Honors Chemistry

Worksheet 3-3 Name________________________________

Periodic Trends Period_______

1. Discuss the importance of Mendeleev's periodic law.

He arranged elements by atomic mass and noticed repeating trends

2. Identify each element as a metal, metalloid, or nonmetal.
   a) fluorine nonmetal
   b) germanium metalloid
   c) zinc metal
   d) phosphorous nonmetal
   e) lithium metal

3. Give two examples of elements for each category.
   a) noble gases He, Ne, Ar, Kr, Rn
   b) halogens F, Cl, Br, I,
   c) alkali metals Li, Na, K, Rb, Cs
   d) alkaline earth metals Be, Mg, Ca, Sr, Ba

4. What trend in atomic radius do you see as you go down a group/family on the periodic table? What causes this trend?

Increases as it goes down due to increasing energy levels

5. What trend in atomic radius do you see as you go across a period/row on the periodic table? What causes this trend?

~~It~~ Decreases to the left due to increasing positive charge in nucleus

6. Circle the atom in each pair that has the largest atomic radius.

a)	Al	B	b)	S	O	c)	Br	Cl
d)	Na	Al	e)	O	F	f)	Mg	Ca

7. Define ionization energy.

The energy required to remove an electron from a neutral atom

8. Is it easier to form a positive ion with an element that has a high ionization energy or an element that has a low ionization energy? Explain.

Low I.E. They want to get rid of an e^- to ~~#~~ have full valence shell

9. Use the concept of ionization energy to explain why sodium form a 1+ ion (Na^+) but magnesium forms a 2+ ion (Mg^{2+}).

Sodium has Low 1st ionization energy 1 valence e^-

Mg has Low 2nd ionization energy 2 valence e^-

10. What trend in ionization energy do you see as you go down a group/family on the periodic table? What causes this trend?

Decreases as you go down; valence electrons are farther from nucleus

11. What trend in ionization energy do you see as you go across a period/row on the periodic table? What causes this trend?

Ionization energy increases as you go to the right

Greater positive charge ~~[illegible]~~ leads to greater attraction to electrons

12. Circle the atom in each pair that has the greater ionization energy.

a)	Li	Be	b)	Na	K	c)	Cl	Si
d)	Ca	Ba	e)	~~P~~	Ar	f)	Li	K

13. Define electronegativity

The ability of an atom to remove an electron from another neutral atom

14. What trend in electronegativity do you see as you go down a group/family on the periodic table? What causes this trend?

Decreases as you go down

Valence e⁻ farther from nucleus

15. What trend in electronegativity do you see as you go across a period/row on the periodic table? What causes this trend?

electro negativity increases as you go to the right

atoms are more inclined to gain e⁻ to gain a full shell

16. Circle the atom in each pair that has the greater electronegativity.

a)	Ca	Ga	b)	Li	O	c)	Cl	S
d)	Br	As	e)	Ba	Sr	f)	O	S

18. Define electron affinity.

The energy change that occurs when a neutral atom gains an electron

19. What trend in electron affinity do you see as you go down a group/family on the periodic table? What causes this trend?

Decreases as you go down

Electron configurations cause this trend

20. What trend in electron affinity do you see as you go across a period/row on the periodic table? What causes this trend?

Electron affinity increases as you go to the right

Name: ______________________________

Group: ______________________ Block #: ___

Date: ______________________________

Exceed to Succeed

Worksheet: Periodic Trends

1. ATOMIC RADIUS

For each of the following sets of atoms, rank the atoms from smallest to largest atomic radius.

a. Li, C, F — F C Li
b. Li, Na, K — K, Na, Li
c. Ge, P, O — O P Ge
d. C, N, Al — N, C, Al
e. Al, Cl, Ga — Cl, Al, Ga

2. IONIC RADIUS

For each of the following sets of ions, rank them from smallest to largest ionic radius.

a. Mg^{2+}, Si^{4-}, S^{2-} — Mg^{2+} S^{2-} Si^{4-}
b. Mg^{2+}, Ca^{2+}, Ba^{2+} — Mg^{2+} Ca^{2+} Ba^{2+}
c. F^-, Cl^-, Br^- — F^- Cl^- Br^-
d. Ba^{2+}, Cu^{2+}, Zn^{2+} — Zn^{2+} Cu^{2+} Ba^{2+}
e. Si^{4-}, P^{3-}, O^{2-} — O^{2-} P^{3-} Si^{4-}

3. IONIZATION ENERGY

For each of the following sets of atoms, rank them from lowest to highest ionization energy.

a. Mg, Si, S — Mg Si S
b. Mg, Ca, Ba — Ba Ca Mg
c. F, Cl, Br — Br Cl F
d. Ba, Cu, Ne — Ba Cu Ne
e. Si, P, He — Si P He

4. ELECTRONEGATIVITY

For each of the following sets of atoms, rank them from lowest to highest electronegativity.

a. Li, C, N — Li C N
b. C, O, Ne — Ne C O
c. Si, P, O — Si P O
d. K, Mg, P — K Mg P
e. S, F, He — He S F

Periodic Trends Worksheet

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) What is the difference between electron affinity and ionization energy?

Ionization energy is the energy required to remove an electron. Electron affinity is the energy change that occurs when a neutral atom gains an electron

4) Why does fluorine have a higher ionization energy than iodine?

The valence electrons are closer to the nucleus

5) Why do elements in the same family generally have similar properties?

Same number of valence electrons

