Homework #7

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

Chapters 7&10

1. a. What is organic chemistry?
   b. What are hydrocarbons?
   c. What is the system that names organic compounds in chemistry?

2. Which of the following are organic compounds?
   a. NH$_3$  b. C$_6$H$_{12}$O$_6$  c. NaCl  d. CH$_2$Cl$_2$

3. What is the IUPAC name for a,b,c and the common name of c?

   a. \[
   \begin{align*}
   \text{CH}_3 &- \text{CH}_2 - \text{CH} - \text{CH}_2 - \text{CH} - \text{CH}_3 \\
   \text{CH}_3 &- \text{CH}_2 - \text{CH} - \text{CH}_2 - \text{CH} - \text{CH}_3 \\
   \text{Br} &
   \end{align*}
   \]

   b. \[
   \begin{align*}
   \text{CH}_3 &- \text{CH}_2 - \text{CH} - \text{CH}_2 - \text{CH} - \text{CH}_3 \\
   \text{CH}_3 &- \text{CH}_2 - \text{CH} - \text{CH}_2 - \text{CH} - \text{CH}_3 \\
   \text{CH}_3 &
   \end{align*}
   \]

   c. CH$_3$–CH$_2$–Cl

4. There are two isomers corresponding to the chemical formula C$_2$H$_6$O. One is an alcohol, and the other is an ether. (hint use the table of electronegativity)
   a. Draw each compound.
   b. Which compound would you expect to be more water soluble, and why?
   c. Which compound would you expect to have the higher boiling point, and why?

5. Draw the structures of a three-carbon chain structure with following functional groups.
   a. An alcohol
   b. A carboxylic acid
   c. An aldehyde
   d. An amine

6. Write the condensed structural formula for each of the following molecules:
   a. ethylcyclopropane  b. methylcyclohexane  c. 1,3-dichloro-3-methylheptane
7. a. | Molarity | Moles | Vol(L) |
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>0.0951</td>
<td>0.424</td>
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b. | Molarity | Moles | Vol(L) |
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<tbody>
<tr>
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<td>2.98</td>
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c. | Molarity | Moles | Vol(L) |
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<td>1.03</td>
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d. | Molarity | Moles | Vol(L) |
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<tr>
<td>0.774</td>
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<td>3.71</td>
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8. 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?

9. 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?

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

   a. $\text{K}_2\text{SO}_4(s) \text{ (in H}_2\text{O)} \rightarrow 2\text{K}^+(aq) + \text{SO}_4^{2-}(aq)$
   b. $\text{NH}_4\text{OH(aq)} \text{ (in H}_2\text{O)} \rightleftharpoons \text{NH}_4^+(aq) + \text{OH}^-(aq)$
   c. $\text{C}_6\text{H}_12\text{O}_6(s) \text{ (in H}_2\text{O)} \rightarrow \text{C}_6\text{H}_12\text{O}_6(aq)$
   d. $\text{MgCl}_2(s) \text{ (in H}_2\text{O)} \rightarrow \text{Mg}^{2+}(aq) + 2\text{Cl}^-(aq)$