1.39 Draw a Lewis dot structure for each of the following compounds:
(a) CH₃CH₂OH  (b) CH₃CN

1.43 Determine whether each compound below exhibits a molecular dipole moment:
(a) CH₄  (b) NH₃  (c) H₂O
(d) CO₂  (e) CCl₄  (f) CH₂Br₂

1.52 For each pair of compounds below, predict which compound will have the higher boiling point and explain your choice:
(a) CH₃CH₂CH₂OCH₃ or CH₃CH₂CH₂CH₂OH
(b) CH₃CH₂CH₂CH₃ or CH₃CH₂CH₂CH₂CH₃
(c) H·O·H  or  H·C·C·C·H

(c) H·H·H  or  H·C·C·C·H
1.55 Identify the hybridization state and geometry of each carbon atom in the following compounds: Predict the bond angles for all bonds.

For (a), draw the molecular orbitals.
2.34 Draw all lone pairs for the following compounds:
Write a molecular formula for each.

Acetylsalicylic acid (aspirin)

Acetaminophen (Tylenol)

Caffeine

2.40 Draw the missing formal charge in each case below:
2.52 Draw resonance structures for each of the following:
3.45 HA has a $pK_a$ of 15, while HB has a $pK_a$ of 5. Draw the equilibrium that would result upon mixing HB with NaA. Does the equilibrium favor formation of HA or formation of HB?

3.43 In each case, identify the more stable anion. Explain why it is more stable:

(a) \[ \text{ } \text{ } \text{ vs. } \text{ } \text{ } \text{ } \text{ (b) } \text{ } \text{ } \text{ vs. } \text{ } \text{ } \text{ } \text{ (c) } \text{ } \text{ } \text{ vs. } \text{ } \text{ } \text{ } \]

3.44 For each pair of compounds below, identify the more acidic compound:

(a) \[ \text{ } \text{ } \text{ } \text{ (c) } \text{ } \text{ } \text{ } \text{ (e) } \text{ } \text{ } \text{ } \text{ (f) } \text{ } \text{ } \text{ } \text{ (c) } \text{ } \text{ } \text{ } \]
3.46 For each reaction below, draw a mechanism (curved arrows) and then predict which side of the reaction is favored under equilibrium conditions:

(a) \[ \text{H}_2\text{O}^- + \text{O}^\text{-} \rightleftharpoons \text{HO}^- + \text{O}^\text{-} \]

(b) \[ \text{SH} + \text{O}^\text{-} \rightleftharpoons \text{S}^\text{-} + \text{OH} \]

(c) \[ \text{S}^\text{-} + \text{HS}^\text{-} \rightleftharpoons \text{S}^\text{-} \text{S}^\text{-} + \text{H}_2\text{S} \]

(d) \[ \text{O}^\text{-} \text{N}^\text{+} \rightleftharpoons \text{O}^\text{-} \text{N}^\text{-} \]

3.37 In each reaction, identify the Lewis acid and the Lewis base:

(a) \[ \text{OH}^- + \text{O}^\text{+} \rightleftharpoons \text{OH}^- \text{O}^\text{+} \]

(b) \[ \text{OH}^- + \text{B}^- \text{F}_2^\text{+} \rightleftharpoons \text{OH}^- \text{B}^- \text{F}_2^\text{+} \]

(c) \[ \text{Cl}^- + \text{Al}^- \text{Cl}_3^\text{+} \rightleftharpoons \text{Cl}^- \text{Al}^- \text{Cl}_3^\text{+} \]