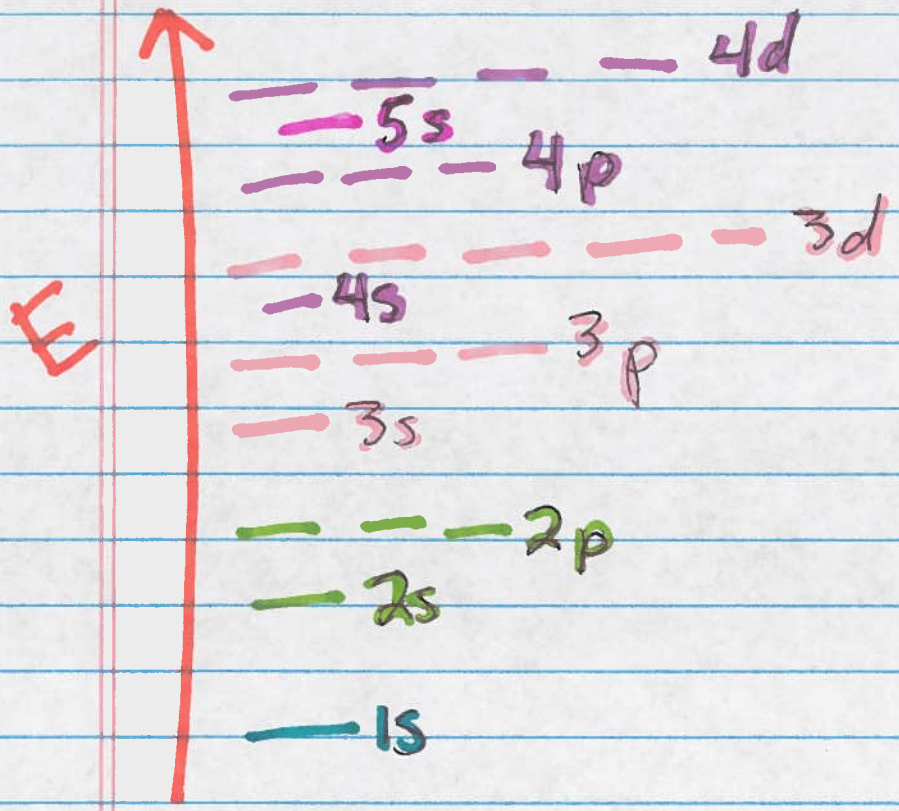
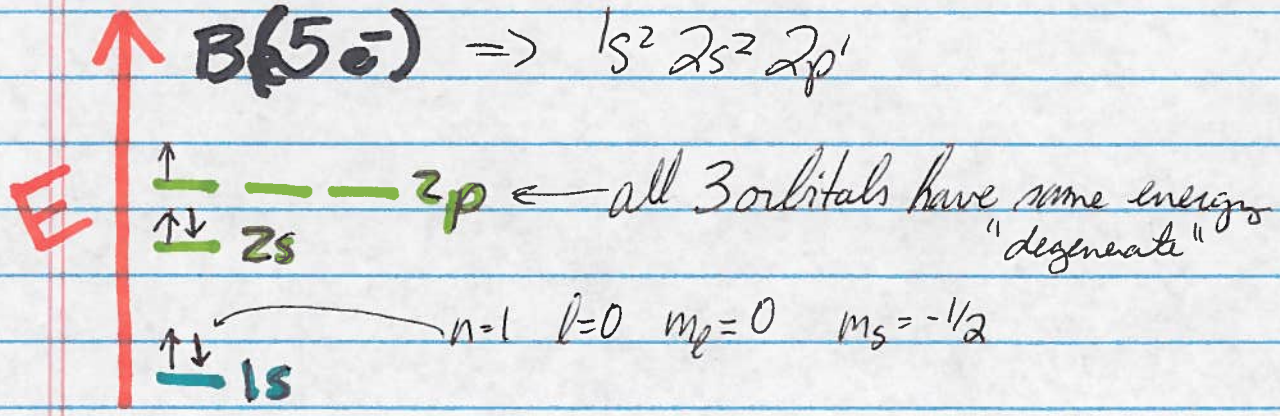
General Chemistry with Dr. Mattson
Wednesday, 10/14/15

Today: Sect 5.9-5.14
Thursday: No Review
Friday: No Class
Sunday 10/25: Review @ 7pm in Eppley 110
Monday 10/26: Chapt. 6
Tuesday 10/27: Expt 8
Wednesday: Chapt 6.
Friday: Chap 7 + Nomenclature Quiz
Monday 11/2: CK4

n	l	m_l	# of orbitals	total	e^-
1	0	0	1	1	2
2	0	0	1	4	8
	1	-1 0 +1	3		
3	0	0	1		
	1	-1 0 +1	3	9	18
	2	-2 -1 0 +1 +2	5		
4	0	0	1		
	1	-1 0 +1	3		
	2	-2 ... +2	5	16	32
	3	-3 ... +3	7		





