Chapter 12 Review 2

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

1. A mutual electrical attraction between the nuclei and valence electrons of different atoms that binds the atoms together is called a(n)
   a. dipole.
   b. Lewis structure.
   c. chemical bond.
   d. London force.

2. The electrons involved in the formation of a chemical bond are called
   a. dipoles.
   b. *s* electrons.
   c. Lewis electrons.
   d. valence electrons.

3. A chemical bond resulting from the electrostatic attraction between positive and negative ions is called a(n)
   a. covalent bond.
   b. ionic bond.
   c. charged bond.
   d. dipole bond.

4. If two covalently bonded atoms are identical, the bond is
   a. nonpolar covalent.
   b. polar covalent.
   c. nonionic.
   d. coordinate covalent.

5. If the atoms that share electrons have an unequal attraction for the electrons, the bond is called
   a. nonpolar.
   b. polar.
   c. ionic.
   d. dipolar.

6. A covalent bond results when ____ are shared.
   a. ions
   b. Lewis structures
   c. electrons
   d. dipoles

7. Nonpolar covalent bonds are not common because
   a. one atom usually attracts electrons more strongly than the other.
   b. ions always form when atoms join.
   c. the electrons usually remain equally distant from both atoms.
   d. dipoles are rare in nature.

8. The greater the electronegativity difference between two bonded atoms, the greater the percentage of
   a. ionic character.
   b. covalent character.
   c. metallic character.
   d. electron sharing.

9. The pair of elements that forms a bond with the least ionic character is
   a. Na and Cl.
   b. H and Cl.
   c. O and Cl.
   d. Br and Cl.

10. In which of these compounds is the bond between the atoms NOT a nonpolar covalent bond?
    a. Cl_2
    b. H_2
    c. HCl
    d. O_2

11. Bond energy is the energy
    a. required to break a chemical bond.
    b. released when a chemical bond breaks.
    c. required to form a chemical bond.
    d. absorbed when a chemical bond forms.

12. In a molecule of fluorine, the two shared electrons give each fluorine atom ____ electron(s) in the outer energy level.
    a. 1
    b. 2
    c. 8
    d. 32

13. The octet rule states that chemical compounds tend to form so that each atom has an octet of electrons in
    a. its highest occupied energy level.
    b. the 1*s* orbital.
    c. its *d* orbitals.
    d. its *p* orbitals.

14. The electron configuration of nitrogen is $1s^2\ 2s^2\ 2p^3$. How many more electrons does nitrogen need to satisfy the octet rule?
    a. 1
    b. 3
    c. 5
    d. 8

15. The elements of the ____ group satisfy the octet rule without forming compounds.
    a. main
    b. noble gas
    c. alkali metal
    d. alkaline-earth metal

16. When the octet rule is satisfied, the outermost ____ are filled.
    a. *d* and *f* orbitals
    b. *s* and *p* orbitals
    c. *s* and *d* orbitals
    d. *d* and *p* orbitals

17. In drawing a Lewis structure, the central atom is the
    a. atom with the greatest mass.
    b. atom with the highest atomic number.
    c. atom with the fewest electrons.
    d. least electronegative atom.

18. After drawing a Lewis structure, one should
    a. determine the number of each type of atom in the molecule.
    b. add unshared pairs of electrons around nonmetal atoms.
    c. determine the total number of valence electrons in each atom.
    d. determine the electronegativity of each atom.

19. To draw a Lewis structure, it is NOT necessary to know
    a. bond energies.
    b. the types of atoms in the molecule.
    c. the number of valence electrons for each atom.
    d. the number of atoms in the molecule.

20. The substance whose Lewis structure shows three covalent bonds is
    a. H_2O.
    b. CH_2Cl_2.
    c. NH_3.
    d. CCl_4.

21. How many electrons must be shown in the Lewis structure of the hydroxide ion, OH^-?
    a. 1
    b. 8
    c. 9
    d. 10

22. Bonding in molecules or ions that cannot be correctly represented by a single Lewis structure is
    a. covalent bonding.
    b. resonance.
    c. single bonding.
    d. double bonding.

23. In a crystal of an ionic compound, each cation is surrounded by
    a. molecules.
    b. positive ions.
    c. dipoles.
    d. anions.

24. VSEPR theory is a model for predicting
    a. the strength of metallic bonds.
    b. the shape of molecules.
    c. lattice energy values.
    d. ionization energy.

25. According to VSEPR theory, the electrostatic repulsion between electron pairs surrounding an atom causes
    a. an electron sea to form.
    b. positive ions to form.
    c. these pairs to be separated as far as possible.
    d. light to reflect.

26. That the boiling point of water (H_2O) is higher than the boiling point of hydrogen sulfide (H_2S) is partially explained by
    a. London forces.
    b. covalent bonding.
    c. ionic bonding.
    d. hydrogen bonding.

Problem

27. a. Draw a Lewis structure for the ammonium ion, NH_4^+.

28. a. Draw a Lewis structure for the nitrate ion, NO_3^-.

29. a. Draw a Lewis structure for the sulfate ion, SO_4^{2-}.

Answers:

1) C	5) B	9) D	13) C	17) B	21) B	25) C
2) D	6) C	10) C	14) A	18) D	22) B	26) D
3) B	7) A	11) C	15) B	19) A	23) D	
4) A	8) A	12) A	16) B	20) C	24) B	