CHAPTER 12 REVIEW

Liquids and Solids

SECTION 12-1

SHORT ANSWER  Answer the following questions in the space provided.

1. ________________  List the following attractive forces in order of increasing strength:
   (a) hydrogen bonding    (c) ionic bonding
   (b) London dispersion forces    (d) dipole-dipole forces

2. _____  All of the following statements about liquids and gases are true except _____.
   (a) Molecules in a liquid are much more closely packed than molecules in a gas.
   (b) Molecules in a liquid can vibrate and rotate, but they cannot move about freely as molecules in a gas.
   (c) Liquids are much more difficult to compress into a smaller volume than are gases.
   (d) Liquids diffuse more slowly than gases.

3. _____  Liquids posses all the following properties except _____.
   (a) relatively low density    (c) relative incompressibility
   (b) the ability to diffuse    (d) the ability to change to a gas

4. a. Chemists distinguish between intermolecular and intramolecular forces. Explain the difference between these two types of forces.

   Classify each of the following as intramolecular or intermolecular:
   ________________  b. hydrogen bonding in liquid water
   ________________  c. the O—H covalent bond in methanol, CH₃OH
   ________________  d. the bonds that cause gaseous Cl₂ to become a liquid when cooled

5. Explain at the molecular level the following properties of liquids:
   a. A liquid takes the shape of its container but does not expand to fill its volume.
b. Polar liquids are slower to evaporate than nonpolar liquids.

c. Most liquids are much denser than their corresponding gases.

6. Explain briefly why liquids tend to form spherical droplets, decreasing surface area to the smallest size possible.

7. Is freezing a chemical change or a physical change? Explain your answer.
SECTION 12-2

SHORT ANSWER  Answer the following questions in the space provided.

1. Match the following descriptions on the right to the crystal type on the left.

   _____ ionic crystal  (a) has mobile electrons in the crystal
   _____ covalent molecular crystal  (b) is hard, brittle, and nonconducting
   _____ metallic crystal  (c) typically has the lowest melting point of the four crystal types
   _____ covalent network crystal  (d) has strong covalent bonds between neighboring atoms

2. For each of the four types of solids, give a specific example other than those listed in Table 12-1 on page 370 of the text.

   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________

3. A chunk of solid lead is dropped into a pool of molten lead. The chunk sinks to the bottom of the pool. What does this tell you about the density of the solid lead compared with the density of the molten lead?

   ___________________________________________________________
   ___________________________________________________________

4. Answer solid or liquid to the following questions:

   _______________________  a. Which is more incompressible?
   _______________________  b. Which is quicker to diffuse into neighboring media?
   _______________________  c. Which has a definite volume and shape?
   _______________________  d. Which has molecules that are primarily rotating or vibrating in place?
SECTION 12-2 continued

5. Explain at the molecular level the following properties of solids:
   a. Solid metals conduct electricity well, but network solids do not.

b. Almost all solids are denser than their liquid state.

c. Amorphous solids do not have a definite melting point.

d. Ionic crystals are much more brittle than covalent molecular crystals.

6. Experiments show that it takes 6.0 kJ of heat energy to melt 1 mol of ice at its melting point but only about 0.6 kJ to melt 1 mol of methane, CH₄, at its melting point. Explain in terms of intermolecular forces why it takes so much less energy to melt the methane.