Name _____ Date _____

Periodic Trends Worksheet

Directions: ***Use your notes to answer the following questions.***

1. Rank the following elements by increasing atomic radius: carbon, aluminum, oxygen, potassium.

2. Rank the following elements by increasing electronegativity: sulfur, oxygen, neon, aluminum.

3. Why does fluorine have a higher ionization energy than iodine?

4. Why do elements in the same family generally have similar properties?

5. Indicate whether the following properties increase or decrease from left to right across the periodic table.
   a. atomic radius (excluding noble gases)
   b. first ionization energy
   c. electronegativity

6. What trend in atomic radius occurs down a group on the periodic table? What causes this trend?

7. What trend in ionization energy occurs across a period on the periodic table? What causes this trend?

8. Circle the atom in each pair that has the largest atomic radius.
   a. Al or B
   b. Na or Al
   c. S or O
   d. O or F
   e. Br or Cl
   f. Mg or Ca

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9. Circle the atom in each pair that has the greater ionization energy.
   a. Li or Be
   b. Ca or Ba
   c. Na or K
   d. P or Ar
   e. Cl or Si
   f. Li or K

10. Define electronegativity.

11. Circle the atom in each pair that has the greater electronegativity.
   a. Ca or Ga
   b. Br or As
   c. Li or O
   d. Ba or Sr
   e. Cl or S
   f. O or S

Name_____

Worksheet: Periodic Trends

Period_____

____1. Which statement best describes Group 2 elements as they are considered in order from top to bottom of the Periodic Table?

(A) The number of principal energy levels increases, and the number of valence electrons increases.
(B) The number of principal energy levels increases, and the number of valence electrons remains the same.
(C) The number of principal energy levels remains the same, and the number of valence electrons increases.
(D) The number of principal energy levels remains the same, and the number of valence electrons decreases.

____2. What is the total number of valence electrons in an atom of boron in the ground state?

(A) 1 (C) 3
(B) 7 (D) 5

____3. What is the total number of valence electrons in an atom of xenon, Xe?

(A) 0 (C) 8
(B) 2 (D) 18

____4. The elements calcium and strontium have similar chemical properties because they both have the same

(A) atomic number
(B) mass number
(C) number of valence electrons
(D) number of completely filled sublevels

____5. On the Periodic Table of the Elements, all the elements within Group 16 have the same number of

(A) valence electrons (C) protons
(B) energy levels (D) neutrons

____6. An element with a partially filled *d* sublevel in the ground state is classified as

(A) a halogen (C) an alkali metal
(B) a transition metal (D) an alkaline earth metal

____7. Which electron configuration represents a transition element?

(A) $1s^2 2s^2 2p^5$ (C) $[Ar]3d^5 4s^2$
(B) $[Ne]3s^2$ (D) $[Ar]3d^{10} 4s^2 4p^6$

____8. Which element in Period 5 of the Periodic Table is a transition element?

(A) Sr (C) Ag
(B) Sb (D) Xe

____9. Which of the following atoms has the largest atomic radius?

(A) Na (C) Mg
(B) K (D) Ca

____10. Which noble gas has the highest first ionization energy?

(A) radon (C) neon
(B) krypton (D) helium

____11. Which sequence of elements is arranged in order of decreasing atomic radii?

(A) Al, Si, P (C) Cl, Br, I
(B) Li, Na, K (D) N, C, B

____12. Which list of elements from Group 2 on the Periodic Table is arranged in order of increasing atomic radius?

(A) Be, Mg, Ca (C) Ba, Ra, Sr
(B) Ca, Mg, Be (D) Sr, Ra, Ba

____13. As each successive element in Group 15 of the Periodic Table is considered in order of increasing atomic number, the atomic radius

(A) decreases (C) remains the same
(B) increases

____14. The strength of an atom's attraction for the electrons in a chemical bond is the atom's

(A) electronegativity (C) heat of reaction
(B) ionization energy (D) heat of formation

____15. Which properties are most common in nonmetals?

(A) low ionization energy and low electronegativity
(B) low ionization energy and high electronegativity
(C) high ionization energy and low electronegativity
(D) high ionization energy and high electronegativity

____16. Which Group 17 element has the least attraction for electrons?

(A) F (C) Br
(B) Cl (D) I

____17. Which element in Group 16 has the greatest tendency to gain electrons?

(A) Te (C) S
(B) Se (D) O

____18. The Group 17 element with the highest electronegativity is

(A) fluorine (C) bromine
(B) chlorine (D) iodine

____19. As the elements of Group 1 on the Periodic Table are considered in order of increasing atomic radius, the ionization energy of each successive element generally

(A) decreases (C) remains the same
(B) increases

____20. The amount of energy required to remove the outermost electron from a gaseous atom in the ground state is known as

(A) first ionization energy (C) conductivity
(B) activation energy (D) electronegativity

____21. Which element is a member of the halogen family?

(A) K (C) I
(B) B (D) S

____22. Which of the following Group 2 elements has the *lowest* first ionization energy?

(A) Be (C) Ca

(B) Mg (D) Ba

____23. As elements of Group 1 of the Periodic Table are considered in order from top to bottom, the ionization energy of each successive element decreases. This decrease is due to

