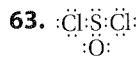


Study Tip

Switch Task Understanding Concepts

losing for you are 3s and three 3p orbitals of you are phosphorus hybridize to form four you are atomic orbitals. The resulting are shape is pyramidal with a bond angle of 107° between the sigma bonds.



64. a. C does not have an octet.



b. One F has more than an octet.



65. a. tetrahedral, 109.5°

b. trigonal planar, 120°

c. tetrahedral, 109.5°

d. bent, 105°

66. a. The percent ionic character increases as the difference in electronegativities increases.

b. 1.6

c. (1) 85% (2) 10% (3) 62% (4) 23%

67. a. 109.5°

b. 120°

c. 180°

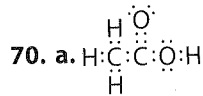
68. a. trigonal planar

b. pyramidal

c. linear

d. tetrahedral

69. a. Phosphorus in  $\text{PBr}_5$  has 10 valence electrons.



b. No, the molecule contains one carbon-oxygen double bond and one carbon-oxygen single bond.

c. polar bond

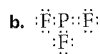
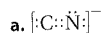
d. Yes, it has polar oxygen atoms at one end of the molecule and a nonpolar  $\text{CH}_3^-$  group at the opposite end.

Understanding Concepts

62. Devise a hybridization scheme for  $\text{PCl}_3$  and predict the molecular shape based on this scheme.

63. The chlorine and oxygen atoms in thionyl chloride ( $\text{SOCl}_2$ ) are bonded directly to the sulfur. Draw an acceptable electron dot structure for thionyl chloride.

64. Explain why each electron dot structure is incorrect. Replace each structure with one that is more acceptable.

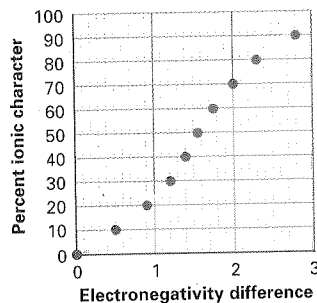


65. Use VSEPR theory to predict the geometry of each of the following.

a.  $\text{SiCl}_4$  b.  $\text{CO}_3^{2-}$  c.  $\text{CCl}_4$  d.  $\text{SCl}_2$

66. The following graph shows how the percent ionic character of a single bond varies according to the difference in electronegativity between the two elements forming the bond. Answer the following questions, using this graph and Table 6.2.

Single Bond Ionic Character



a. What is the relationship between the percent ionic character of single bonds and the electronegativity difference?

b. What electronegativity difference will result in a bond with a 50% ionic character?

c. Estimate the percent ionic character of the bonds formed between (1) lithium and oxygen, (2) nitrogen and oxygen, (3) magnesium and chlorine, and (4) nitrogen and fluorine.

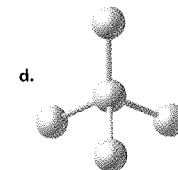
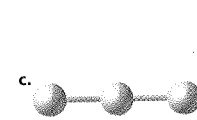
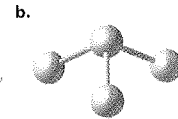
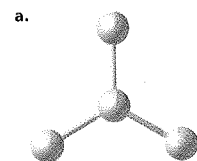
67. Give the angles between the orbitals of each hybrid.

a.  $sp^3$  hybrids

b.  $sp^2$  hybrids

c.  $sp$  hybrids

68. What is the geometry around the central atom in each of these simple molecules?



69. Which of the following molecules contains a central atom that does not obey the octet rule?

a.  $\text{PBr}_3$

b.  $\text{AlI}_3$

c.  $\text{PF}_3$

d.  $\text{SiCl}_4$

70. Vinegar contains the compound ethanoic acid, whose molecular formula is  $\text{CH}_3\text{COOH}$ .

a. Draw the electron dot structure of ethanoic acid.

b. Is the bonding between each of the oxygen atoms and the carbon the same?

c. Is the bonding between the carbon atom and each oxygen atom a polar or nonpolar bond?

d. Is ethanoic acid a polar molecule?