Chapter 13

1. Would each of the following be true or false? If false, tell why.

   _____a) Liquids have a greater density than their corresponding solids.
   _____b) Solids have fixed shape while liquids do not.
   _____c) Solids and liquids will both expand and contract considerably.
   _____d) A liquid’s ability to flow is called its vapor pressure.
   _____e) Surface tension is greater when the intermolecular attractions are stronger.
   _____f) Vapor pressure is greater when the intermolecular attractions are stronger.
   _____g) When water freezes it expands slightly due to empty cavities in its solid structure.
   _____h) Water is a bent shape and is polar.
   _____i) The melting point and boiling point of water are lower than expected due to dipole forces.
   _____j) The density of ice is greater than that of liquid water.

2. For each substance below, tell what intermolecular attractions are present. Also compare relative vapor pressure, boiling point, viscosity and surface tension (put in order from low to high for each property). Note: For those substances with the same attractions, assume they are = to each other and group them together in your relative ranking:

   SUBSTANCE                         TYPE OF ATTR ACTIONS
   a) pentane, C₅H₁₂
   b) ethanol C₂H₅OH
   c) bromine Br₂
   d) ammonia NH₃
   e) sulfur dioxide SO₂ (polar)

   RANKING FOR PROPERTIES:
   Vapor Pressure
   Boiling Point
   Viscosity
   Surface Tension
3. Categorize each of the following as either ionic, molecular or metallic crystalline solids:

a) C<sub>graphite</sub>(s)  b) Cu(s)  c) K<sub>2</sub>O(s)  d) H<sub>2</sub>O(s)  e) S<sub>8</sub>(s)  f) CuO(s)  g) CO<sub>2</sub>(s)

Chapter 14:

4. Classify the following liquids as either polar or nonpolar solvents:

a) acetone C<sub>3</sub>H<sub>6</sub>O  b) heptane C<sub>7</sub>H<sub>16</sub>  c) acetic acid HC<sub>2</sub>H<sub>3</sub>O<sub>2</sub>  d) pentane C<sub>5</sub>H<sub>12</sub>

5. Tell if the following pairs of substances will form solutions. Use “miscible” or “immiscible” for two liquids and “soluble” and “insoluble” for a solid in a liquid.

a) toluene C<sub>7</sub>H<sub>8</sub>(l) and hexane C<sub>6</sub>H<sub>14</sub>(l) _____________________________

b) glycerine C<sub>3</sub>H<sub>5</sub>(OH)<sub>3</sub>(l) and toluene C<sub>7</sub>H<sub>8</sub>(l) _____________________________

c) NaOH(s) and hexane C<sub>6</sub>H<sub>14</sub>(l) _____________________________

d) MgSO<sub>4</sub>(s) and glycerine C<sub>3</sub>H<sub>5</sub>(OH)<sub>3</sub>(l) _____________________________

e) glycerine C<sub>3</sub>H<sub>5</sub>(OH)<sub>3</sub>(l) and water _____________________________

6. The solubility of sucrose is 92g /100g water at 0°C, 130g/100g water at 50°C, and 150g/100g water at 58°C. Determine if each of the following would be unsaturated, saturated or supersaturated.

a) 409g sucrose in 444g water at 0°C _____________________________

b) 409g sucrose in 444g water at 50°C _____________________________

c) 361g sucrose in 369g water at 0°C _____________________________

d) 1500g sucrose in 1050g water at 58°C _____________________________

e) 1500g sucrose in 1050g water at 50°C _____________________________

7. A glucose solution contains 7.93g of glucose dissolved in 89.5g of water. What is %Mass of the solution?

8. What mass (in g) of a 15.0% NaOH solution would contain 50.0g of NaOH solute?

9. How many moles (and grams) of KOH would be in 450.0mL of a 1.5M KOH solution?

10. What is the molarity of a solution containing 68.9g of Ca(OH)<sub>2</sub> dissolved to make 500.0mL of solution?

11. If 50.0mL of a 9.0M NaOH solution were diluted to 1100.0mL, what is the final molarity?