

Periodic Table of the Elements

	IA																VIII A									
1	1 H 1.008															2 He 4.00										
2	3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18								
3	11 Na 22.99	12 Mg 24.30											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95								
4	19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80								
5	37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3								
6	55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.8	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)								
7	87 Fr (223)	88 Ra 226.0	89 Ac 227.0	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (269)	109 Mt (268)	110 (271)	111 (272)	112 (277)	114 (285)	116 (289)												

Lanthanides	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.2	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
Actinides	90 Th 232.0	91 Pa 231.0	92 U 238.0	93 Np 237.0	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)

Useful Information

$$E_n = -2.18 \times 10^{-18} \text{ J} \left(\frac{1}{n^2} \right) \quad r_n = 0.529 \times 10^{-8} n^2 \text{ cm} \quad h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$$

$$\Delta E = -2.18 \times 10^{-18} \text{ J} \left(\frac{1}{n_f} - \frac{1}{n_i} \right) \quad \lambda = \frac{c}{\nu} \quad E = h\nu \quad c = 3.00 \times 10^8 \frac{\text{m}}{\text{s}}$$

$$U = \frac{kQ_1Q_2}{d}$$

$$\text{Avogadro's number} = 6.02 \times 10^{23}$$

$$\text{density of water} = 1.00 \frac{\text{g}}{\text{mL}}$$

Activity Series

Metal	Half-Reaction Reaction
Gold	$\text{Au}^{3+} + 3\text{e}^{-} \rightarrow \text{Au}$
Platinum	$\text{Pt}^{2+} + 2\text{e}^{-} \rightarrow \text{Pt}$
Mercury	$\text{Hg}^{2+} + 2\text{e}^{-} \rightarrow \text{Hg}$
Silver	$\text{Ag}^{+} + \text{e}^{-} \rightarrow \text{Ag}$
Copper	$\text{Cu}^{2+} + 2\text{e}^{-} \rightarrow \text{Cu}$
Hydrogen	$2\text{H}^{+} + 2\text{e}^{-} \rightarrow \text{H}_2$
Lead	$\text{Pb}^{2+} + 2\text{e}^{-} \rightarrow \text{Pb}$
Tin	$\text{Sn}^{2+} + 2\text{e}^{-} \rightarrow \text{Sn}$
Nickel	$\text{Ni}^{2+} + 2\text{e}^{-} \rightarrow \text{Ni}$
Cobalt	$\text{Co}^{2+} + 2\text{e}^{-} \rightarrow \text{Co}$
Iron	$\text{Fe}^{2+} + 2\text{e}^{-} \rightarrow \text{Fe}$
Chromium	$\text{Cr}^{3+} + 3\text{e}^{-} \rightarrow \text{Cr}$
Zinc	$\text{Zn}^{2+} + 2\text{e}^{-} \rightarrow \text{Zn}$
Manganese	$\text{Mn}^{2+} + 2\text{e}^{-} \rightarrow \text{Mn}$
Aluminum	$\text{Al}^{3+} + 3\text{e}^{-} \rightarrow \text{Al}$
Magnesium	$\text{Mg}^{2+} + 2\text{e}^{-} \rightarrow \text{Mg}$
Sodium	$\text{Na}^{+} + \text{e}^{-} \rightarrow \text{Na}$
Calcium	$\text{Ca}^{2+} + 2\text{e}^{-} \rightarrow \text{Ca}$
Barium	$\text{Ba}^{2+} + 2\text{e}^{-} \rightarrow \text{Ba}$
Potassium	$\text{K}^{+} + \text{e}^{-} \rightarrow \text{K}$
Lithium	$\text{Li}^{+} + \text{e}^{-} \rightarrow \text{Li}$

Solubility Table

<u>Ion</u>	<u>Solubility</u>	<u>Exceptions</u>
NO_3^{-}	soluble	none
ClO_4^{-}	soluble	none
Cl^{-}	soluble	except Ag^{+} , Hg_2^{2+} , Pb^{2+}
I^{-}	soluble	except Ag^{+} , Hg_2^{2+} , Pb^{2+}
SO_4^{2-}	soluble	except Ca^{2+} , Ba^{2+} , Sr^{2+} , Hg^{2+} , Pb^{2+} , Ag^{+}
CO_3^{2-}	insoluble	except Group IA and NH_4^{+}
PO_4^{3-}	insoluble	except Group IA and NH_4^{+}
OH^{-}	insoluble	except Group IA, Ca^{2+} , Ba^{2+} , Sr^{2+}
S^{2-}	insoluble	except Group IA, IIA and NH_4^{+}
Na^{+}	soluble	none
NH_4^{+}	soluble	none
K^{+}	soluble	none

*slightly soluble