

Worksheet 4

1. Identify the types of intermolecular forces present in each of the following substances, and select the substance in the pair that has the higher boiling point. a) C_6H_{14} or C_8H_{18} , b) C_3H_8 or CH_3OCH_3 , c) $HOOH$ or $HSSH$, d) NH_2NH_2 or CH_3CH_3 .
2. The fluorocarbon compound $C_2Cl_3F_3$ has a normal boiling point of $47.6\text{ }^\circ\text{C}$. The specific heats of $C_2Cl_3F_3$ (l) and $C_2Cl_3F_3$ (g) are $0.91\text{ J/g}\cdot\text{K}$ and $0.67\text{ J/g}\cdot\text{K}$, respectively. The heat of vaporization for the compound is 27.49 kJ/mol . Calculate the heat required to convert 25.0 g of $C_2Cl_3F_3$ from a liquid at $5.00\text{ }^\circ\text{C}$ to a gas at $82.00\text{ }^\circ\text{C}$.
3. PCl_3 and $AsCl_3$ are similar substances with similar geometries and bonding modes. Give a brief explanation with your answers to the following: a) Which of the two substances would you expect to be more volatile at room temperature? b) Which substance would you expect to have the higher boiling point? c) Which substance would have the greater average kinetic energy at $40\text{ }^\circ\text{C}$? d) In which substance would you expect the intermolecular forces to be larger?
4. a) When you exercise vigorously you sweat. How does this help your body cool? b) A flask of water is connected to a vacuum pump. A few moments after the pump is turned on the water begins to boil. After a few minutes the water begins to freeze. Explain why these processes occur.