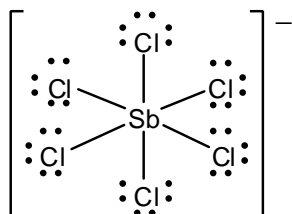


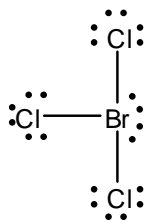
Chapter Nine

- 9.1 (a) See Figure 9.4. The angles are 120° .
 (b) See Figures 9.4 and 9.5. The bond angles are 109.5° .
 (c) See Figures 9.4 and 9.10. The bond angles are 90° .
- 9.2 (a) See Figure 9.4. The bond angle is 180° .
 (b) See Figures 9.4 and 9.7. The bond angles are 120° between the equatorial bonds and 180° between the two axial bonds.
- 9.4 An electron domain is a region in space where electrons can be found.
- 9.19 Hybrid orbitals provide better overlap than do atomic orbitals, and this results in stronger bonds.
- 9.21 Elements in period 2 do not have a *d* subshell in the valence level.
- 9.32 σ bond – The electron density is concentrated along an imaginary straight line joining the nuclei of the bonded atoms.
 π bond – The electron density lies above and below an imaginary straight line joining the bonded nuclei.
- 9.51 (a) trigonal pyramidal (b) planar triangular
 (c) tetrahedral (d) nonlinear (bent)
 (e) linear
- 9.53 (a) distorted tetrahedral (b) octahedral
 (c) nonlinear (d) tetrahedral
 (e) tetrahedral
- 9.55 (a) linear (b) square planar
 (c) T-shaped (d) trigonal pyramidal
 (e) planar triangular
- 9.57 PF_3
- 9.63 Two of these substances have planar triangular structures that are not polar because the individual bond dipole moments cancel one another: SO_3 and BCl_3 . Two of these molecules have pyramidal structures, and are, therefore, polar: PBr_3 and AsCl_3 . ClF_3 is T-shaped and, therefore, polar.
- 9.65 BeH_2 is nonpolar since it is linear. H_2S is bent and, therefore, polar. SCN^- and CN^- are linear, but have dipoles that do not cancel out. BrCl_3 is T-shaped and, therefore, polar.
- 9.67 In CCl_4 , although the individual bonds in this substance are polar bonds, the geometry of the bonds is symmetrical which serves to cause the individual dipole moments of the various bonds to cancel one another. In CH_3Cl , one of the four bonds has a different polarity so the individual dipole moments of the various bonds do not cancel one another.
- 9.73 (a) Six Cl atoms surround the central Sb atom in an octahedral geometry, and the hybridization of Sb is sp^3d^2 .



Chapter Nine

- (b) Three Cl atoms are bonded to the Br atom, plus the Br atom has two lone pairs of electrons. This requires the Br atom to be sp^3d hybridized, and the geometry is T-shaped.



- (c) The central Xe atom is bonded to four F atoms, plus it has two lone pairs of electrons. The molecule has a square planar geometry. This requires sp^3d^2 hybridization of Xe.

