

Today: "Finish" chapter 5

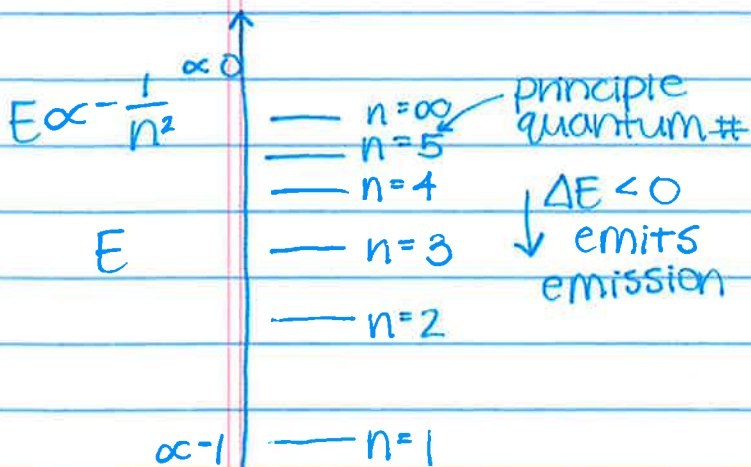
October 7th

Tuesday Oct. 8 = study prelab as usual

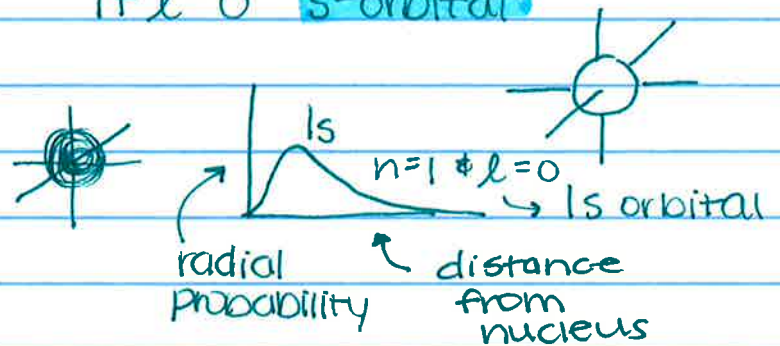
↳ watch both youtube mohl pipet videos

↳ quiz will include a Mohr Pipet practicum (3 pts)

wednesday Oct. 9 = chapter 6, Day 1 of 2



if $l = 0$ "s-orbital"

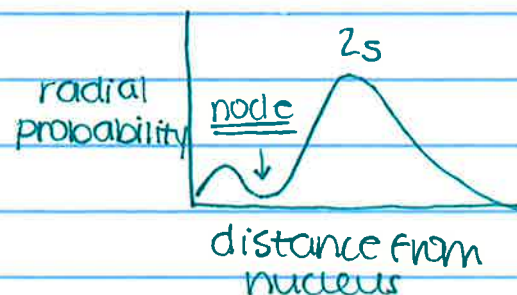


n	l=0	orbitals
n=1	1s	
n=2	2s	2p
n=3	3s	3p
n=4	4s	3d
	5s	4d
	6s	5d
	7s	6d

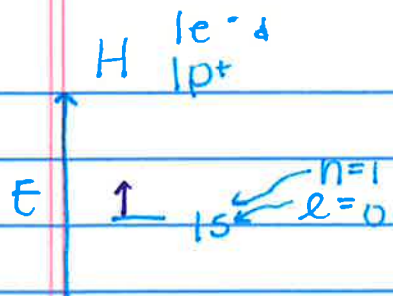
l shape quantum number

n	l	m_l	n	l	m_l
1	0 "s"	0	4	0 s	
2	0 "s"	0		1 p	
	1 "p"	-1, 0, +1		2 d	
3	0 3s	0		3 f	-3...+3 (7)
	1 3p	-1, 0, +1			
	2 3d	-2, -1, 0, +1, +2			

