CLAS Chem 1C  Ch 16 Liquids and Solids (16.1,2,10,11)

1. Indicate the types of intermolecular forces present for each of the following:

   a. BH₃
   b. HF
   c. NH₄Br
   d. Ar
   e. H₂S
   f. SO₂
   g. H₂CO

2. Pick the best answer:

   a. Highest melting point  Br₂  Cl₂  I₂
   b. Lowest freezing point  NaCl  CO₂  CH₃OH
   c. Highest boiling point  H₂O  H₂S  H₂Se
   d. Highest vapor pressure  CH₄  CH₂Cl₂  CH₂F₂
   e. Greatest ΔH_{vaporization}  CH₄  NH₃  SO₂
   f. Greatest viscosity  CH₃CH₂CH₃  CH₃CH₂CH₂CH₂CH₃  CH₃CHCH₂CH₃CH₃
3. The enthalpy of vaporization of water is 40.7 kJ/mole.

a. What is the vapor pressure of water at 25 °C?

b. On top of a mountain, the atmospheric pressure is 0.75 atm. What is the boiling point of water at this location?

4. Consider the following phase diagrams for water and carbon dioxide, respectively. Which phase is the most dense for each substance? How does pressure affect the MP and BP for each substance?
5. How much energy does it take to convert 180 g of ice at -20.0 °C to steam at 150 °C?
(Specific heat capacities: ice, 2.1 J/g°C; liquid, 4.2 J/g°C; vapor, 2.0 J/g °C, \( \Delta H_{vap} = 40.7 \text{ kJ/mol} \), 
\( \Delta H_{fusion} = 6.02 \text{ kJ/mol} \))

6. Determine the final temperature if a 25 g cube of ice at -7 °C is placed in 180 g of water at 64 °C and allowed to come to equilibrium.
Equations

\[
\ln \left( \frac{P_2}{P_1} \right) = -\frac{\Delta H^o}{R} \left( \frac{1}{T_2} - \frac{1}{T_1} \right)
\]

\[q = m \ C \ \Delta T\]

\[q = n \ \Delta H\]