(A) decreasing radius and decreasing shielding effect

(B) decreasing radius and increasing shielding effect

(C) increasing radius and decreasing shielding effect

(D) increasing radius and increasing shielding effect

____24. Which sequence correctly places the elements in order of increasing ionization energy?

(A) $H \rightarrow Li \rightarrow Na \rightarrow K$ (C) $O \rightarrow S \rightarrow Se \rightarrow Te$

(B) $I \rightarrow Br \rightarrow Cl \rightarrow F$ (D) $H \rightarrow Be \rightarrow Al \rightarrow Ga$

____25. Compared to the atomic radius of a sodium atom, the atomic radius of a magnesium atom is smaller. The smaller radius is primarily a result of the magnesium atom having

(A) a larger nuclear charge

(B) a smaller nuclear charge

(C) more principal energy levels

(D) fewer principal energy levels

____26. Which of these elements has the *least* attraction for electrons in a chemical bond?

(A) oxygen (C) nitrogen

(B) fluorine (D) chlorine

____27. The ability of carbon to attract electrons is

(A) greater than that of nitrogen, but less than that of oxygen

(B) less than that of nitrogen, but greater than that of oxygen

(C) greater than that of nitrogen and oxygen

(D) less than that of nitrogen and oxygen

____28. As the elements Li to F in Period 2 of the Periodic Table are considered in succession, how do the relative electronegativity and the covalent radius of each successive element compare?

(A) The relative electronegativity decreases, and the atomic radius decreases.

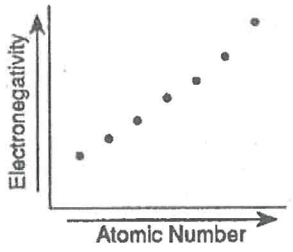
(B) The relative electronegativity decreases, and the atomic radius increases.

(C) The relative electronegativity increases, and the atomic radius decreases.

(D) The relative electronegativity increases, and the atomic radius increases.

____29. Which diagram correctly shows the relationship between electronegativity and atomic number for the elements of Period 3?

(A)



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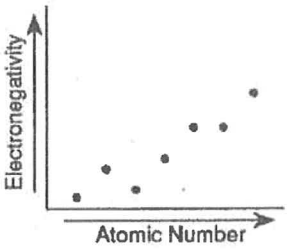

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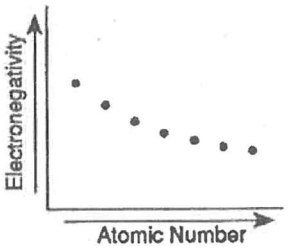

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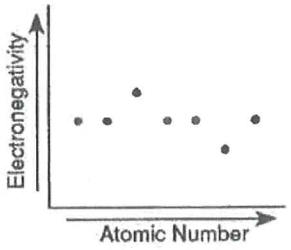

Name KEY Date _____

Periodic Trends Worksheet

ections: Use your notes to answer the following questions.

1. Rank the following elements by increasing atomic radius: carbon, aluminum, oxygen, potassium.

   O, C, Al, K

2. Rank the following elements by increasing electronegativity: sulfur, oxygen, neon, aluminum.

   Ne, Al, S, O

3. Why does fluorine have a higher ionization energy than iodine?

   Fluorine has a smaller atomic radius, so the p^+ can exert a greater pull on e^- (val. shell is close)

4. Why do elements in the same family generally have similar properties?

   They have the same valence shell e^- arrangement.

5. Indicate whether the following properties increase or decrease from left to right across the periodic table.
   a. atomic radius (excluding noble gases) decrease
   b. first ionization energy increase
   c. electronegativity increase

6. What trend in atomic radius occurs down a group on the periodic table? What causes this trend?

   Atomic radius increases down a group because energy levels (shells) are added

7. What trend in ionization energy occurs across a period on the periodic table? What causes this trend?

   Ionization energy increases across a period because as elements become less metallic, it requires more energy to remove an e^-.

8. Circle the atom in each pair that has the largest atomic radius.
   a. (Al) or B
   b. (Na) or Al
   c. (S) or O
   d. (O) or F
   e. (Br) or Cl
   f. Mg or (Ca)

Name _____ Date _____

9. Circle the atom in each pair that has the greater ionization energy.
   a. Li or (Be)
   b. (Ca) or Ba
   c. (Na) or K
   d. P or (Ar)
   e. (Cl) or Si
   f. (Li) or K

10. Define electronegativity.

The ability of an atom to gain an e^- in a bonding situation

11. Circle the atom in each pair that has the greater electronegativity.
   a. Ca or (Ga)
   b. (Br) or As
   c. Li or (O)
   d. Ba or (Sr)
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Name KEY

Worksheet: Periodic Trends

Period

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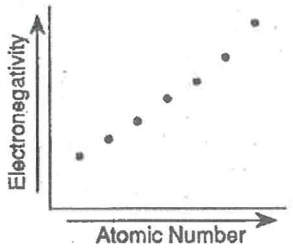

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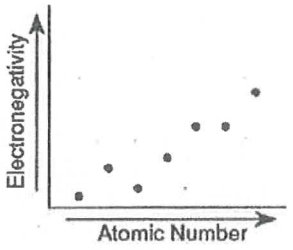

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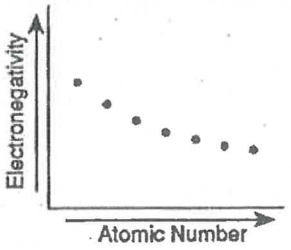

(D)