Name _____ Class _____ Date _____

Skills Worksheet

Concept Review

Section: Trends in the Periodic Table

Complete each statement below by writing the correct word or words in the space provided.

1. The amount of energy needed to remove an electron from a specific atom is called the _____ energy of the atom.
2. The _____ is half the distance from center to center of two like atoms bonded together.
3. _____ is the energy change that occurs when a neutral atom gains an electron.
4. _____ is a numerical value that reflects how much an atom in a molecule attracts electrons.
5. As the nuclear charge increases across a period, the effective nuclear charge _____ pulling the electrons closer to the nucleus and _____ the size of the atom.

Circle the letter of the choice that best answers the question.

6. Which of the following elements has the largest atomic radius?
   - **a.** boron
   - **b.** aluminum
   - **c.** gallium
   - **d.** indium
7. Which of the following elements has the smallest ionization energy?
   - **a.** potassium
   - **b.** arsenic
   - **c.** nitrogen
   - **d.** bismuth

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Concept Review *continued*

8. Which of the following elements has the largest electronegativity?

a. lithium

b. carbon

c. chlorine

d. iodine

Answer the following questions in the space provided.

9. Explain why the exact size of an atom is difficult to determine.

10. Which metal has the larger radius, Li or Na? Why?

11. What is electron shielding?

12. Explain the large decrease in atomic radii as you move across a period from Group 1 to Group 14.

13. Explain why ionization energies tend to decrease down a group.

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Concept Review *continued*

14. Explain the large increase in electronegativity as you move across a period.

_____

_____

_____

_____

15. Complete the following table.

	General Trends	
	From left to right across a period	**Down a group**
Ionization energy		
Atomic radius		
Electronegativity		
Ionic size		
Electron affinity		

Concept Review: Trends in the Periodic Table

1. ionization energy
2. bond radius
3. electron affinity
4. electronegativity
5. increases, decreasing
6. d
7. a
8. c
9. The electron cloud model is based on the probability of finding an electron at a specific location. As you move farther out from the nucleus, the probability of finding electrons becomes less and less. With this model there is not a well-defined boundary of the individual atom.
10. Na; because it has one more energy level than Li.
11. Electron shielding is the reduction of the attractive force between a positively charged nucleus and its outermost electrons due to the cancellation of some of the positive charge by the negative charge of the other electrons.
12. As the outermost electrons are pulled closer to the nucleus, they also get closer to one another and repulsion gets stronger. At Group 13, the electrons will not come closer to the nucleus because the electrons repel each other.
13. Each element has one more occupied energy levels than the one above it. Therefore, the outermost electrons are farther from the nucleus as you move down a group. Also, each successive element contains more electrons between the nucleus and the outermost electrons. These innermost electrons shield the outermost electrons from the full attractive force of the nucleus, thereby making it easier to remove valence electrons.
14. As you more across a period, each atom has one more proton and one more electron in the same principal energy level as the one before it. Therefore, because electron shielding does not change, the nuclear charge increases across a period, attracting the electrons more strongly.
15.

	General Trend	
	Across a Period	Down a Group
Ionization Energy	increases	decreases
Atomic Radius	decreases	increases
Electronegativity	increases	decreases
Ionic Size	decreases	increases
Electron affinity	increases	decreases

Concept Review: Where Did the Elements Come From?

1. carbon, hydrogen, oxygen, nitrogen, phosphorous, and sulfur
2. energy
3. matter, electrons, protons, and neutrons
4. hydrogen, helium
5. helium
6. fusion reactions
7. supernova
8. transmutation
9. synthetic
10. particle accelerators
11. The 93 naturally occurring elements are found on Earth or on stars. The remaining 20 elements are synthetic.
12. Cyclotrons cannot accelerate particles fast enough because as the particles accelerate, they become more massive, making it increasingly difficult to achieve further acceleration.
13. A synchrotron times its energy pulses to match the acceleration of the particle, thereby accelerating particles to enormous speeds.
14. Only a few atoms are created and they last for tiny fractions of a second.