

14.2

PERIODIC TRENDS

SECTION REVIEW

Objectives

- Interpret group trends in atomic radii, ionic radii, ionization energies, and electronegativities
- Interpret period trends in atomic radii, ionic radii, ionization energies, and electronegativities

Key Terms

- atomic radius
- ionization energy
- electronegativity

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

Atomic radii generally **1** as you move from left to right **1.** _____
 in a period. Atomic size generally **2** within a given group **2.** _____
 because there are more **3** occupied and an increased **3.** _____
 shielding effect, despite an increase in nuclear **4**. **4.** _____

The energy required to remove an electron from an atom is **5.** _____
 known as the **5** energy. This quantity generally **6** as **6.** _____
 you move left to right across a period. The size of an ion depends **7.** _____
 on whether the atom from which it formed gained or lost an **8.** _____
7. The ionic radius of anions and cations increases as you **9.** _____
 move **8**. The ability of a bonded atom to attract electrons **10.** _____
 to itself is known as **9**, and this quantity **10** as you
 move from left to right across a period.

Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

_____ **11.** The radius of an atom cannot be measured directly.

- _____ 12. Removing one electron from an atom results in the formation of a positive ion with a 1+ charge.
- _____ 13. The relative radii of atoms are estimated as being half the distance between nuclei in diatomic molecules.
- _____ 14. Atoms with high electronegativity tend to form positive ions.

Part C Matching

Match each description in Column B to the correct term in Column A.

- | Column A | Column B |
|-----------------------------|--|
| _____ 15. ionization energy | a. half the distance between the nuclei of two atoms. |
| _____ 16. electronegativity | b. When the elements are arranged in order of increasing atomic number, there is a periodic pattern in their physical and chemical properties. |
| _____ 17. atomic radius | c. the energy required to overcome the attraction of the nuclear charge and remove an electron from a gaseous atom |
| _____ 18. cations | d. positively charged ions |
| _____ 19. periodic law | e. the tendency for the atoms of an element to attract electrons when they are chemically combined with another element |

Part D Questions and Problems

Answer the following in the space provided.

20. For the following pairs of atoms, tell which one of each pair has the largest ionic radius.
- a. Al, B _____
- b. S, O _____
- c. Br, Cl _____
- d. Na, Al _____
- e. O, F _____
21. Indicate which element of the following pairs has the greater electronegativity.
- a. calcium, gallium _____
- b. lithium, oxygen _____
- c. chlorine, sulfur _____
- d. bromine, arsenic _____