Homework #7

You must show your entire work on a separate sheet(s) of paper to get full credit.

Chapter 7

1. a. 

<table>
<thead>
<tr>
<th>Molarity</th>
<th>Moles</th>
<th>Vol(L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0951</td>
<td>0.424</td>
<td></td>
</tr>
</tbody>
</table>

b. 

<table>
<thead>
<tr>
<th>Molarity</th>
<th>Moles</th>
<th>Vol(L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.545</td>
<td></td>
<td>2.98</td>
</tr>
</tbody>
</table>

c. 

<table>
<thead>
<tr>
<th>Molarity</th>
<th>Moles</th>
<th>Vol(L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.273</td>
<td></td>
<td>1.03</td>
</tr>
</tbody>
</table>

d. 

<table>
<thead>
<tr>
<th>Molarity</th>
<th>Moles</th>
<th>Vol(L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.774</td>
<td></td>
<td>3.71</td>
</tr>
</tbody>
</table>

2. a. What is the molarity of a solution of calcium chloride which contains 33500 mg of solute in a total volume of 0.352L?

b. What is the molarity of a solution of LiI which contains 26800 mg of solute in a total volume of 0.282L?

c. What is the molarity of a solution of calcium chloride which contains 0.440 moles of solute in a total volume of 0.872L?

3. a. How many mL of solvent should be added to 0.99L of a 1.5M solution if you want a final concentration of 0.74M?

b. 0.096L of a 2.9M solution is diluted to a final volume of 250mL. What is the resultant molarity?

c. How many L of solvent should be added to 0.77L of a 1.0M solution if you want a final concentration of 0.45M?

4. Indicate whether following reactions is a strong, weak, or nonelectrolyte represented in the following equations:

a. \( \text{K}_2\text{SO}_4(\text{s}) \) (in H\(_2\)O) \( \rightarrow \) \( 2\text{K}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \)

b. \( \text{NH}_4\text{OH}(\text{aq}) \) (in H\(_2\)O) \( \Leftrightarrow \) \( \text{NH}_4^+ (\text{aq}) + \text{OH}^- (\text{aq}) \)

c. \( \text{C}_6\text{H}_12\text{O}_6(\text{s}) \) (in H\(_2\)O) \( \rightarrow \) \( \text{C}_6\text{H}_12\text{O}_6(\text{aq}) \)

d. \( \text{MgCl}_2(\text{s}) \) (in H\(_2\)O) \( \rightarrow \) \( \text{Mg}^{2+}(\text{aq}) + 2\text{Cl}^-(\text{aq}) \)
5. Suppose you put a piece of a solid into a beaker that contains water and stir the mixture briefly. You find that the solid does not immediately dissolve completely. Describe three things you might do to try to get the solid to dissolve.

6. Classify the following as being a solution or not a solution. Explain your reasons when you classify one as not a solution. For the ones classified as solutions, identify the solvent and solute(s).
   a. maple syrup  b. milk  c. eye drops  d. tomato juice  e. tap water

7. Calculate the concentration in %(m/m), %(v/v), or %(m/v) respectively in the following solutions:
   a. A 50.0 ml solution sample with a density of 0.898 g/ml leaves 12.6 g of solid residue when evaporated.
   b. A solution of acetone and water is separated by distillation. A 300 ml sample gives 109 ml of acetone.
   c. 28.0 g of solute is dissolved in 200 ml of water to give a solution with a density of 1.10 g/ml.

8. How many milliliters of 6.00 M HCl solution would be needed to react exactly with 20.0 g of pure solid NaOH?

   \[ \text{HCl}(aq) + \text{NaOH}(s) \rightarrow \text{NaCl}(aq) + \text{H}_2\text{O}(l) \]

9. An ingredient found in some antacids is magnesium hydroxide, Mg(OH)\(_2\). Calculate the number of grams of Mg(OH)\(_2\) needed to react exactly with 250 ml and 0.10 M concentration of stomach acid (in this case HCl).

   \[ \text{Mg(OH)}_2(s) + 2\text{HCl}(aq) \rightarrow \text{MgCl}_2(aq) + 2\text{H}_2\text{O}(l) \]

10. The blood serum acetone level for a person is determined to be 1.8 mg of acetone per 100 ml of serum. Express this concentration as %(v/v) if liquid acetone has a density of 0.79 g/ml.