CHM 1046 Ch 11 Homework

1. Review Example 11.01. Determine the quantity of heat that must be removed from water (18.0 g/mole) in order to freeze 189.0 g into ice at 0 ^{o}C, where the heat of fusion for water is 6.01 kJ/mol. Then, use the Molar Enthalpies of Vaporization table in the class notes to determine the enthalpy of vaporization (kJ/mol) for CCl_2F_2. Use that value to determine the quantity of CCl_2F_2 (120.9 g/mole) in moles and in grams that must be evaporated to remove the heat. Show all equations, units, and conversion factors. (2 pts)

2. Review Example 11.02. Use the Molar Enthalpies of Vaporization table in the class notes to determine the normal boiling point and enthalpy of vaporization for carbon disulfide (CS_2). Then, use the Clausius-Clapeyron equation to determine the vapor pressure at 35.0 ^{o}C in both atm and mmHg. Show all equations, units, and conversion factors. Also, include conversions between J and kJ, as well as between ^{o}C and K. (2 pts)

3. Review the phase diagram for water in the chapter notes and in Figure 10.31.
   Name the two phases which meet at 0 ^{o}C and 1.0 atm (101 kPa) on the diagram, and the two phase changes that happen on this line. Do the same for 100 ^{o}C and 1.0 atm.
   Determine what phase water will have at − 10 ^{o}C and 1.0 atm.
   Determine what phase water will have at 110 ^{o}C and 1.0 atm.
   Answer each part with a complete sentence. (2 pts)

4. Review the phase diagram for CO_2 in the chapter notes and in Figure 10.34.
   Examine the triple point for carbon dioxide in its phase diagram.
   Explain, in terms of that triple point, why CO_2 cannot be a liquid at 2.0 atm (202 kPa).
   Determine what phase CO_2 will have at 2.0 atm and − 78 ^{o}C.
   Determine the new phase if CO_2 is kept at 2.0 atm while warmed to 0 ^{o}C.
   Finally, determine the phase again if CO_2 is kept at 0 ^{o}C, but pressurized to 10,000 kPa.
   Answer each part with a complete sentence. (2 pts)

5. Review the phase diagram for sulfur, where the y-axis (P) is in bars (1.0125 bar = 1 atm).
   Explain what a triple point is and, then, explain if its three phases need to be solid, liquid, and gas all together.
   Determine what three phases can exist for S at 95.6 ^{o}C and 3.8 $\times 10^{-6}$ bar.
   Determine what three phases can exist for S at 119.6 ^{o}C and 1.8 $\times$ 10^{-5} bar.
   Determine what three phases can exist for S at 154 ^{o}C and 1400 bar.
   Answer each part with a complete sentence. (2 pts)