

## Problem Set 11: Intermolecular Forces of Attraction and Heating Curves

- Ethanol molecules ( $\text{CH}_3\text{CH}_2\text{OH}$ ) are capable of hydrogen bonding to one another, but dimethyl ether molecules ( $\text{CH}_3\text{OCH}_3$ ) are not. Given this information, complete a-d below.
  - Draw a Lewis structure for each molecule.
  - Use your drawings from (a) to explain why only ethanol can form hydrogen bonds.
  - Draw two molecules of ethanol and show a hydrogen bond using a dotted line.
  - Which substance do you expect to have the higher boiling point?
- Identify the intermolecular forces of attraction in each of the following substances.
  - $\text{N}_2$
  - $\text{NH}_3$
  - $\text{CCl}_4$
- Ethanol has a melting point of  $-117\text{ }^\circ\text{C}$  and a boiling point of  $78\text{ }^\circ\text{C}$ . Draw a heating curve for ethanol, and label the line that represents the melting point, boiling point, and solid, liquid and gaseous states.