Due Wednesday December 7, 2011. Show all work to receive credit.

1. Identify which of the following molecular solids will exhibit dipole-dipole intermolecular forces. There may be more than one answer, you must provide a Lewis or VSEPR structure for each in support of your answers.

   Molcular compounds: a) NH_3, b) BF_3, c) I_2, d) H_2S

2. The following molecules are gases a room temperature: Ne, N_2, O_2, Cl_2, and SiH_4. Which one will have the highest boiling point? **Provide a rationale for your answer.**

3. Arrange KCl, CH_3, CH_3CH_2OH, C_3H_8, and He in order of **increasing** boiling point. You must state which intermolecular forces are present in each.

4. Draw Lewis structures for each of the following molecules and indicate which ones will form hydrogen bonds. H_2SO_4, HF, CH_3OH (methanol), and CH_2O (formaldehyde).

   5. In the unit cell below, element X is within the cell and element Y is at the corners. What is the formula for this compound? Show how you arrived at your choice.
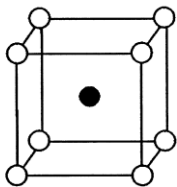
        a) XY,   b) XY$_2$, c) XY$_4$, d) X$_2$Y, e) none of these

6. How many sigma (σ) and how many (π) bonds are in the following molecule. Also state the hybridization of each carbon atom.
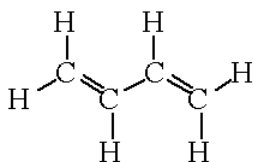
7.   In general, which of the following types of solids would be the most soluble in carbon disulfide, CS$_2$?   ***Provide a rationale for your answer.***
     A) ionic
     B) polar molecular
     C) nonpolar molecular
     D) network covalent
     E) metallic

8.   Which for the following pure liquids is the best solvent for sodium fluoride?   BCl$_3$(l) , CCl$_4$(l), PCl$_5$(l), C$_2$Cl$_6$(l), HCl(l). You must provide a rationale for your answer.

9. How many grams of urea, CO(NH$_2$)$_2$, must be dissolved in 56.9 g of water to give a 1.8 molal (m) solution? Show all calculations.

10. What is the mass percent of an aqueous sodium hydroxide solution in which the molarity (M) of NaOH is 4.37 M? The density of the solution is 1.1655 g/mL.