Thermodynamics Worksheet #1
SCH 4U

1. Steam at 150 °C is slowly cooled to ice to −20 °C. Sketch a heating/cooling curve for this process (vertical axis is temperature, horizontal is heat). If 35 g of ice forms, calculate the total heat involved (note that this is a six step problem). Use specific heat capacities tabulated on page 799 and latent heats found on page 307 for your calculations. After you have completed this, make an accurate graph of temperature versus heat released for this problem.

2. 25 g of gold heated to 800 °C is placed in 200 mL of H_2O at 10 °C. Determine the final temperature of both gold and water after thermal equalization has occurred.

3. Determine how many grams of steam are formed if 120 kcal of heat is added to 0.750 L of water at an initial temperature of 15 °C.

4. 32 g of an unidentified metal is placed in 500 mL of water. The initial temperature of the metal was 100.00 °C and the initial temperature of the water was 20.00 °C. After thermal equilibrium is reached, both the metal and the water are at 20.468 °C Find the specific heat capacity of the metal and identify the metal from the list on page 799.

5. Show a heating curve for the conversion of 355 g of ice at −25 °C to steam at 250 °C. Calculate the total amount of energy required do this by first calculating
   1. heat ice @ −25 °C to ice @ 0 °C
   2. ice @ 0 °C to water @ 0 °C
   3. water @ 0 °C to water @ 100 °C
   4. water @ 100 °C to steam @ 100 °C
   5. steam @ 100 °C to steam @ 250 °C

   The following data should be of assistance:

   Molar Heat of Fusion (melting) of Ice: 6.02 kJ/mol @ 0 °C
   Molar Heat of Vaporization of water: 40.6 kJ/mol @ 100 °C
   Specific Heat Capacity of Ice: 2.033 J/g°C
   Specific Heat Capacity of Water: 4.184 J/g°C
   Specific Heat Capacity of Steam: 2.010 J/g°C