**20.** Use electron-dot structures to demonstrate the formation of ionic compounds involving the following elements:
   a. Na and S
   b. Ca and O
   c. Al and S

**21.** Draw Lewis structures for each of the following molecules. (Hint: See Sample Problem D.)
   a. contains one C and four F atoms
   b. contains two H and one Se atom
   c. contains one N and three I atoms
   d. contains one Si and four Br atoms
   e. contains one C, one Cl, and three H atoms

**22.** Determine the type of hybrid orbitals formed by the boron atom in a molecule of boron fluoride, $BF_3$.

**23.** Draw Lewis structures for each of the following molecules. Show resonance structures, if they exist.
   a. $O_2$
   b. $N_2$
   c. CO
   d. $SO_2$

**24.** Draw Lewis structures for each of the following polyatomic ions. Show resonance structures, if they exist.
   a. $OH^-$
   b. $H_3C_2O_2^-$
   c. $BrO_3^-$

## Ionic Bonding and Ionic Compounds

### SECTION 3 REVIEW

**25.** a. What is an ionic compound?
   b. In what form do most ionic compounds occur?

**26.** a. What is a formula unit?
   b. What are the components of one formula unit of $CaF_2$?

**27.** a. What is lattice energy?
   b. In general, what is the relationship between lattice energy and the strength of ionic bonding?

**28.** a. In general, how do ionic and molecular compounds compare in terms of melting points, boiling points, and ease of vaporization?
   b. What accounts for the observed differences in the properties of ionic and molecular compounds?
   c. Cite three physical properties of ionic compounds.

**29.** a. What is a polyatomic ion?
   b. Give two examples of polyatomic ions.
   c. In what form do such ions often occur in nature?

## Metallic Bonding

### SECTION 4 REVIEW

**30.** a. How do the properties of metals differ from those of both ionic and molecular compounds?
   b. What specific property of metals accounts for their unusual electrical conductivity?

**31.** What properties of metals contribute to their tendency to form metallic bonds?

**32.** a. What is metallic bonding?
   b. How can the strength of metallic bonding be measured?

## Molecular Geometry

### SECTION 5 REVIEW

**33.** a. How is the VSEPR theory used to classify molecules?
   b. What molecular geometry would be expected for $F_2$ and HF?

**34.** According to the VSEPR theory, what molecular geometries are associated with the following types of molecules?
   a. $AB_2$
   b. $AB_3$
   c. $AB_4$
   d. $AB_5$
   e. $AB_6$

**35.** Describe the role of each of the following in predicting molecular geometries:
   a. unshared electron pairs
   b. double bonds