Chapter 9 Chemical Bonding: General Concepts

Multiple Choice

Section 9.1

1. Sodium tends to form ions which have the electronic configuration of a noble gas. What is the electronic configuration of the noble gas which the sodium ion mimics?

   a. $1s^2$
   b. $1s^2\ 2p^6$
   ! c. $1s^2\ 2s^2\ 2p^6$
   d. $1s^2\ 2s^2\ 2p^6\ 3s^2$
   e. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$

Section 9.1

2. Bromine tends to form simple ions which have the electronic configuration of a noble gas. What is the electronic configuration of the noble gas which the bromide ion mimics?

   a. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4p^6$
   b. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4p^6\ 4d^{10}$
   c. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 4p^6$
   ! d. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6$
   e. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^{10}$

Section 9.3

16. The atoms in the nitrogen molecule, N_2, are held together by

   a. a single covalent bond
   b. a double covalent bond
   ! c. a triple covalent bond
   d. an ionic bond
   e. a magnetic dipole bond

Section 9.3

17. The atoms in the oxygen molecule, O_2, are held together by

   a. a single covalent bond
   ! b. a double covalent bond
   c. a triple covalent bond
   d. an ionic bond
   e. a magnetic dipole bond

Section 9.3

18. The atoms in the hydrogen fluoride molecule are held together by

   ! a. a single covalent bond
   b. a double covalent bond
   c. a triple covalent bond
   d. an ionic bond

e. a magnetic dipole bond

Section 9.3

19. The Lewis symbol for the carbon atom shows __ valence electrons. The number of bonds which carbon usually forms in order to complete its valence shell and obey the octet rule is ___

a. 4, 1
b. 4, 2
c. 2, 4
d. 4, 3
! e. 4, 4

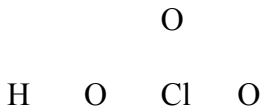
Section 9.3

20. The Lewis symbol for the nitrogen atom shows __ valence electrons. The number of bonds which nitrogen usually forms in order to complete its valence shell and obey the octet rule is ___.

a. 5, 1
b. 5, 2
c. 3, 4
! d. 5, 3
e. 5, 4

Section 9.3

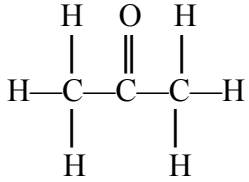
23. Complete the Lewis structure for $HClO_3$ from the skeletal template presented below by filling in the bonds and the remaining valence electrons (those which are not in the bonds). If the valence shells are filled to the ***usual*** limit (maximum of 8), what is the sum of the absolute values of all the formal charges in the molecule?



a. 0
b. 1
c. 2
d. 3
! e. 4

Section 9.4

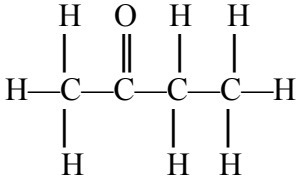
29. The compound shown immediately below is an example of



a. an alcohol

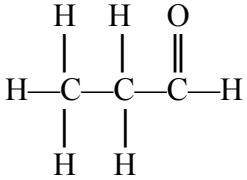
! b. a ketone
c. an acid
d. a hydrocarbon
e. an amine

Section 9.4
30. The compound shown immediately below is an example of



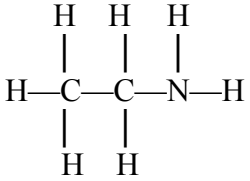
a. an alcohol
b. an acid
c. an amine
! d. a ketone
e. a hydrocarbon

Section 9.4
31. The compound shown immediately below is an example of



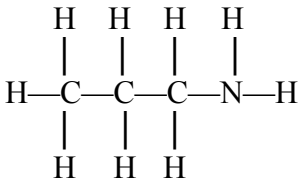
a. an alcohol
b. a ketone
! c. an aldehyde
d. an acid
e. an amine

Section 9.4
33. The compound shown immediately below is an example of



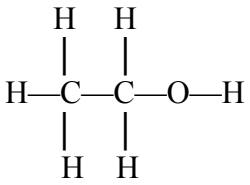
a. an alcohol
b. a ketone
c. an aldehyde
d. an acid
! e. an amine

