Intermolecular Forces II
Worksheet

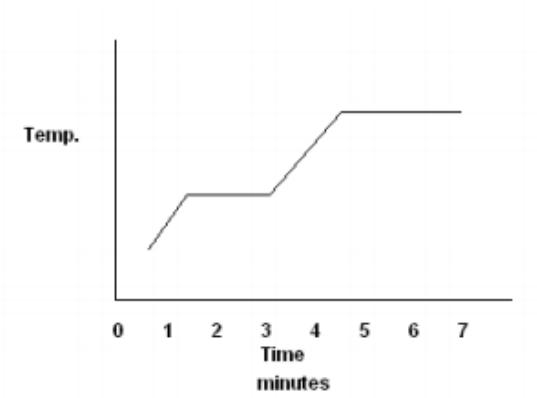
1) Explain why the standard enthalpy of vaporization, ΔH_{vap}, values for each set of compounds below are not the same.
   a. CH_4 and H_2O
   b. PH_3 and NH_3
   c. C_2H_6 and C_3H_8
   d. BH_3 and OF_2

2) Classify each of the following processes as a physical change, a chemical change, or both. Justify your answer by identifying the types of intermolecular or intramolecular forces that are involved in each of the following processes and describing what happens to those forces while the processes are occurring.
   a. $CO_2(s) \rightarrow CO_2(g)$
   b. $CO_2(g) \rightarrow C(s) + O_2(g)$
   c. $NH_2F(l) \rightarrow NH_2F(g)$
   d. $NaCl\ (s) \rightarrow Na^+(aq) + Cl^-(aq)$
   e. $NH_2F(l) \rightarrow \frac{1}{2}\ N_2(g) + H_2(g) + \frac{1}{2}\ F_2(g)$
   f. $H_2O(s) \rightarrow H_2O(l)$

3) Explain why the temperature of a liquid remains constant while it is being boiled, although heat continues to be absorbed. Describe what happens to the heat that is absorbed.

4) Explain why the boiling point of water decreases as elevation increases.

5) The following graph shows the plot of temperature versus time as heat is added to a pure substance.

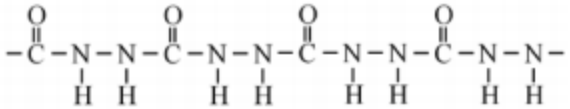


a. During what period of time was the substance at its normal freezing point?
b. Over what period of time was the substance boiling?
c. What is happening to the substance between the 1 and 1.5 minute marks?
d. What is happening to the substance between the 2 and 3 minute marks?

e. What is happening to the substance between the 3.5 and 4.5 minute marks?
f. What is happening to the substance between the 5 and 7 minute marks?

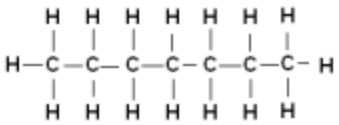
6) At -92°C, a pure sample of HBr has a higher vapor pressure than a pure sample of KBr.
   a. Create visual representations that show the interactions between the particles in both samples during vaporization.
   b. Explain why the vapor pressure of HBr is higher than the vapor pressure of KBr at -92°C.

7) Nylon is made up of long synthetic polymers that interact with one another. The Lewis structure for a section of a nylon polymer is shown below. Explain why nylon is such a strong material in terms of the interactions between adjacent polymers. Use a diagram to help with your explanation.

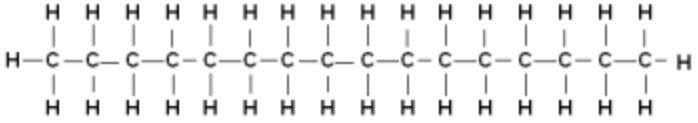


8) The following question pertains to pure samples of the compounds below. Both samples are liquids at 25°C. Which sample would have the highest viscosity at 25°C?

i.



ii.



9) Water beads up on the hood of a freshly waxed car. Explain why this happens. Use a particulate model to assist with your explanation. Refer to the strengths and types of intermolecular forces that are present.

10) Is the surface tension of water greater than, equal to, or less than that of methane, CH_4, at 15.0°C? Justify your answer.

11) If a glass tube with a small diameter is placed in water, water rises up the tube. Explain why this happens. Use a diagram to assist with your explanation.