Name: _____ Date: _____

Unit 3.1
Intermolecular Forces

1. For each pair of compounds listed below, identify the compound that has the highest boiling point. Justify your choice in terms of intermolecular forces.
   (a) Br_2 and I_2

   (b) NH_3 and NCl_3

   (c) CH_4 and CCl_4

   (d) He and Ar

   (e) Cl_2 and H_2

   (f) NH_3 and PH_3

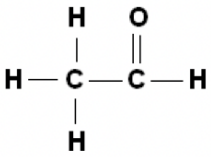
   (g) C_2H_6 and C_4H_{10}

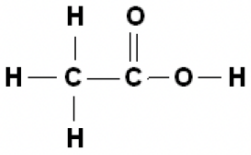
2. Explain why Cl_2 is a gas and Br_2 is a liquid at 25˚C and 1 atm.

3. Explain why H_2 is a gas and I_2 is a solid at 25˚C and 1 atm.

4. Explain why propane, C_3H_8, is a gas and decant, $C_{10}H_{22}$, is a liquid at 25˚C and 1atm.

5. The structures for ethanal, C_2H_4O, and ethanoic acid, CH_3COOH, are shown below.



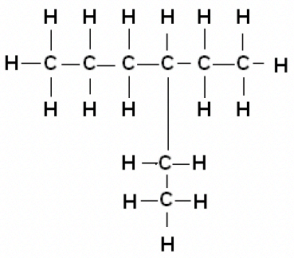


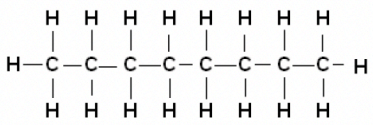
   (a) Identify the types of intermolecular forces that exist in a pure sample of ethanal.

   (b) Identify the types of intermolecular forces that exist in a pure sample of ethanoic acid.

6. Explain why oxygen gas, O_2, is able to dissolve in water.

7. The two molecules below are isomers - meaning that they have the same number of each type of atom but have different structures. A pure sample of which liquid would have the highest boiling point? Justify your answer.

i. 

ii. 

8. Which gas is more soluble in water: He(g) or CO(g)? Justify your answer.

9. Draw the complete Lewis diagrams, showing all lone pairs, for water and ammonia in an orientation that allows for a hydrogen bond. Use a line to indicate the location of the hydrogen bond.