SCH 3UI

Review #2: Periodic Trends

1. a. What is an ion?
   b. Describe two ways in which an ion can form from an atom.
   c. What is meant by ionization energy?

2. a. What is meant by the term electron affinity?
   b. If the noble gases are ignored, how is electron affinity related to ionization energy?

3. How do chemists define atomic radius?

4. Use either increases or decreases to describe the trend on the periodic table for the following:

Characteristic	Direction of Movement	Trend
First ionization energy	Left to right	
First ionization energy	Up	
Atomic radius	Left to right	
Atomic radius	Down	
Reactivity of metals	Down	
Reactivity of metals	Left to right	
Reactivity of nonmetals	Left to right	
Reactivity of nonmetals	Down	

5. Using only their location in the periodic table, rank the atoms in each set by the corresponding trend.
   a. Decreasing atomic size: Mg, Be, Ba
   b. Increasing atomic size: Ca, Se, Ga
   c. Increasing ionization energy: Xe, He, Ar
   d. Decreasing ionization energy: Kr, Br, K
   e. Lower first ionization energy: F, N
   f. Lower first ionization energy: Ca, K
   g. Lower electron affinity: K or Ca
   h. Higher electron affinity: O or Li

6. a. What relationship exists between ionization energy and chemical reactivity for:
      i. metallic elements ii. nonmetallic elements
   b. What relationship exists between atomic radius and chemical reactivity for:
      i. metallic elements ii. nonmetallic elements
   c. What relation is there between the atomic radius and the first ionization energy of the elements?

7. The table on the right contains the ionization energies (IE) for one element. Which family on the periodic table would have this trend?

8. In which group do most of the elements have no electronegativity values? Explain.

IE1	1.01
IE2	1.90
IE3	2.91
IE4	4.96
IE5	6.27
IE6	21.17
IE7	25.40
IE8	29.85

9. The following Lewis Dot Diagrams represent atoms of two elements that lie on the same period of the periodic table (remember that Lewis diagrams show only the number of valence electrons for that element).

   a. Is X a metal or nonmetal?
   b. Is Z a metal or nonmetal?
   c. Which element has the greater chemical reactivity with iron?
   d. Which element would have the highest first ionization energy?
   e. Which one would have the greater chemical reactivity with oxygen?
   f. Which one would have the smaller atomic radius?

10. Which Family of the Periodic Table would an element that has the following properties be located:
    -low first IE -low second IE -large third IE
    -conducts electricity -reacts rapidly with sulfur

11. Explain why the first IE of an atom generally increases as atomic radius decreases.

12. Why is potassium a more reactive metal than lithium?

13. Which element is more reactive, argon or chlorine?

14. Use the EN values listed on the Periodic Table to determine which nonmetal would be more reactive between sulfur and bromine.

15. Chlorine is typically used to disinfect water in swimming pools. Bromine is often used to disinfect water in hot tubs. Explain the difference in halogen use.

16. Challenge: Identify the 8 elements
    There are 4 pairs of elements:
    A & B F & G P & Q X & Y

- Each pair belongs to the same family. So A and B are in the same family on the periodic table
- All elements are representative elements (no transition metals)
- All elements are either in the 3^{rd} or 6^{th} period
- Element F has a common valence of 2^-
- Element A is less metallic than element B
- Element P has a larger atomic radius than element Q
- Element G is more electronegative than element F
- Element X is more reactive towards water than Y
- Element Y has a valence of 2^+
- Element A has 5 valence electrons
- Element Q is an alkali metal

Identify likely elements that correspond to the letters A, B, F, G, P, Q, X, and Y.