The Periodic Table, Valence Electrons, Charges Review Notes

The Periodic Table

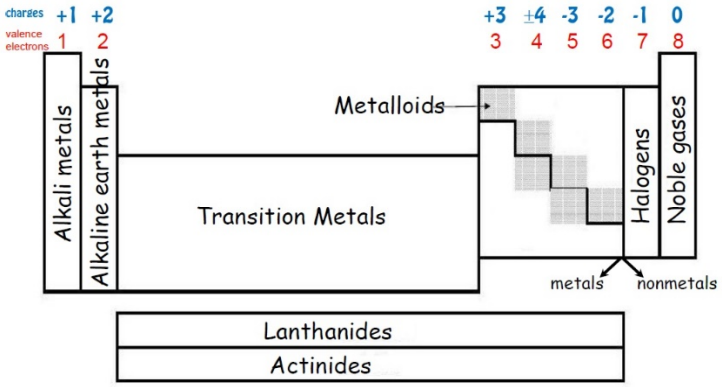
column = group or family
- similar properties based on same number of valence electrons
- Numbered 1-18 or with Roman numerals

row = period

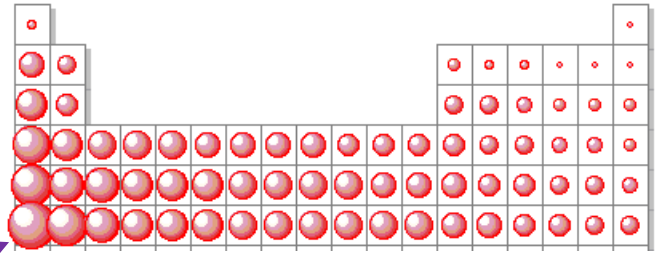
valence electrons – atoms in the outermost energy level; these electrons participate in bonding

octet rule – atoms are stable when they have 8 valence electrons, or full s & p sublevels

ions & charges – atoms gain or lose electrons to obtain eight valence electrons
cation – positive ion; lost electrons
anion – negative ion; gained electrons



Atomic Radius – distance from nucleus to outer electrons

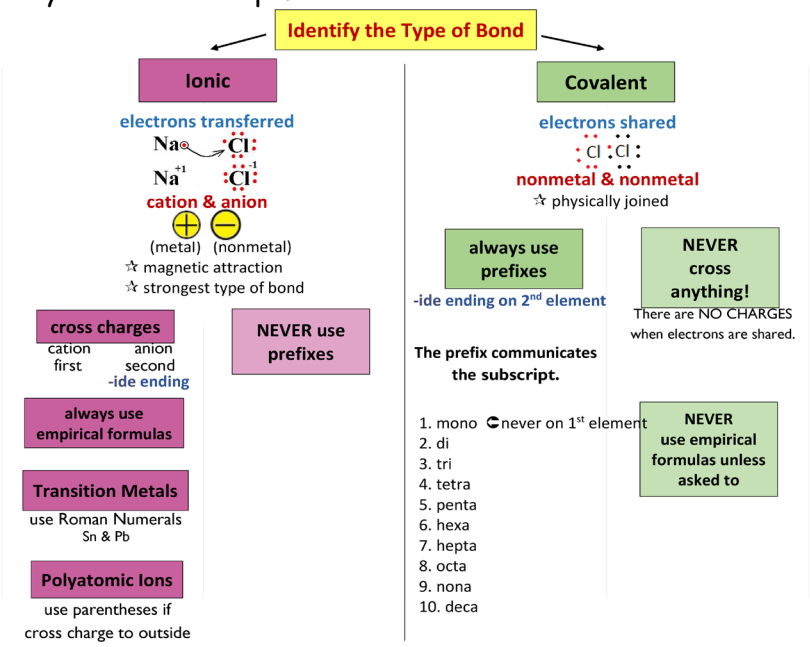


Atoms are larger as get closer to Francium

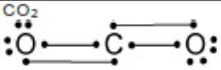
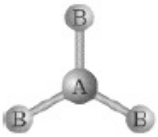
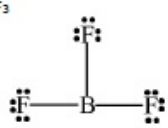
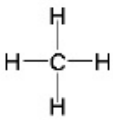
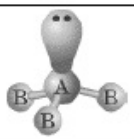
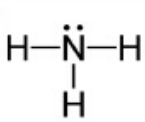
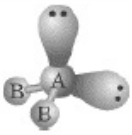
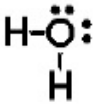
Covalent Bonding, Lewis Dot Structures, and Valence Shell Electron Pair Repulsion (VSEPR) Molecular Geometry Notes

Writing Formulas of Covalent Compounds

- Electrons are shared, so there are NO CHARGES.
- Don't cross *anything*!
- The prefix tells you the subscript.