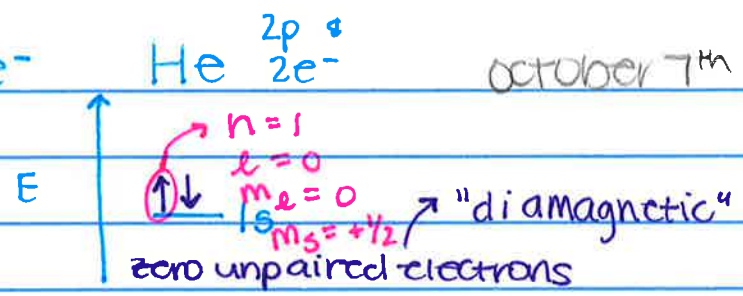
4f
5f



October 7th



$\uparrow \equiv 1e^-$



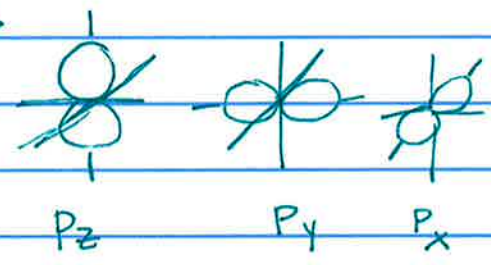
* ground state helium atom
 means electrons are at lowest state possible!

If $l=1$ "p-orbital"

2p ← home for 6 electrons

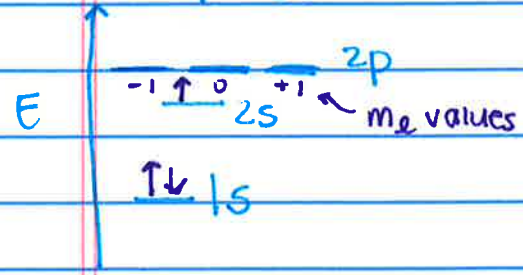
- 3p
- 4p
- 5p

→ three p-orbitals



xy plane node

Li $3e^-$

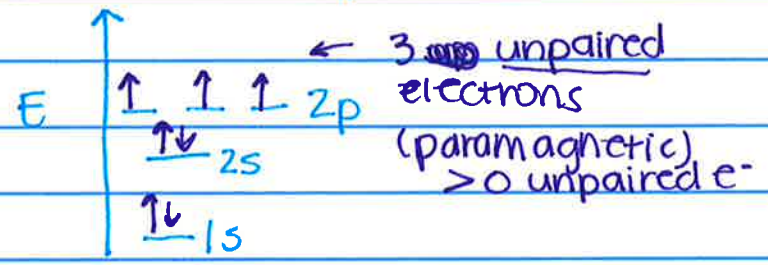


Electron configuration

$1s^2 2s^1$

Nitrogen $7e^-$

$1s^2 2s^2 2p^3$



Ni → $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8$

→ what values are allowed for n & l if $m_l = -5$?

