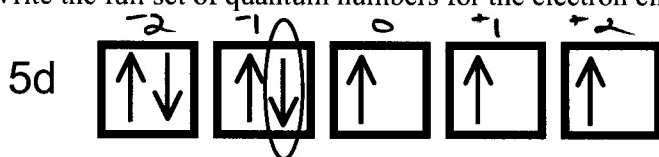


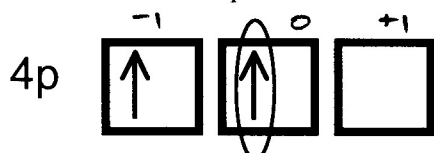
## Quantum Chemistry 4: Quantum Numbers & Periodic Properties

- 1) Write the full set of quantum numbers for the electron circled in the diagram below:



$$n = 5 \quad l = 2 \quad m_l = -1 \quad m_s = -\frac{1}{2}$$

- 2) Write the full set of quantum numbers for the electron circled in the diagram below:



$$n = 4 \quad l = 1 \quad m_l = 0 \quad m_s = +\frac{1}{2}$$

- 3) Draw an orbital diagram (as in 1 & 2 above) if the last electron filling in a ground state atom has the following set of 4 quantum numbers:

$$n = 5, \quad l = 3, \quad m_l = +2, \quad m_s = +\frac{1}{2}$$

5f

↑  
1st e<sup>-</sup>



- 4) Draw an orbital diagram (as in 1 & 2 above) if the last electron filling in a ground state atom has the following set of 4 quantum numbers:

$$n = 6, \quad l = 0, \quad m_l = 0, \quad m_s = -\frac{1}{2}$$

6s



- 5) Place the following in order of increasing (smallest to largest) particle size:

F He N O P



- 6) Place the following in order of increasing (smallest to largest) particle size:

K K<sup>+</sup> Se Se<sup>2-</sup>



7) Put the following in order of increasing (smallest to largest 1<sup>st</sup> ionization energy):

Al K Mg Na



8) What atom in the third row of the periodic table will have the largest jump between its 5<sup>th</sup> and 6<sup>th</sup> ionization energies?

P.

9) What does the following reaction correspond to?  $S_{(g)} + e^- \rightarrow S^-$

1<sup>st</sup> e<sup>-</sup> affinity for S

10) Write the reaction for the 2<sup>nd</sup> ionization of barium.



11) Using only an ordinary periodic table:

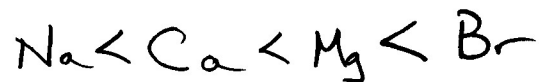
A) Put the following in order of INCREASING radius:

Al Al<sup>3+</sup> P P<sup>3-</sup>



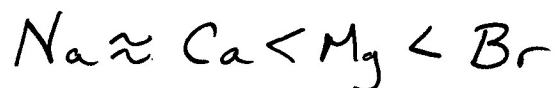
B) Put the following in order of INCREASING 1<sup>st</sup> ionization energy:

Br Ca Na Mg



C) Put the following in order of INCREASING electronegativity:

Br Ca Na Mg



12) Which element in the 3<sup>rd</sup> period will have its most significant jump in ionization energies between its 5<sup>th</sup> and 6<sup>th</sup>?

Same Question as # 8

(P)