Today

Attendance

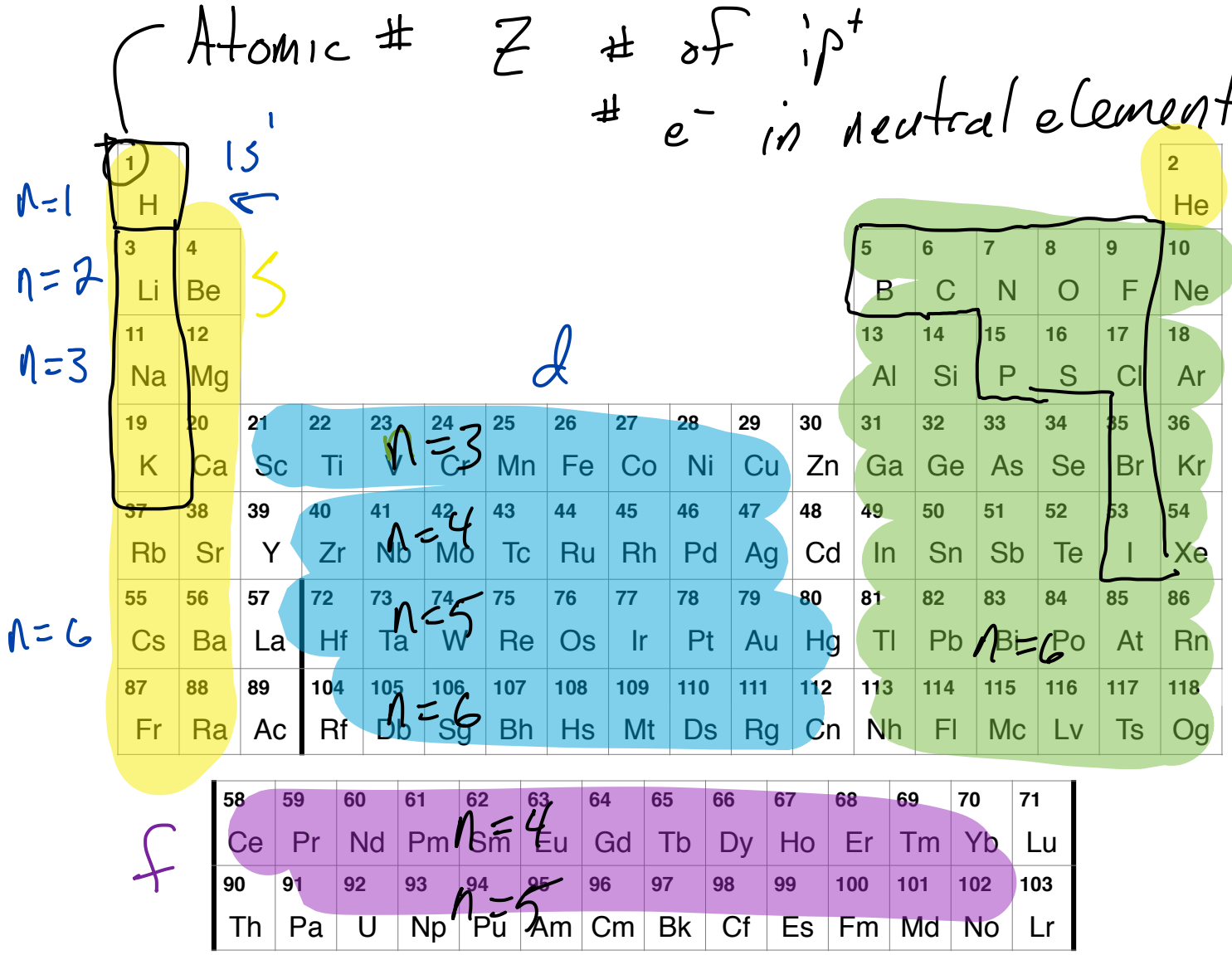
Sections 1.1 – 1.3, 1.5
- electrons, valence vs core electrons and using the periodic table for help
- periodic trends
- metals and nonmetals
- octet rule
- Ionic Interactions, Polar Bonds, and Nonpolar Bonds

Next Class

Sections 1.4, 1.6
Different ways of representing molecules
An introduction to Molecular Orbital Theory

Introduction to Mastering Chemistry for Organic Chemistry is open and due by 11:59 pm on 9/18

Homework Chapter 1 is open and due by 11:59 pm on 9/21



Be = [He] $2s^2$

$1s^2$ $2s^2$

F = [He] $2s^2 2p^5$

Cl = [Ne] $3s^2 3p^5$

same valence e⁻ config

Cl has 10 core e⁻'s

F has 2 core e⁻'s

Remember how electrons are distributed into orbitals

Remember the importance of valence and core electrons

Example Electron configurations

1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og

58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

C electron config and # of valence e⁻'s?

$[He]\ 2s^2 2p^2$

count or add

$4e^-$

Br electron config and # of valence e⁻'s?

