

Honors Chemistry I

Test 2- Review Problems

1. Tell whether the following elements are 1) representative, transition, or inner transition elements; and 2) metals, nonmetals, or semimetals

	Representative, transition, inner trans.	Metal, nonmetal, semimetal	Group	Period
Sr	<u>Repres.</u>	<u>Metal</u>	<u>IIA</u>	<u>5</u>
Sb	<u>Repres.</u>	<u>Semimetal</u>	<u>VA</u>	<u>5</u>
Lu	<u>Inner Trans</u>	<u>Metal</u>	<u>IIIB</u>	<u>6</u>
Cu	<u>Trans.</u>	<u>Metal</u>	<u>IB</u>	<u>4</u>
S	<u>Repres</u>	<u>Nonmetal</u>	<u>VIA</u>	<u>3</u>
Al	<u>Repres</u>	<u>Metal</u>	<u>IIIA</u>	<u>3</u>
H	<u>Repres</u>	<u>Nonmetal</u>	<u>IA</u>	<u>1</u>
Kr	<u>Repres</u>	<u>Nonmetal</u>	<u>VIIIA</u>	<u>4</u>
Ga	<u>Repres</u>	<u>Metal</u>	<u>IIIA</u>	<u>4</u>
Cd	<u>Trans.</u>	<u>Metal</u>	<u>IB</u>	<u>5</u>

2. A) Calculate the average atomic mass of Boron if the percent abundance of ^{10}B is 19.78% and ^{11}B is 80.22%.

$$\begin{array}{r}
 (.1978 \times 10) \\
 + (.8022 \times 11) \\
 \hline
 10.8
 \end{array}$$

- B) Calculate the average atomic mass for Copper using the following data:

Copper-63	69.09%	$ \begin{array}{r} (.6909 \times 63) \\ + (.3091 \times 65) \\ \hline 63.62 \end{array} $
Copper-65	30.91%	

3. Complete the table for the following ions:

Symbol	Atomic #	Mass #	Protons	Neutrons	Electrons	Name
A) Sr^{+2}	<u>38</u>	88	<u>38</u>	<u>50</u>	<u>36</u>	strontium ion
B) <u>Bi^{+3}</u>	<u>83</u>	<u>209</u>	83	209	80	bismuth ion
C) <u>N^{-3}</u>	7	14	<u>7</u>	<u>7</u>	10	nitride
D) Cs^{+1}	<u>55</u>	131	<u>55</u>	<u>76</u>	<u>54</u>	cesium ion
E) <u>Si^{+4}</u>	14	29	<u>14</u>	<u>15</u>	10	silicon ion
F) <u>Cl^{-1}</u>	<u>17</u>	<u>35</u>	17	18	18	chloride
G) B^{+3}	<u>5</u>	12	<u>5</u>	<u>7</u>	<u>2</u>	boron ion
H) <u>O^{-2}</u>	8	15	<u>8</u>	<u>7</u>	10	oxide

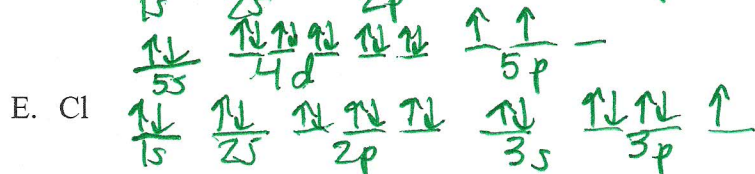
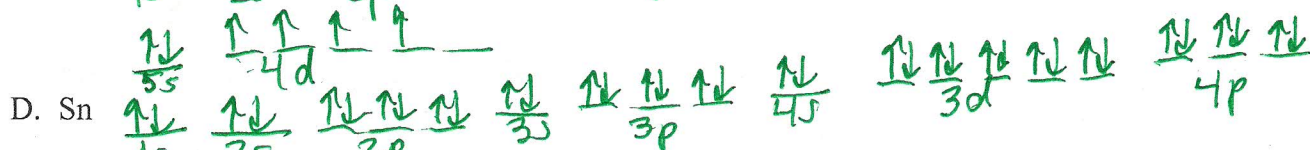
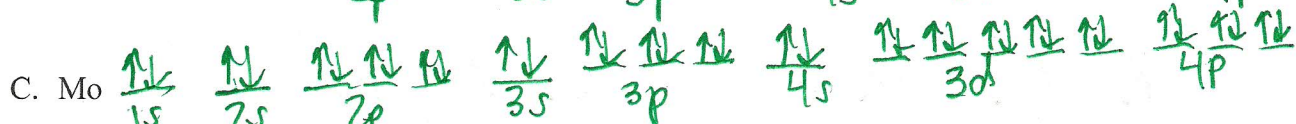
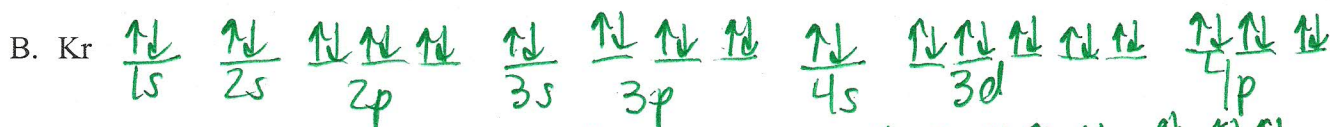
4. Write unabbreviated electron configurations for the following:

