

36. a. What are hybrid orbitals?
b. What determines the number of hybrid orbitals produced by the hybridization of an atom?
37. a. What are intermolecular forces?
b. In general, how do these forces compare in strength with those in ionic and metallic bonding?
c. What types of molecules have the strongest intermolecular forces?
38. What is the relationship between electronegativity and the polarity of a chemical bond?
39. a. What are dipole-dipole forces?
b. What determines the polarity of a molecule?
40. a. What is meant by an induced dipole?
b. What is the everyday importance of this type of intermolecular force?
41. a. What is hydrogen bonding?
b. What accounts for its extraordinary strength?
42. What are London dispersion forces?
47. On the basis of individual bond polarity and orientation, determine whether each of the following molecules would be polar or nonpolar:
 - a. H_2O
 - b. I_2
 - c. CF_4
 - d. NH_3
 - e. CO_2
48. Draw a Lewis structure for each of the following molecules, and then use the VSEPR theory to predict the molecular geometry of each:
 - a. SCl_2
 - b. PI_3
 - c. Cl_2O
 - d. NH_2Cl
 - e. SiCl_3Br
 - f. ONCl
49. Draw a Lewis structure for each of the following polyatomic ions, and then use VSEPR theory to determine the geometry of each:
 - a. NO_3^-
 - b. NH_4^+
 - c. SO_4^{2-}
 - d. ClO_2^-

PRACTICE PROBLEMS

43. According to the VSEPR theory, what molecular geometries are associated with the following types of molecules?
 - a. AB_3E
 - b. AB_2E_2
 - c. AB_2E
44. Use hybridization to explain the bonding in methane, CH_4 .
45. For each of the following polar molecules, indicate the direction of the resulting dipole:
 - a. H-F
 - b. H-Cl
 - c. H-Br
 - d. H-I
46. Determine whether each of the following bonds would be polar or nonpolar:
 - a. H-H
 - b. H-O
 - c. H-F
 - d. Br-Br
 - e. H-Cl
 - f. H-N

MIXED REVIEW

50. Arrange the following pairs from strongest to weakest attraction:
 - a. polar molecule and polar molecule
 - b. nonpolar molecule and nonpolar molecule
 - c. polar molecule and ion
 - d. ion and ion
51. Determine the geometry of the following molecules:
 - a. CCl_4
 - b. BeCl_2
 - c. PH_3
52. What types of atoms tend to form the following types of bonding?
 - a. ionic
 - b. covalent
 - c. metallic