

7.3 BONDING IN METALS

Section Review

Objectives

- Model the valence electrons of metal ions
- Describe the arrangement of atoms in a metal
- Explain the importance of alloys

Vocabulary

- metallic bonds
- alloys

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.

Metals consist of closely packed 1 that are surrounded **1.** _____
 by a sea of 2 . This arrangement constitutes the 3 **2.** _____
 bond. The electron mobility accounts for the excellent **3.** _____
 4 conductivity of metals and helps explain why **4.** _____
 metals are 5 and 6 . Metal atoms are commonly **5.** _____
 packed in a 7 cubic, a 8 cubic, or a 9 **6.** _____
 arrangement. When two or more elements, at least one of which **7.** _____
 is a metal, are mixed together, the resulting mixture is called **8.** _____
 an 10 . **9.** _____
10. _____

Part B True-False

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

- _____ 11. In a body-centered cubic structure, each atom has 12 neighbors.
- _____ 12. Metallic objects are formed from pure metals.

- _____ 13. Metals that are good conductors of electricity are said to be ductile.
- _____ 14. Drifting valence electrons insulate cations from one another and contribute to the malleability of a metal.
- _____ 15. Metals are good conductors of electricity because electrons can flow freely in them.

Part C Matching

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

Column A

Column B

- | | |
|------------------------------|--|
| _____ 16. ductile | a. an alloy whose component atoms are different sizes |
| _____ 17. metallic bonds | b. a mixture of two or more elements, at least one of which is a metal |
| _____ 18. alloy | c. can be hammered or forced into shapes |
| _____ 19. malleable | d. can be drawn into wires |
| _____ 20. interstitial alloy | e. the attraction of valence electrons for positive metal ions |

Part D Questions and Problems

Answer the following in the space provided.

21. Explain the physical properties of metals, using the theory of metallic bonding.

22. Explain why the properties of alloys are generally superior to their constituent components.
