O}^+] \quad 10^{-\text{pOH}} = [\text{OH}^-]$$

$$\text{pH} + \text{pOH} = 14 \quad [\text{H}^+] = [\text{H}_3\text{O}^+]$$

$$K_w = 1 \times 10^{-14} = [\text{H}_3\text{O}^+][\text{OH}^-]$$

Polyatomic Ions

Ammonium NH_4^+

Acetate	$\text{C}_2\text{H}_3\text{O}_2^-$
Arsenate	AsO_4^{3-}
Arsenite	AsO_3^-
Bicarbonate	HCO_3^-
Carbonate	CO_3^{2-}
Chlorate	ClO_3^-
Chromate	CrO_4^{2-}
Cyanide	CN^-
Dichromate	$\text{Cr}_2\text{O}_7^{2-}$
Hydroxide	OH^-
Iodate	IO_3^-
Nitrate	NO_3^-
Nitrite	NO_2^-
Oxalate	$\text{C}_2\text{O}_4^{2-}$
Permanganate	MnO_4^-
Perchlorate	ClO_4^-
Phosphate	PO_4^{3-}
Phosphite	PO_3^{3-}
Silicate	SiO_3^{2-}
Sulfate	SO_4^{2-}
Sulfite	SO_3^{2-}
Thiocyanate	SCN^-

Gases

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} \quad PV = nRT \quad P_{\text{total}} = P_1 + P_2 + P_3 \dots$$

Combined Gas Law
Pressure

Ideal Gas Law

Dalton's Law of Partial Pressure

$$1 \text{ atm} = 760 \text{ mmHg} = 760 \text{ torr} = 14.7 \text{ p.s.i.} = 101 \text{ kPa}$$

$$\text{STP} = 1 \text{ atm} \ \& \ 273 \text{ }^{\circ}\text{K}$$

$$R = 0.0821 \frac{\text{atm} \cdot \text{L}}{\text{mol} \cdot \text{K}}$$

$$R = 8.31 \frac{\text{kPa} \cdot \text{L}}{\text{mol} \cdot \text{K}}$$

Conversions

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

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

$$1 \text{ kg} = 2.2 \text{ lbs}$$

$$1 \text{ L} = 1.06 \text{ qt}$$

$$1 \text{ cup} = 8 \text{ fl oz}$$

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

$$4 \text{ qt} = 1 \text{ gal}$$

$$1 \times 10^9 \text{ nm} = 1 \text{ m}$$

Molecular Prefixes

1: mono-

6: hexa-

2: di-

7: hepta-

3: tri-

8: octa-

4: tetra-

9: nona-

5: penta-

10: deca-

Roman Numerals

I = 1

V = 5

II = 2

VI = 6

III = 3

IV = 4

Specific Heat of H₂O

$$4.184 \text{ J/g } ^{\circ}\text{C}$$

$$\Delta H = m C \Delta T$$

Density

$$D = M / V$$

Molarity

$$\text{Molarity} = \text{mol} / \text{L}$$

$$M_1V_1 = M_2V_2$$