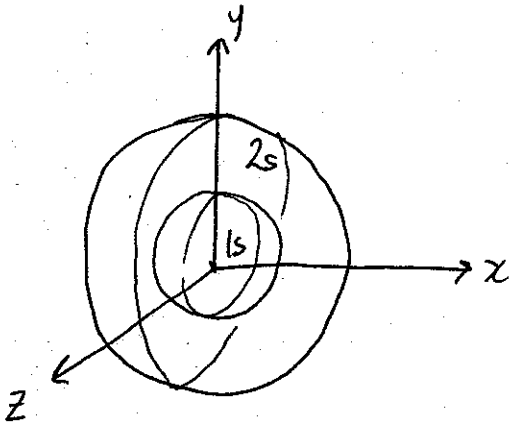
Name: _____ Date : Key

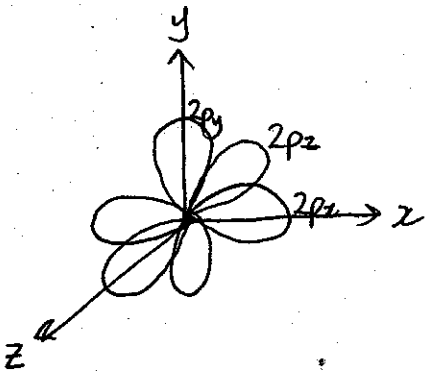
Electron Configuration Worksheet

Part 1 – Draw each of the following orbitals with labeled axis

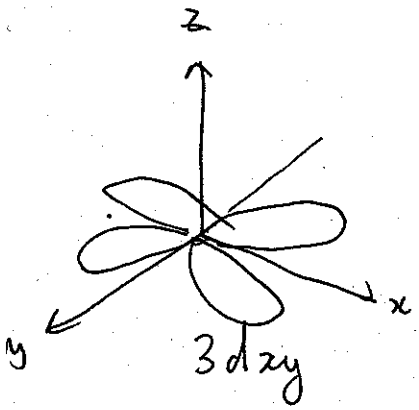
1. 1s, 2s

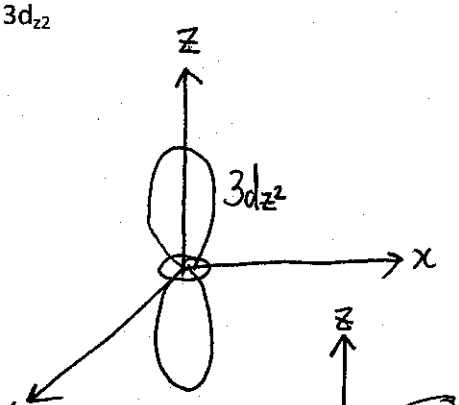


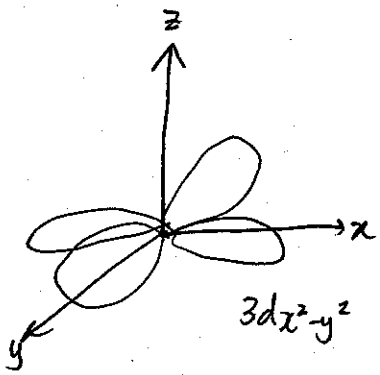
2. $2p_y$, $2p_x$, $2p_z$

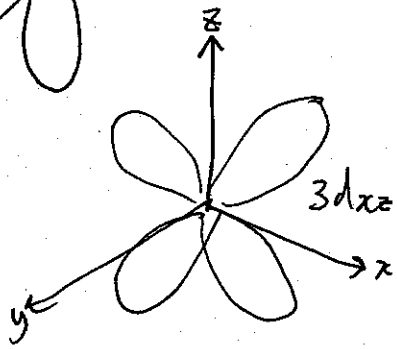


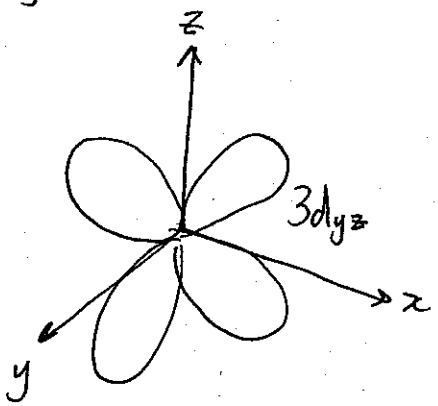
3. $3d_{xy}$, $3d_{xz}$, $3d_{yz}$, $3d_{x2-y2}$, $3d_{z2}$











Part 2: Write the electron configuration for these atoms.
Part 3: Write the core notation for these atoms.