7 Pauli Exclusion Principle: No 2 e⁻ on any given atom can have the same set of 4 quantum #'s

$m_s = \pm 1/2 \Rightarrow +1/2$ or $-1/2$

↑ ↓

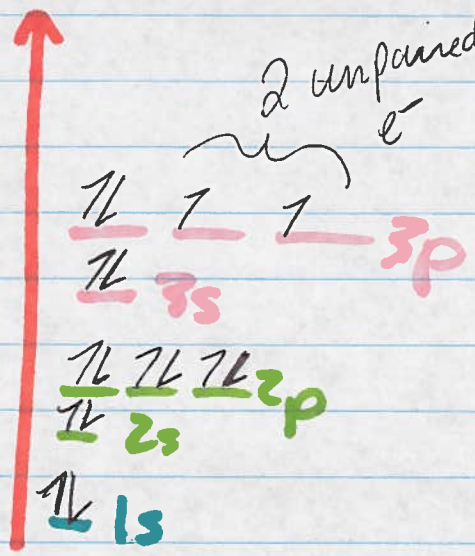
$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4 \Rightarrow$ Sulfur

① Can look at periodic table and look for 4th element of 3p orbital.

or

② Count all superscripts and look at atomic #

Unpaired Electron



Hund's rule: fill orbitals with one before adding a second on

Ni $\Rightarrow$ 2 unpaired electrons

Sn $\Rightarrow$ $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^2$

2 unpaired e^- — core electrons — Valence e^-

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

Krypton core — Valence

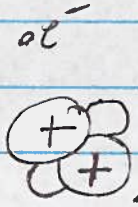
Cr (predict) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^4$

actual Cr: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1\ 3d^5$

H

"see/feel" attraction of 1 proton

He



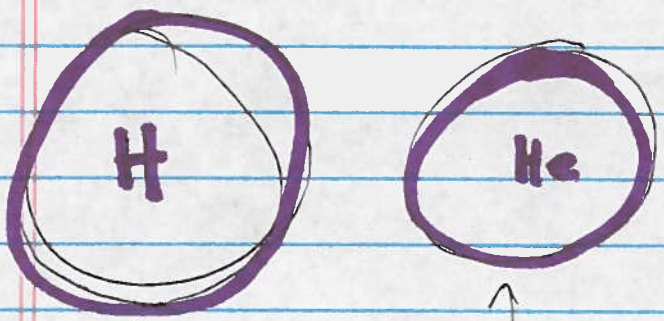
Each electron "sees/feels" 1.7 p^+

$Z = 2\ p^+$

$Z_{eff} = 1.7\ p^+$

the difference is called shielding

$.3\ p^+$ are shielded



big

smaller

Z_{eff} increases

Size/atomic radius decreases *

increases **

** due to addition of new shells

* due to increasing Z_{eff}

Folder Activity Chapter 5 Day 3 **14 October 2015**

Printed Name: Monika Satkauskas Chm 203 Student number: TA

smallest

r increases

r decreased →

biggest

1	1 H																2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	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
5	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
6	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
7	87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110	111	112		114		116		118

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

1. Write the electron configuration for each of the following. You may use core notation for all with Z > 18

(a) Na $1s^2 2s^2 2p^6 3s^1$	(b) P $1s^2 2s^2 2p^6 3s^2 3p^3$	(c) Co $[Ar]\ 4s^2 3d^7$
(d) Sn $[Kr]\ 5s^2 4d^{10} 5p^2$	(e) Zr $[Kr]\ 5s^2 4d^2$	(f) Bi $[Xe]\ 6s^2 4f^{14} 5d^{10} 6p^3$

2. How many unpaired electrons does each of the elements in Question 1 possess?

(a) Na $1e^-$	(b) P $3e^-$	(c) Co $3e^-$
(d) Sn $2e^-$	(e) Zr $2e^-$	(f) Bi $3e^-$

3. Circle the largest member of each set. In some cases the correct answer is "Can't predict"

(a) Na or P Na	(b) P or Bi Bi	(c) Co or Zr Zr
(d) Sn or P Sn	(e) Sn or Bi Can't predict	(f) Li or Na Na

4. Circle the smallest member of each set. In one case the correct answer is "Can't predict"

(a) (Na) K Rb	(b) P S (Cl)	(c) (Cu) Ag Au
(d) Sn As (S)	(e) Pt Ag (Zn)	(f) C P Se Can't predict

5. True/False

T (F) Z_{eff} is always < Z. (Look at H) However, ~~every~~ every other element will experience Shielding and have Zeff<Z

(T) F Z_{eff} is proportional to atomic radius within a subshell. → inversely proportional

(T) F Atomic radius decreases within a subshell.

T (F) The number of unpaired electrons increases within a subshell.

(T) F The atomic orbitals within a subshell have degenerate energies.