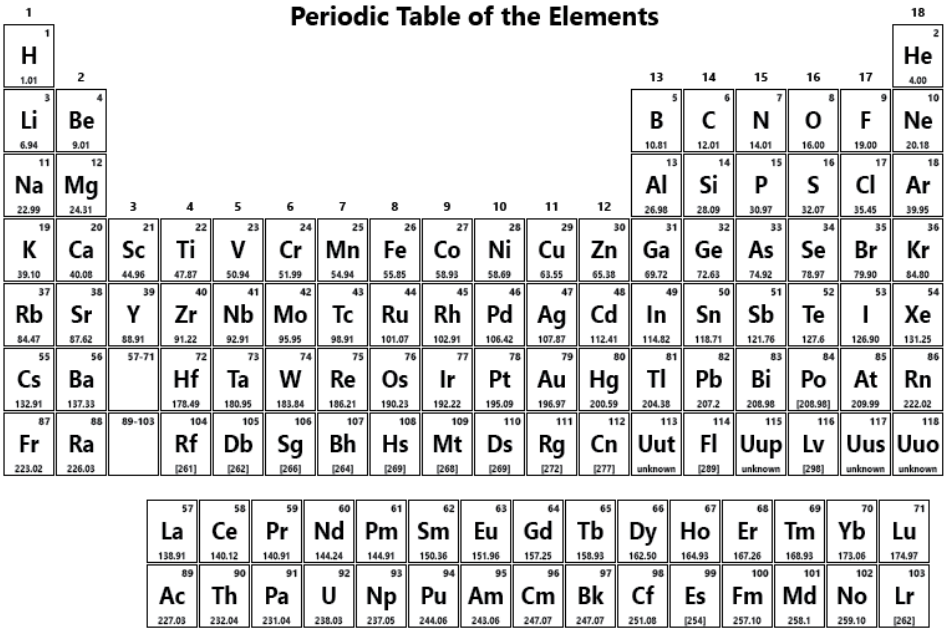
Lewis Dot Structures & Valence Shell Electron Pair Repulsion (VSEPR) Molecular Geometry

Bonds	Lone Pairs	Name	Geometry	Lewis Structure
2 atoms		linear		Cl_2 
2	0	linear		CO_2 
3	0	trigonal planar		BF_3 
4	0	tetrahedral		CH_4 
3	1	trigonal pyramidal		NH_3 
2	2	bent		H_2O 

Principles of Lewis Dot Structures:

- Identify the center atom first. It is the element that you have the smallest quantity of in the formula.
- Ring the valence electrons around the symbol, no more than 2 dots per side, "singly before pairing."
- Only make bonds to single dots.
- There can be no single dots leftover.
  - You may need to make a double or triple bond.
- Identify the VSEPR shape or "geometry" by looking at the center atom. Identify how many bonding groups are on the center atom and how many lone pairs are on the center atom.
  - Lone pairs repel electrons in bonds "away" from them, and affect the shape of the molecule.

Periodic Table Practice Problems



Write the names of the family / groups below. Use the periodic table above to reference the group numbers #1-18.

	Group name	Number of valence electrons of elements in this group	Charge of elements in this group
Group 1:			
Group 2:			
Group 17:			
Group 18:			

The large middle section of metals on the periodic table are called _____

A column is called a _____ or _____.

A row is called a _____.

The Periodic Table and the Behavior of the Elements

1. Every atom on the periodic table wants a total of _____ valence electrons.
2. The only group on the periodic table with 8 valence electrons are the _____.
3. In order to be stable _____ will lose electrons and form cations.
4. In order to be stable _____ will gain electrons and form anions.
5. An ionic bond is between metals and nonmetals. An ionic bond will _____ electrons between atoms.
6. A covalent bond is between 2 or more nonmetals. A covalent bond will _____ electrons between atoms.
7. Which atomic radius is bigger? Lithium (Li) or Potassium (K)?
8. Which atomic radius is bigger? Fluorine or Iodine?

Periodic Table Practice Problems

Periodic Table of the Elements

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H 1.01																	2 He 4.00
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
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.87	23 V 50.94	24 Cr 51.99	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 72.63	33 As 74.92	34 Se 78.97	35 Br 79.90	36 Kr 84.80
37 Rb 84.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.95	43 Tc 98.91	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.6	53 I 126.90	54 Xe 131.25
55 Cs 132.91	56 Ba 137.33	57-71	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.09	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po [208.98]	85 At 209.99	86 Rn 222.02
87 Fr 223.02	88 Ra 226.03	89-103	104 Rf [261]	105 Db [262]	106 Sg [266]	107 Bh [264]	108 Hs [269]	109 Mt [268]	110 Ds [269]	111 Rg [272]	112 Cn [277]	113 Uut unknown	114 Fl [289]	115 Uup unknown	116 Lv [298]	117 Uus unknown	118 Uuo unknown

57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm 144.91	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.06	71 Lu 174.97
89 Ac 227.03	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np 237.05	94 Pu 244.06	95 Am 243.06	96 Cm 247.07	97 Bk 247.07	98 Cf 251.08	99 Es [254]	100 Fm 257.10	101 Md 258.1	102 No 259.10	103 Lr [262]

Write the names of the family / groups below. Use the periodic table above to reference the group numbers #1-18.

	Group name	Number of valence electrons of elements in this group	Charge of elements in this group
Group 1:	Alkali metals	1	+1
Group 2:	Alkaline earth metals	2	+2
Group 17:	Halogens	7	-1
Group 18:	Noble Gases	8	0

The large middle section of metals on the periodic table are called transition metals.

A column is called a group or family

A row is called a period

The Periodic Table and the Behavior of the Elements

1. Every atom on the periodic table wants a total of _____8_____ valence electrons.
2. The only group on the periodic table with 8 valence electrons are the ___noble gases___.
3. In order to be stable ___metals___ will lose electrons and form cations.
4. In order to be stable ___nonmetals___ will gain electrons and form anions.
5. An ionic bond is between metals and nonmetals. An ionic bond will ___transfer___ electrons between atoms.
6. A covalent bond is between 2 or more nonmetals. A covalent bond will ___share___ electrons between atoms.
7. Which atomic radius is bigger? Lithium (Li) or Potassium (K)?
8. Which atomic radius is bigger? Fluorine or Iodine?