Section 9.4
34. The compound shown immediately below is an example of



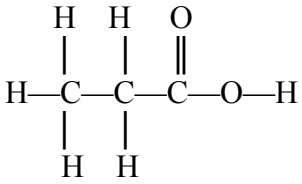
a. an acid
b. an alcohol
c. an aldehyde
! d. an amine
e. a ketone

Section 9.4
35. The compound shown immediately below is an example of



! a. an alcohol
b. a ketone
c. an aldehyde
d. an acid
e. an amine

Section 9.4
37. The compound shown immediately below is an example of



a. an alcohol
b. a ketone
c. an aldehyde
! d. an acid
e. an amine

Section 9.5
39. Which one of the following bonds is the most polar one of the set?

a. H—Br
b. H—Cl
! c. H—F
d. H—I
e. H—N

Section 9.5
44. Which one of the following is the least electronegative element of the set presented?

a. F
b. N
c. C
d. O
! e. H

Section 9.5
46. Which one of the following is the least electronegative element of the set presented?

a. N
b. O
c. Cl
d. Br
! e. I

Section 9.6
47. Based on electronegativity considerations, which one of the following listed species should be the strongest oxidizing agent?

a. Ne
b. Kr
c. Br_2
! d. Cl_2
e. S

Section 9.8
53. The formal charge on the oxygen atom in the carbon monoxide molecule is

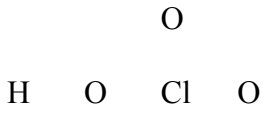
a. -2
b. -1
c. 0
! d. +1
e. +2

55. The formal charge on the carbon atom in the carbonate ion is

a. -2
! b. 0
c. +1
d. +2
e. +4

Section 9.8

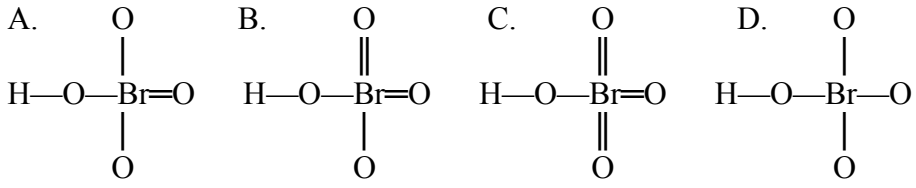
60. Complete the Lewis structure for $HClO_3$ from the skeletal template presented below by filling in the bonds and the remaining valence electrons (those which are not in the bonds). If the valence shells are filled to the ***usual*** limit (maximum of 8), what is the formal charge on the chlorine atom?



a. -1
b. 0
c. +1
! d. +2
e. +3

Section 9.8

62. A student drew four possible Lewis structures for $HBrO_4$



Complete these Lewis structures presented above by filling in the remaining valence electrons (those which are not in the bonds). Based on these structures, the preferred structure would be the structure shown as ____ in which the sum of the absolute values of the formal charges on all the atoms is ____, _____

a. A, 4
b. B, 2
! c. C, 0
d. D, 6
e. D, 0

Section 9.8

63. Draw a correct Lewis structure for CH_2Cl_2. Based on this Lewis structure, the calculated value for the formal charge on the carbon atom is

! a. 0
b. +4
c. +2
d. -2
e. -4

Section 9.8

64. Draw a correct Lewis structure for $H_3C—NH_2$. Based on this Lewis structure, the calculated value for the formal charge on the nitrogen atom is

a. -2
b. +3
c. -3
d. +2
! e. 0

Section 9.9
68. How many resonance structures, if any, can be drawn for the O_3 molecule?

a. 1 (no resonance)
! b. 2
c. 3
d. 4
e. 5

Section 9.9
69. How many resonance structures, if any, can be drawn for the nitrate ion?

a. 1 (no resonance)
b. 2
! c. 3
d. 4
e. 5

Section 9.9
71. How many resonance structures, if any, can be drawn for the BF_3 molecule?

! a. 1 (no resonance)
b. 2
c. 3
d. 4
e. 5