53. What happens to the energy level and stability of two bonded atoms when they are separated and become individual atoms?

54. Draw the three resonance structures for sulfur trioxide, SO_3.

55. a. How do ionic and covalent bonding differ?
b. How does an ionic compound differ from a molecular compound?
c. How does an ionic compound differ from a metal?

56. Write the electron-dot notation for each of the following elements:
a. He
b. Cl
c. O
d. P
e. B

57. Write the structural formula for methanol, CH_3OH.

58. How many K^+ and S^{2-} ions would be in one formula unit of the ionic compound formed by these ions?

59. Explain metallic bonding in terms of the sparsely populated outermost orbitals of metal atoms.

60. Explain the role of molecular geometry in determining molecular polarity.

61. How does the energy level of a hybrid orbital compare with the energy levels of the orbitals it was formed from?

62. Aluminum's enthalpy of vaporization is 284 kJ/mol. Beryllium's enthalpy of vaporization is 224 kJ/mol. In which element is the bonding stronger between atoms?

63. Determine the electronegativity difference, the probable bonding type, and the more-electronegative atom for each of the following pairs of atoms:
a. Zn and O
b. Br and I
c. S and Cl

64. Draw the Lewis structure for each of the following molecules:
a. PCl_3
b. CCl_2F_2
c. CH_3NH_2

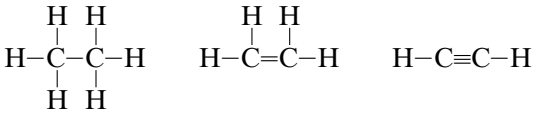
65. Write the Lewis structure for $BeCl_2$. (Hint: Beryllium atoms do not follow the octet rule.)

66. Draw a Lewis structure for each of the following polyatomic ions and determine their geometries:
a. NO_2^-
b. NO_3^-
c. NH_4^+

67. Why do most atoms tend to chemically bonded to other atoms?

CRITICAL THINKING

68. **Inferring Relationships** The length of a bond varies depending on the type of bond formed. Predict and compare the lengths of the carbon-carbon bonds in the following molecules. Explain your answer. (Hint: See Table 2.)

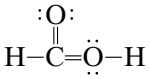


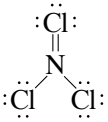
C_2H_6 C_2H_4 C_2H_2

69. Why does F generally form covalent bonds with great polarity?

70. Explain what is wrong with the following Lewis structures, and then correct each one.

a. H–H–S

b. 

c. 

71. Ionic compounds tend to have higher boiling points than covalent substances do. Both ammonia, NH_3, and methane, CH_4, are covalent compounds, yet the boiling point of ammonia is 130°C higher than that of methane. What might account for this large difference?

USING THE HANDBOOK

72. Figure 18 shows a model for a body-centered cubic crystal. Review the Properties tables for all of the metals in the *Elements Handbook*. What metals exist in body-centered cubic structures?