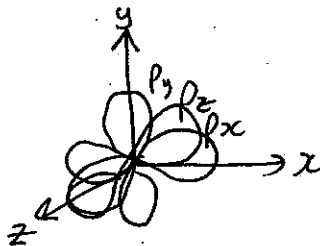
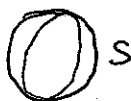


Name: \_\_\_\_\_

Date: KEY

### Atomic Theory Review

1. Draw s, p<sub>x</sub>, p<sub>y</sub>, and p<sub>z</sub> orbitals:



2. What does an orbital represent?

electron probability cloud

3. On the periodic table, where is the 's block'? 'p block'? 'd block'? 'f block'?

↑  
most left  
two columns

↑  
most  
right  
6 columns

↑  
middle  
10  
columns

↑  
bottom  
two  
rows of 14.

4. How many s orbitals are there? p orbitals? d orbitals? f orbitals?

1

3

5

7

5. Give the electron configurations (NOT core notation) for each:

Be:  $1s^2 2s^2$

N:  $1s^2 2s^2 2p^3$

Mn:  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$

6. Give core notation for each:

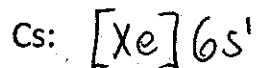
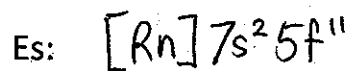
Al:  $[Ne] 3s^2 3p^1$

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

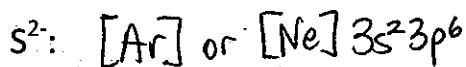
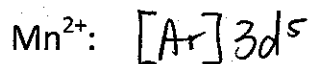
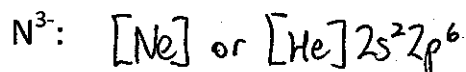
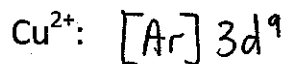
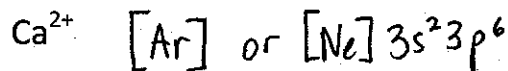
Zr:  $[Kr] 5s^2 4d^2$

Cr:  $[Ar] 4s^1 3d^5$

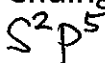
Au:  $[Xe] 6s^1 4f^{14} 5d^{10}$



7. Give core notation for each:



8. a) What is the electron configuration ending for the halogens?



b) How many valence electrons does each halogen have?

7

c) What is the common ion charge for a halogen and why?

-1 gain 1 electron to be isoelectronic w/ a noble gas

9) Why are noble gases unreactive?

full electron orbitals = no valence electrons  
= stable

10) Why does Ni make a  $Ni^{2+}$  ion?

$[Ar] 4s^2 3d^8$  loses its outer s orbital electrons  
to become  $[Ar] 3d^8$

11) Give the symbols for and explain the four quantum numbers. Why do we have

them?

$n$  = energy level 1, 2, 3, ...

$l$  = orbital shape s, p, d, f

$m$  = orbital orientation  $p_x, p_y, p_z$  etc.

$m_s$  = electron spin  $\pm \frac{1}{2}$

important for  
keeping track of  
electrons in a  
particle - each electron  
has a unique set of 4  
quantum numbers

12) How many valence electrons do each of the following have:

A) Li    B) C    C) Sn    4)  $\text{Cr}^{3+}$     5)  $\text{S}^{2-}$     6) Al    7)  $\text{Pd}^{4+}$   
1        4        4        3        0        3        6

13) Define ionization energy:

The energy required to remove an electron

Which of the following have the highest ionization energy? Li, Al, F, I Why?

F has an outermost electron quite close to its nucleus  
and it doesn't want to lose an electron, it wants to gain one

14) Which of the following have the smallest atomic radius? Na, K, Cl, Br Why?

K is 3<sup>rd</sup> energy level and so is Br

Na and Cl only 2<sup>nd</sup> energy level but Cl smaller due same  
energy level but larger positive charge in nucleus.

15) Define electronegativity:

the ability to gain and/or attract electrons

Which has the highest electronegativity? Li, Fr, F, I Why?

needs one electron to be isoelectronic w/ a noble  
gas.

Smaller atom so easier for its positive nucleus to  
attract an  $e^-$  compared to I.