

Periodic Table Structure Info Sheet

Periods (rows) →

Mendeleev – Organized PT based on atomic masses and properties

Groups (columns) ↑

Moseley – Organized PT based on atomic numbers (the way we do it now!)

Three classes of elements: Metals, non-metals, metalloids/semi-metals

Color code each class of element. Make a key here

*Lanthanide series

La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
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** Actinide series

Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No
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Metal Properties:

Chemical Prop.	Physical Prop.
Few electrons in VALENCE shell (outer shell)	Ductile Malleable
Lose electrons easily	Good conductors
POSITIVE charge like Ca^{2+}	Shiny
Make Cations	Solid at room temp

Non-metal Properties:

Chemical Prop.	Physical Prop.
Almost full, or totally full valence shell	NOT Ductile NOT malleable
Tend to gain electrons	BAD conductors
NEGATIVE charge like N^{3-}	Mostly solid
Make ANIONS	Some are gas at room temp

Semi-metal Properties:

Chemical Prop.	Physical Prop.
Most have half full valence shell	Have properties of metals AND non-metals
Make anions OR cations depending on their environment	No way to know which properties of each

Things in the same period have:

Increasing atomic # and mass $L \rightarrow R$
 Same number of energy levels
 Period 1 has 1 level
 Period 2 has 2 levels etc...

Things in the same group have:

Increasing atomic # and mass \downarrow
 Same number of valence electrons
 Exceptions: d and f block
 Similar physical and chemical properties
 b/c they have same # of valence e^- s

Valence Electrons:

Outer electrons
 Matches the "A" column number
 1A has 1 v. e^- , 2A has 2v. e^- , etc.
 d and f blocks don't follow rules

Shielding and Z_{eff} :

Outer electrons have trouble "seeing" the protons in the nucleus – the nucleus is "shielded" by the electrons. You can calculate how much "shielding" there is by calculating the "Effective Nuclear Charge"

$$Z_{eff} = Z - S$$

Z_{eff} = effective nuclear charge

Z = atomic #

S = all non-valence electrons

Periodic Table Structure Info Sheet

The Periodic Table of the Elements

		Element name → Mercury ← Atomic #																		
		Symbol → Hg ← Avg. Mass																		
		80																		
		200.59																		
1	Hydrogen 1 H 1.01	2											18	Helium 2 He 4.00						
			3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
			Li 3 6.94	Be 4 9.01											B 5 10.81	C 6 12.01	N 7 14.01	O 8 16.00	F 9 19.00	Ne 10 20.18
			Na 11 22.99	Mg 12 24.31											Al 13 26.98	Si 14 28.09	P 15 30.97	S 16 32.07	Cl 17 35.45	Ar 18 39.95
			K 19 39.10	Ca 20 40.08	Sc 21 44.96	Ti 22 47.88	V 23 50.94	Cr 24 52.00	Mn 25 54.94	Fe 26 55.85	Co 27 58.93	Ni 28 58.69	Cu 29 63.55	Zn 30 65.39	Ga 31 69.72	Ge 32 72.61	As 33 74.92	Se 34 78.96	Br 35 79.90	Kr 36 83.80
			Rb 37 85.47	Sr 38 87.62	Y 39 88.91	Zr 40 91.22	Nb 41 92.91	Mo 42 95.94	Tc 43 (98)	Ru 44 101.07	Rh 45 102.91	Pd 46 106.42	Ag 47 107.87	Cd 48 112.41	In 49 114.82	Sn 50 118.71	Sb 51 121.76	Te 52 127.60	I 53 126.90	Xe 54 131.29
			Cs 55 132.91	Ba 56 137.33	La 57 138.91	Hf 72 178.49	Ta 73 180.95	W 74 183.84	Re 75 186.21	Os 76 190.23	Ir 77 192.22	Pt 78 195.08	Au 79 196.97	Hg 80 200.59	Tl 81 204.38	Pb 82 207.20	Bi 83 208.98	Po 84 (209)	At 85 (210)	Rn 86 (222)
			Fr 87 (223)	Ra 88 (226)	Ac 89-102 **	Rf 104 (261)	Db 105 (266)	Sg 106 (271)	Bh 107 (272)	Hs 108 (270)	Mt 109 (276)	Ds 110 (281)	Rg 111 (280)	Cn 112 (285)	Uut 113 (284)	Uuq 114 (289)	Uup 115 (288)	Uuh 116 (293)	Uus 117 (2947)	Uuo 118 (294)

- Alkali metals
- Alkaline earth metals
- Transition metals
- Other metals
- Metalloids (semi-metal)
- Nonmetals
- Halogens
- Noble gases

*lanthanides	La 57 138.91	Ce 58 140.12	Pr 59 140.91	Nd 60 144.24	Pm 61 (145)	Sm 62 150.36	Eu 63 151.97	Gd 64 157.25	Tb 65 158.93	Dy 66 162.50	Ho 67 164.93	Er 68 167.26	Tm 69 168.93	Yb 70 173.04
**actinides	Ac 89 (227)	Th 90 232.04	Pa 91 231.04	U 92 238.03	Np 93 (237)	Pu 94 (244)	Am 95 (243)	Cm 96 (247)	Bk 97 (247)	Cf 98 (251)	Es 99 (252)	Fm 100 (257)	Md 101 (258)	No 102 (259)