Ch 13 Practice MC Problems

1. Which of the following statements is *incorrect*?
   A) Ionic bonding results from the transfer of electrons from one atom to another.
   B) Dipole moments result from the unequal distribution of electrons in a molecule.
   C) The electrons in a polar bond are found nearer to the more electronegative element.
   D) A molecule with very polar bonds can be nonpolar.
   E) Linear molecules cannot have a net dipole moment.

2. For the elements Cs, F, and Cl, the order of increasing electronegativity is
   A) F < Cl < Cs.
   B) Cs < Cl < F.
   C) Cl < Cs < F.
   D) F < Cs < Cl.
   E) None of these

3. Which element listed below has the highest electronegativity?
   A) K
   B) Rb
   C) Br
   D) Te
   E) I

4. As a general pattern, electronegativity is inversely related to
   A) ionization energy.
   B) atomic size
   C) polarity of the atom.
   D) the number of neutrons in the nucleus.
   E) two of these

5. The electron pair in a C-F bond could be considered
   A) closer to C because carbon has a larger radius and thus exerts greater control over the shared electron pair.
   B) closer to F because fluorine has a higher electronegativity than carbon.
   C) closer to C because carbon has a lower electronegativity than fluorine.
   D) an inadequate model because the bond is ionic.
   E) centrally located directly between the C and F.

6. In the gaseous phase, which of the following diatomic molecules would be the most polar?
   A) CsF
   B) CsCl
   C) NaCl
   D) NaF
   E) LiF

7. Atoms having greatly differing electronegativities are expected to form
   A) no bonds.
   B) polar covalent bonds.
   C) nonpolar covalent bonds.
   D) ionic bonds.
   E) covalent bonds.

8. Which of the following bonds is the least polar?
   A) H-F
   B) H-N
   C) H-O
   D) H-C
   E) All are the same.

9. Which of the following elements forms the most ionic bond with chlorine?
   A) Rb
   B) Ga
   C) N
   D) Ar
   E) I

10. In which case is the bond polarity *incorrect*?
   A) δ^+ H–F δ^-
   B) δ^+ Na–O δ^-
   C) δ^+ Mg–H δ^-
   D) δ^+ Cl–Br δ^-
   E) δ^+ C–O δ^-

11. Which of the following groups contains no ionic compounds?
   A) HCN, SO_2, $Ca(NO_3)_2$
   B) PCl_5, LiBr, $Cu(OH)_2$
   C) NaOH, CBr_4, SF_4
   D) NaH, CaF_2, $NaNH_2$
   E) CH_4O, H_2O, NBr_3

12. What of the following shows the bonds in order of decreasing polarity?
   A) N-Cl, P-Cl, As-Cl
   B) P-Cl, N-Cl, As-Cl
   C) As-Cl, N-Cl, P-Cl
   D) P-Cl, As-Cl, N-Cl
   E) As-Cl, P-Cl, N-Cl

13. Which of the following has the largest radius?
   A) O^{2-}
   B) F^-
   C) Ne
   D) Na^+
   E) Mg^{2+}

14. Which of the following has the smallest radius?
   A) Se^{2-}
   B) Br^+
   C) Kr
   D) Rb^+
   E) Sr^{2+}

15. Which of the following series is isoelectronic?
   A) B, C, N, O
   B) S^{2-}, Cl^-, K^+, Ca^{2+}
   C) F^-, Cl^-, K^+, Rb^+
   D) Na, K, Rb, Cs
   E) Sn, As, S, F

16. Which of the following molecules contains a double bond?

A) CO_2
B) NH_3
C) H_2O
D) all
E) none

17. In the Lewis structure for elemental nitrogen, there is(are)

A) a single bond between the nitrogens.
B) a double bond between the nitrogens.
C) a triple bond between the nitrogens.
D) three unpaired electrons.
E) none of these

18. How many electrons are in the Lewis structure for SO_2?

A) 16
B) 30
C) 18
D) 20
E) 32

19. How many of the following molecules and ions contain double or triple bonds?

N_2 H_2CO C_2H_4 C_2H_6 SCN^-

A) 1
B) 2
C) 3
D) 4
E) 5

20. How many of the following exhibit resonance?

O_3 OCl_2 NF_3 CCl_4

A) 0
B) 1
C) 2
D) 3
E) 4

21. For which compound is resonance required to describe the structure adequately?

A) PCl_3
B) CO_3^{2-}
C) HCN
D) NH_4^+
E) none of these

22. How many resonance structures does the molecule SO_2 have?

A) 0
B) 1
C) 2
D) 3
E) 4

Draw the Lewis structures of the molecules below, and use them to answer the questions 23-24.

I. BH_3

II. NO_2

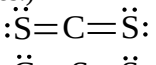
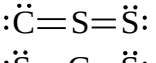
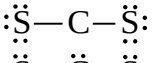
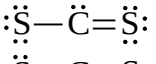
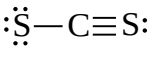
III. SF_6

IV. O_3

V. PCl_5

23. Which of the molecules obeys the octet rule?
A) I
B) II
C) III
D) IV
E) V

24. Which of the following has an incomplete octet in its Lewis structure?
A) I
B) II
C) III
D) IV
E) V

25. Choose the electron dot formula that most accurately describes the bonding in CS_2. (*Hint:* Consider formal charges.)
A) 
B) 
C) 
D) 
E) 

26. Using the following data reactions:

	$\Delta H°$ (kJ)
$H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$	-184
$H_2(g) \rightarrow 2H(g)$	432
$Cl_2(g) \rightarrow 2Cl(g)$	239

calculate the energy of an H–Cl bond.

A) 770 kJ
B) 856 kJ
C) 518 kJ
D) 326 kJ
E) 428 kJ

27. Using the following bond energies:

Bond	Bond Energy (kJ/mol)
C≡C	839
C-H	413
O=O	495
C=O	799
O-H	467

estimate the heat of combustion for 1 mol of acetylene:

$C_2H_2(g) + 5/2O_2(g) \rightarrow 2CO_2(g) + H_2O(g)$

A) 1228 kJ
B) –1228 kJ
C) –447 kJ
D) +447 kJ
E) +365 kJ

Answers:

1. E 2. B 3. C 4. B 5. B 6. A 7. D 8. D 9. A 10. D 11. E 12. E

13. A 14. E 15. B 16. A 17. C 18. C 19. D 20. B 21. B 22. C 23. D 24. A

25. A 26. E 27. B