

14.1

CLASSIFICATION OF THE ELEMENTS**SECTION REVIEW****Objectives**

- Explain why you can infer the properties of an element based on those of other elements in the periodic table
- Use electron configurations to classify elements as noble gases, representative elements, transition metals, or inner transition metals

Key Terms

- noble gases
- transition metals
- representative elements
- inner transition metals

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.

- The periodic table organizes the elements into vertical _____ 1. _____
 _____ 1 and horizontal _____ 2 in order of increasing _____ 3. _____ 2. _____
- The table is constructed so that elements that have similar chemical _____ 3. _____
 properties are in the same _____ 4. The elements in Groups 1A _____ 4. _____
 through 7A are called the _____ 5. The _____ 6 make up Group 0. _____ 5. _____
- The elements in Groups 2A and 3A are interrupted in periods 4 and _____ 6. _____
 5 by the _____ 7 and in periods 6 and 7 by the _____ 8. _____ 7. _____
- The atoms of the noble gas elements have their outermost _____ 8. _____
 and _____ 9 sublevels filled. The outermost *s* and *p* sublevels of _____ 9. _____
 the representative elements are _____ 10. _____ 10. _____

Part B True-False

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

- _____ 11. The representative elements are the Group A elements.
- _____ 12. Chlorine has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^7$.
- _____ 13. The element in Group 4A, period 3, is gallium.

_____ 14. There is a relationship between the electron configurations of elements and their chemical and physical properties.

Part C Matching

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

Column A	Column B
_____ 15. period	a. an element in which the outermost <i>s</i> and <i>p</i> sublevels are filled
_____ 16. inner transition metal	b. a horizontal row on the periodic table
_____ 17. representative element	c. an element whose outermost <i>s</i> sublevel and nearby <i>d</i> sublevel contain electrons.
_____ 18. transition metal	d. an element whose outermost <i>s</i> and nearby <i>f</i> sublevel generally contain electrons
_____ 19. noble gas	e. a vertical column on the periodic table
_____ 20. group	f. an element whose outermost <i>s</i> or <i>p</i> sublevels are only partially filled.

Part D Questions and Problems

Answer the following in the space provided.

21. List the outer electron configurations for the atoms in period 3 from left to right.

22. List the elements of group 5A. Tell whether each is a solid, liquid or gas, at room temperature; and whether it is a metal, non-metal, or metalloid.

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.
- Al, B _____
 - S, O _____
 - Br, Cl _____
 - Na, Al _____
 - O, F _____
21. Indicate which element of the following pairs has the greater electronegativity.
- calcium, gallium _____
 - lithium, oxygen _____
 - chlorine, sulfur _____
 - bromine, arsenic _____