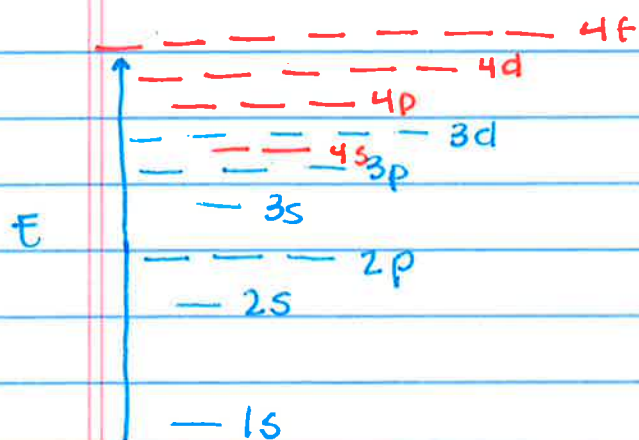
↳ $l \geq 5$ & $n \geq 6$

↳ 6h orbital

7h

7i

October 7th

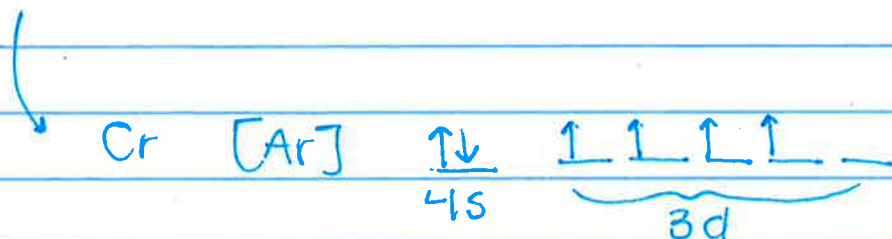
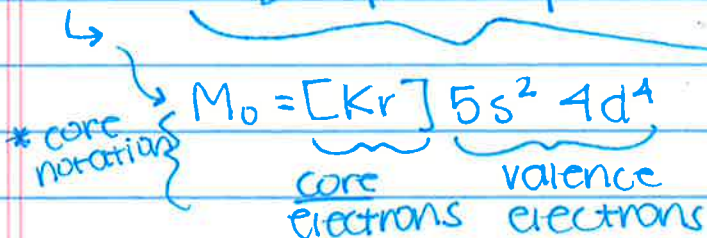
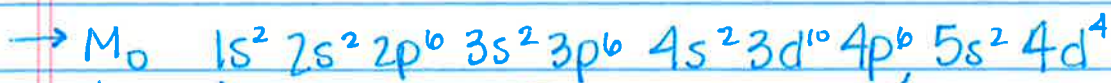


* electron spin quantum number

$$m_s = +\frac{1}{2} \text{ or } -\frac{1}{2}$$

↑ ↓

only pertains to the electrons



* Effective Nuclear charge, Z^*

(P)

H atom

$1p + 1n$

electron "sees" 1 proton

$$Z = 1$$

nuclear charge

He

$2p + 2e^-$

$1s^2$

$$Z = 2$$

$$Z^* < 2 (1.73)$$



He is SMALLER than H because of Z^*

(You will need a periodic table for this worksheet.)

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

(a) Na	(b) P
(c) Co	(d) Sn
(e) Zr	(f) Bi

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

(a) Na	(b) P
(c) Co	(d) Sn
(e) Zr	(f) Bi

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

(a) Na or P	(b) P or Bi	(c) Co or Zr
(d) Sn or P	(e) Sn or Bi	(f) Li or 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

5. True/False

T F Z_{eff} is always $< Z$.

T F The atomic radius is proportional to Z_{eff} within a shell.

T F Atomic radius decreases within a subshell.

T F The maximum number of possible unpaired electrons increases as l increases.

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

Questions in final exam format (multiple choice):

6. How many orbitals are there in the seventh shell?

A. 6 B. 7 C. 21 D. 49

7. An element in a ground state electron configuration has 4 electrons in the 4p orbitals. Which of the following statements can **not** describe the electron configurations in this atom?

A. Some electrons have an orbital angular momentum (l) of 2.

B. Six electrons are in the $n = 4$ shell.

C. The valence electron configuration is identical to carbon.

D. No electrons have an orbital angular momentum (l) of 3.3.

8. Molybdenum has an anomalous electron configuration. Write the electron configuration of Mo using shorthand notation.

A. $[\text{Kr}] 5s^0 4d^6$

B. $[\text{Kr}] 5s^0 4d^0 5p^6$

C. $[\text{Kr}] 5s^1 4d^5$

D. $[\text{Kr}] 5s^2 4d^4$

9) Rank these elements in order of increasing effective nuclear charge: Na, Mg, Cl, and S.

A. $S < Cl < Mg < Na$ B. $Cl < Mg < Na < S$

C. $Mg < Na < Cl < S$ D. $Na < Mg < S < Cl$

Now try these problems from the book:

Section 5.9. (Orbital energy levels) Problems 94, 96, 100, and 102

Section 5.10 - 5.12. (electron configurations) Problems 15, 16, 30, 32, 104 – 116 even.

Section 5.13. (Periodic properties and electron configuration, atomic radii) Problems 8, 17, 18, 118, 120, and 122.

Practice Exam (pg. 199 – 201) Problems 12 – 15.