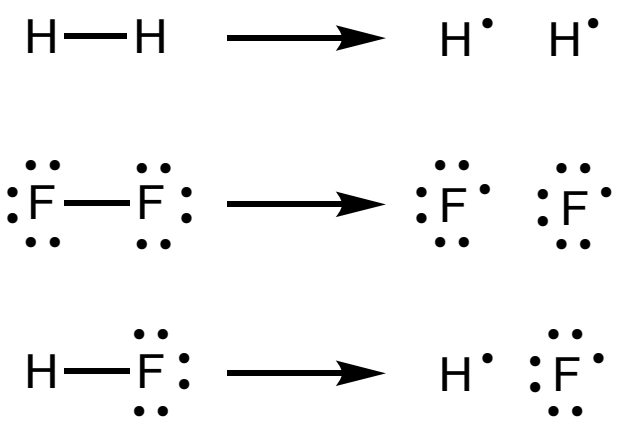
count or add

$7e^-$

$[Ar]\ 4s^2 3d^{10} 4p^5$

only outermost shell $n=4$

The measure of the ability of an atom to attract shared electrons



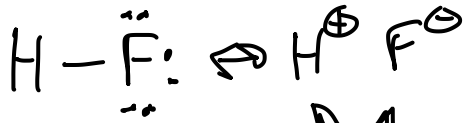
ΔH_{BDE} = 436 kJ/mol[1]

ΔH_{BDE} = 155 kJ/mol[1]

assuming BDE is average of H_2 and F_2 BDE

predict ΔH_{BDE} = ~~296~~ 565 kJ/mol ?

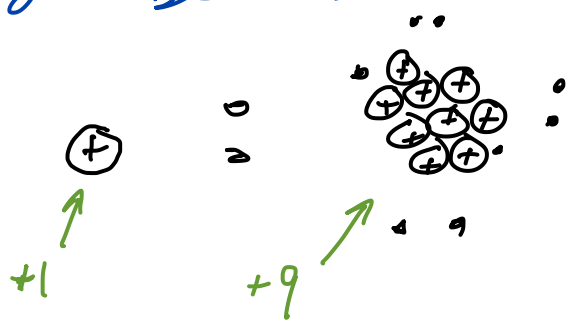
(a) why isn't BDE for HF just the average of the H_2 + F_2 BDE's? Something else holding them together?



(b) If H is ⊕ & F is ⊖ then that attraction would make the bond stronger.

attraction between ⊕ + ⊖

(c) But why would F get more e⁻ density and be ⊖?



+1 +9

F's +9 nucleus is more attractive to e⁻'s than the H's +1 nucleus

δ^+ δ^-
H—F

δ (lowr case delta) means partial charge

1. Atkins, Physical Chemistry, 3rd ed. p 882 565

a better estimate
Z_{eff} for C is 3.25
for F is 5.20

valence e^- 4e⁻ 7e⁻
Z_{eff} +4 +7
core e^- 2 e⁻ 2 e⁻
+6 +9

effective nuclear charge is what valence e⁻'s experience as the nuclear charge

eneg increases from left to right because nuclear charge increases but the # of core e⁻'s stays the same.

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because V e⁻'s move farther out from the nucleus as we go down the table (as the principal quantum # increases) attraction decreases so eneg decreases

Remember periodic trends Z_{eff} = 5.2 & 6.1

F⁻ Cl

The Periodic Table Is Your Friend: Size

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Remember periodic trends

Why does electronegativity or the size of the atom matter? Sections 1.1 – 1.3

High energy electrons are reactive

low energy electrons are less reactive

The Periodic Table Is Your Friend

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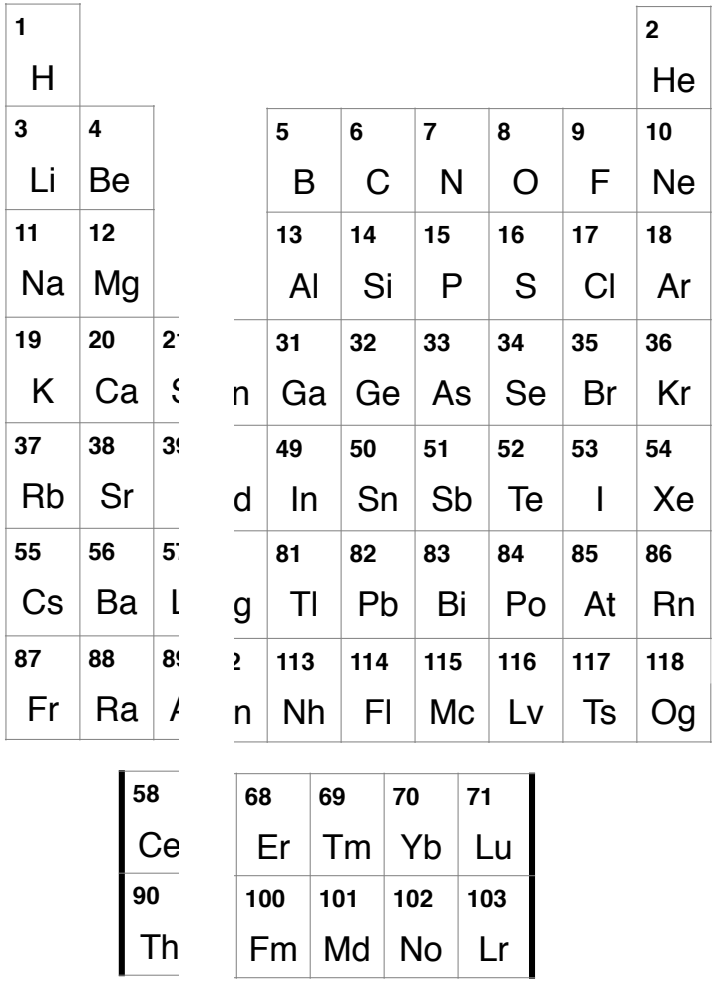
Identify metals and non-metals



Predict the number of electrons or bonds needed for an element to form a stable compound