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5.111 Principles of Chemical Science
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18 ^a
IA	IIA	IIIB	IVB	VB	VIB	VII B	VIII B	VIII B	IB	IB	IIB	IIIA	IVA	VA	VIA	VIIA	VIIIA ^b
1 H 1.008	2 He 4.003	3 Li 6.941	4 Be 9.012	5 B 10.81	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.179	11 Na 22.990	12 Mg 24.305	13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.06	17 Cl 35.453	18 Ar 39.948
19 K 39.098	20 Ca 40.08	21 Sc 44.956	22 Ti 47.88	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.847	27 Co 58.933	28 Ni 58.69	29 Cu 63.546	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.80
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.906	46 Pd 106.42	47 Ag 107.868	48 Cd 112.41	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.904	54 Xe 131.29
55 Cs 132.905	56 Ba 137.33	57 La 138.905	58 Ce 140.908	59 Pr 140.908	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.925	66 Dy 162.50	67 Ho 164.930	68 Er 167.26	69 Tm 168.934	70 Yb 173.04	71 Lu 174.967	
87 Fr (223)	88 Ra 226.025	89 Ac 227.028	† 104 Unq (261)	† 105 Ump (262)	† 106 Unh (263)	† 107 Uup (264)	† 108 Uuq (265)	† 109 Uub (266)	† 110 Uuq (267)	† 111 Uub (268)	† 112 Uuq (269)	† 113 Uub (270)	† 114 Uuq (271)	† 115 Uub (272)	† 116 Uuq (273)	† 117 Uub (274)	† 118 Uuq (275)

The Active Metals		The Nonmetals		Noble Gases	
1	2	3	4	5	6
H	He	Li	Be	B	C
1.008	4.003	6.941	9.012	10.81	12.011
Na	Mg	Al	Si	P	S
22.990	24.305	26.982	28.086	30.974	32.06
K	Ca	Ga	Ge	As	Se
39.098	40.08	69.72	72.59	74.922	78.96
Rb	Sr	In	Sn	Sb	Te
85.468	87.62	114.82	118.69	121.75	127.60
Cs	Ba	Tl	Pb	Bi	Po
132.905	137.33	204.38	207.2	208.98	(209)
Fr	Ra	Po	At	Rn	(222)
(223)	226.025	209	(210)	(210)	(222)

Transition Elements	
21	22
Sc	Ti
44.956	47.88
Y	Zr
88.906	91.224
La	Hf
138.905	178.49
† 104	† 105
Unq	Ump
(261)	(262)
† 106	† 107
Unh	Uup
(263)	(264)
† 108	† 109
Uuq	Uub
(265)	(266)

Inner Transition Metals	
58	59
Ce	Pr
140.12	140.908
Th	Pa
232.038	231.036
† 104	† 105
Unq	Ump
(261)	(262)
† 106	† 107
Unh	Uup
(263)	(264)
† 108	† 109
Uuq	Uub
(265)	(266)

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$c = 2.99792 \times 10^8 \text{ m/s}$
 $h = 6.62608 \times 10^{-34} \text{ J s}$
 $N_a = 6.02214 \times 10^{23} \text{ mol}^{-1}$
 $1 \text{ eV} = 1.60218 \times 10^{-19} \text{ J}$
 $m_e = 9.10939 \times 10^{-31} \text{ kg}$

$e = 1.60218 \times 10^{-19} \text{ C}$
 $U(r) = (z_1 z_2 e^2) / (4\pi\epsilon_0 r)$
 $\epsilon_0 = 8.8542 \times 10^{-12} \text{ C}^2 / (\text{Jm})$

Electronegativity = $(IE + EA) / 2$

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