

NAME:

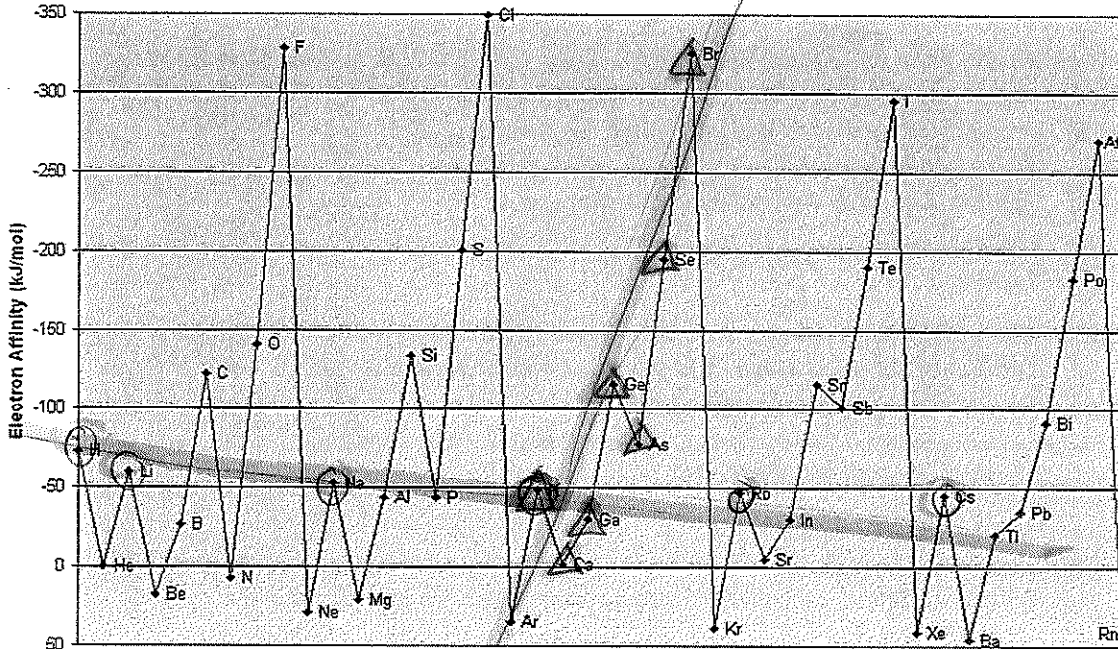
ANSWER KEY

HR:

Periodic Trends Practice

Electron Affinity: the change of energy when an electron is added to form an anion AKA the neutral's atoms's likelihood of gaining an electron

Periodic Trends in Electron Affinity for the Main Group Elements



1. Use the graph above to answer the following questions:

a. What is the electron affinity for:

- i. H: -70 kJ/mol Ca: -2 kJ/mol
- ii. Li: -60 kJ/mol Ga: -35 kJ/mol
- iii. Na: -52 kJ/mol Ge: -120 kJ/mol
- iv. K: -48 kJ/mol Se: -195 kJ/mol

b. From a, circle the elements on the graph that belong to group 1

c. From a, put a triangle around the elements on the graph that belong to period 4.

d. Write a general trend for electron affinity going down a group. decrease

e. Write a general trend for electron affinity across a period. increases

f. Based on your trend, which element has a larger electron affinity:

- i. Mg or P? P
- ii. P or Bi? P

g. Based on your trend, which element has a smaller electron affinity?

- i. N or P? P
- ii. N or F? N

h. For which of these properties, does Oxygen have a larger value than Selenium?

Ionization Energy Atomic Radius Electron Affinity

i. For which of these properties, does Phosphorus have a larger value than Chlorine?

Ionization Energy Atomic Radius Electron Affinity

O
S
Se

P < S < Cl

2. Melting points do vary on the periodic table, but in general you can say that metals have higher melting points than nonmetals. Use the data to determine which metals have a higher melting point.

Melting Points: Mg - 1500°C Li - 200°C Be - 1250°C Na - 150°C

- a. Cs or K? K
- b. Ba or Cs? Ba

Li	Be
Na	Mg

increases →

e- affinity
increases →
↓ decreases

ionization energy
increases →
↓ decreases

atomic radius
increases →
↓ increases

Answer Key

3. K is less reactive than Cs, but more active than Ga. Explain the periodic trend for metal activity across and down a period for metals.
decreases \rightarrow *metal activity* $\left\{ \begin{array}{l} \downarrow \text{across a period} \\ \uparrow \text{down a group} \end{array} \right.$
- metals* $\left\{ \begin{array}{l} K \\ Ga \end{array} \right.$ $\left\{ \begin{array}{l} \text{period} \\ \text{group} \end{array} \right.$

4. Using your trend from #3: Rank the following metal activity from least active to more active – Cu, Ca, Ra, Mn

least active $Cu < Mn < Ca < Ra$ *most active*

5. Elements Z and X are compared. Element Z is larger than Element X. They have the same number of valence electrons. Based on this you could say:

- same group* \leftarrow
- a. Element Z is further to the left side of the periodic table X
 - b. Element X is closer to the top of the periodic table
 - c. Element Z and X are probably in the same group Z
 - d. B and C
 - e. A and B

6. What properties do you think element 117 would hold?

- a. Number of protons? Electrons? Valence Electrons? $pt = 117, et = 117, val e^- = 7$
- b. Which family does it belong to? Period? *halogens, period 7*
- c. Does it become a cation or anion when it becomes an ion? *anion*
- d. Metal, Nonmetal, or Metalloid? *nonstep*

- Parts of the Periodic Table
 - Group and Period #s
 - What is the difference between a group and period on the periodic table?
 - Locate the Groups: alkali metals, alkaline earth metals, halogens, noble gases
 - Valence electrons amounts in the different representative groups (Group #1,2, 13-18)
 - Locate: metals, nonmetals, metalloids
 - Locate: transition metals vs inner transition metals (lanthanides and actinides)
- Analyze a periodic trend graph and determine the periodic trend for periods and groups
 - Examples done in class: atomic radius, ionization energy, electron affinity
- What does it mean to have a smaller nuclear charge? Larger nuclear charge?
 - Which atom has a smaller nuclear charge? Ca or Se
 - Which atom has a larger nuclear charge? Si or Cl
- What does it mean to have a larger coulombic attraction? Key Words: nucleus, valence electrons, distance, energy levels (shells), nuclear charge (protons)
 - Be able to determine which atoms have more coulombic charge and explain why.
 - Larger coulombic charge?
 - Si or S? Why? Si or Sn? Why?
 - Smaller coulombic charge?
 - K or Sc? Why? K or Cs? Why?
- How do you determine the size (radius of an atom)? How does coulombic force play a role?
 - Be able to determine which atoms have a small and large radius and explain why using coulomb's law.
 - Larger radius?
 - B or O? Why? B or Ga? Why?
 - Smaller radius?
 - Li or Be? Why? Li or Cs? Why?
- What does it mean to have a larger ionization energy? How does coulomb's law play a role?
 - Be able to determine which atoms have more and less ionization energy and explain why using coulomb's law.
 - Larger ionization energy? Why?
 - Sb or I? Why? Sb or Bi? Why?
 - Smaller ionization energy? Why?
 - Sr or Zr? Why? Sr or Ba? Why?