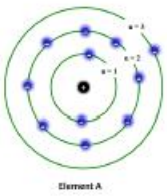
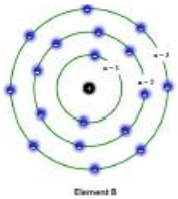
1.7 Periodic Trends
Worksheet

1) Which atom in each set has the larger radius?
   a. Be or O
   b. Cu or Br
   c. F or I
   d. O or As
   e. Kr or K
   f. Ba or Li

2) The shell models of two neutral atoms are drawn below. The representations are not drawn to scale. Which atom has the smallest radius? Justify your answer.





3) Explain each of the following occurrences by referring to the structure of the atoms in question (energy levels, orbitals, protons, etc.).
   a. The atomic radius of oxygen is smaller than the atomic radius of carbon.
   b. The atomic radius of Mg is smaller than the atomic radius of Ca.

4) Mg^{2+} and F^- are isoelectronic.
   a. Which ion has the smaller radius?
   b. Explain why the radii of these two ions are different sizes. Justify your claims.

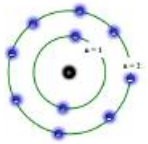
5) Which species has a smaller radius: Ca or Ca^{2+}? Provide an explanation and justify your claims using your knowledge of atomic structure.

6) Which species has a smaller radius: F or F^-? Provide an explanation and justify your claims using your knowledge of atomic structure.

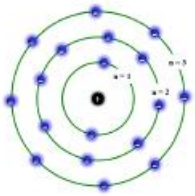
7) Explain each of the following occurrences by referencing the structure of the atoms in question (energy levels, orbitals, protons, etc.).
   a. The first ionization energy of Mg is 738.1 kJ/mol, while the first ionization energy of Al is only 577.9 kJ/mol.
   b. The first ionization energy of Mg is greater than the first ionization energy of Ca.
   c. The first ionization energy of Na is less than the first ionization energy of Cl.

d. The second ionization energy of Na is 4560 kJ/mol, while the second ionization energy of Mg is only 1450 kJ/mol.

8) The shell models of two neutral atoms are drawn below. The representations are not drawn to scale. Which atom would have the highest first ionization energy? Justify your answer.



Element A



Element B

9) Why do the halogens have a negative electron affinity value, while the noble gases have a positive electron affinity value?

10) Why do the Group 1A elements have negative electron affinity values, while Group 2A elements have positive electron affinity values?

11) Which element from each set is most electronegative?

a. F or C
b. Al or Cl
c. Po or S
d. Cs or I
e. Ca or Cl
f. O or Se
g. Zn or K
h. C or Pb
i. Ga or O

12) Sulfur is more electronegative than calcium. Explain why this is and justify your claims using your knowledge of atomic structure.