1. Be $1s^2 2s^2$
   $[He]\,2s^2$
2. N $1s^2 2s^2 2p^3$
   $[He]\,2s^2 2p^3$
3. Ne $1s^2 2s^2 2p^6$
   $[Ne]$ or $[He]\,2s^2 2p^6$
4. Mg $1s^2 2s^2 2p^6 3s^2$
   $[Ne]\,3s^2$
5. Si $1s^2 2s^2 2p^6 3s^2 3p^2$
   $[Ne]\,3s^2 3p^2$
6. Ar $1s^2 2s^2 2p^6 3s^2 3p^6$
   $[Ar]$ or $[Ne]\,3s^2 3p^6$
7. Y $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^1$
   $[Kr]\,5s^2 4d^1$
8. Ge $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^2$
   $[Ar]\,4s^2 3d^{10} 4p^2$
9. Xe $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6$
   $[Xe]$ or $[Kr]\,5s^2 4d^{10} 5p^6$
10. Mn $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$
    $[Ar]\,4s^2 3d^5$
11. Zn $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$
    $[Ar]\,4s^2 3d^{10}$
12. Ag $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^9$ becomes $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1 4d^{10}$
    $[Kr]\,5s^2 4d^9 \longrightarrow$ becomes $[Kr]\,5s^1 4d^{10}$
13. P $1s^2 2s^2 2p^6 3s^2 3p^3$
    $[Ne]\,3s^2 3p^3$
14. Sc $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^1$
    $[Ar]\,4s^2 3d^1$
15. Na $1s^2 2s^2 2p^6 3s^1$
    $[Ne]\,3s^1$
16. Cl $1s^2 2s^2 2p^6 3s^2 3p^5$
    $[Ne]\,3s^2 3p^5$
17. Se $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^4$
    $[Ar]\,4s^2 3d^{10} 4p^4$
18. Mo $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^4$ becomes $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1 4d^5$
    $[Kr]\,5s^2 4d^4$ becomes $[Kr]\,5s^1 4d^5$

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Part 4: Write the core notation for these atoms.

1. Hg $[Xe]\,6s^2 4f^{14} 5d^{10}$
2. Ce $[Xe]\,6s^2 4f^2$
3. Cm $[Rn]\,7s^2 5f^8$
4. Mt $[Rn]\,7s^2 5f^{14} 6d^7$
5. Pu $[Rn]\,7s^2 4f^6$
6. Po $[Xe]\,6s^2 4f^{14} 5d^{10} 6p^4$
7. Bk $[Rn]\,7s^2 5f^9$
8. U $[Rn]\,7s^2 5f^4$

Part 5: Write core notation for each of the following ions. State if the ion is isoelectronic with a noble gas, and if so, state which gas.

1. Fe^{3+} $[Ar]\,3d^5$
2. Cl^- $[Ar]$ or $[Ne]\,3s^2 3p^6$ isoelectronic with Ar
3. Cu^+ $[Ar]\,3d^{10}$
4. Cu^{2+} $[Ar]\,3d^9$
5. Mn^{3+} $[Ar]\,3d^4$
6. O^{2-} $[Ne]$ or $[He]\,2s^2 2p^6$ isoelectronic with Ne
7. Hg^{2+} $[Xe]\,4f^{14} 5d^{10}$
8. Sn^{2+} $[Kr]\,5s^2 4d^{10}$
9. Sn^{4+} $[Kr]\,4d^{10}$
10. Br^- $[Kr]$ or $[Ar]\,4s^2 3d^{10} 4p^6$ isoelectronic with Kr
11. S^{2-} $[Ar]$ or $[Ne]\,3s^2 3p^6$ isoelectronic with Ar
12. Au^+ $[Xe]\,4f^{14} 5d^{10}$

Part 6: Write core notation for each atom or ion. Give an *s* to *d* electron elevation if necessary

1. Mo $[Kr]\,5s^1 4d^5$
2. Pd $[Kr]\,5s^2 4d^8$
3. Ag $[Kr]\,5s^1 4d^{10}$
4. Ag^+ $[Kr]\,4d^{10}$
5. Hg $[Xe]\,6s^2 4f^{14} 5d^{10}$
6. Au $[Xe]\,6s^1 4f^{14} 5d^{10}$

Part 7: State the number of valence electrons. (*full *d* orbitals and core electrons don't count)

1. Se 6
2. Te 6
3. F^- 0
4. Ni 10
5. Pb^{2+} 2
6. Zn 2
7. Ag^+ 0
8. Mn^{2+} 5
9. P 5
10. Xe 0
11. Ca 2
12. Cs 1
13. Ge 4
14. Fe^{3+} 5
15. I^{5+} 2
16. Sn 4
17. Tc^{7+} 0
18. As 5
19. Al^{3+} 0
20. Al 3
21. Sr 2
22. Bi 5
23. Mo^{4+} 2
24. Au^+ 0

Part 8: Short Answer Questions

1. What chemical family ends in an s^1 configuration?

   alkali metals

2. What chemical family ends in an s^2 configuration?

   alkaline earth metals

3. What chemical family ends in an s^2p^5 configuration?

   halogens

4. What chemical family ends in an s^2p^6 configuration?

   noble gases

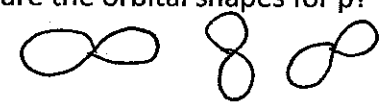
5. What chemical family is the d block?

   transition metals

6. What chemical family is the f block?

   lanthanides + actinides

7. What quantum number represents orbital shape? What are the orbital shapes for p?

   l p_x p_y p_z 

8. Why are the noble gases so unreactive?

   full electron orbitals

9. What happens to orbital energy level and size as the principal quantum number n increases?

   both increase