- A. Co $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$
- B. Br $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$
- C. Xe $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6$
- D. Ba $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2$
- E. Au $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^9$

5. Write abbreviated electron configurations for the following:

- A. Cu $[\text{Kr}] 4s^1 3d^{10}$ ← exception
- B. Pb $[\text{Xe}] 6s^2 4f^{14} 5d^{10} 6p^2$
- C. Ra $[\text{Rn}] 7s^2$
- D. Sn $[\text{Kr}] 5s^2 4d^{10} 5p^2$
- E. Lu $[\text{Xe}] 6s^2 5d^1 4f^{14}$

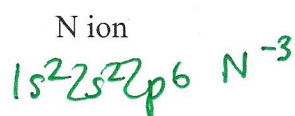
A. Si $\frac{\uparrow\downarrow}{1s} \frac{\uparrow\downarrow}{2s} \frac{\uparrow\downarrow\uparrow\downarrow}{2p} \frac{\uparrow\downarrow}{3s} \frac{\uparrow}{3p} \frac{\uparrow}{3p}$ —



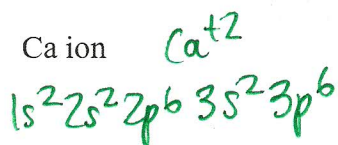
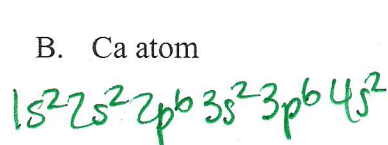
A. Ge 



A. N atom
 $1s^2 2s^2 2p^3$



Noble gas?
Neon



Noble gas?
Argon

9. Arrange the following elements in order of decreasing atomic size:

A. Cl, F, At, Br, I

At I Br Cl F

B. Ga, Ge, Ca, K, Br, Kr, As, Se

K Ca Ga Ge As Se Br Kr

10. Arrange the following elements in order of increasing ionization energy and electronegativity:

A. Cl, F, At, Br, I

At I Br Cl F

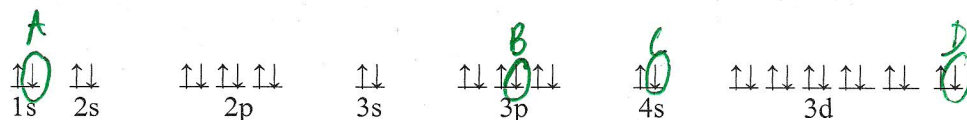
B. Ge, Ga, Ca, K, Br, As, Se

K Ca Ga Ge As Se Br

11. Give all of the 4-quantum number combinations for each electron in the 3d energy sublevel. (3 pts.)

$(3, 2, -2, +\frac{1}{2})$ $(3, 2, 0, +\frac{1}{2})$ $(3, 2, +2, +\frac{1}{2})$
 $(3, 2, -2, -\frac{1}{2})$ $(3, 2, 0, -\frac{1}{2})$ $(3, 2, +2, -\frac{1}{2})$
 $(3, 2, -1, +\frac{1}{2})$ $(3, 2, +1, +\frac{1}{2})$
 $(3, 2, -1, -\frac{1}{2})$ $(3, 2, +1, -\frac{1}{2})$

12. On the following orbital diagram, circle the electron represented by each of the following quantum number combinations and label with the appropriate letter (1 pt. each)



- A. $(1, 0, 0, -\frac{1}{2})$
 B. $(3, 1, 0, -\frac{1}{2})$
 C. $(4, 0, 0, -\frac{1}{2})$
 D. $(3, 2, +2, -\frac{1}{2})$
 E. What element is represented by this orbital diagram?

Zn