## Thermochemistry Lab #4: Heat of Fusion; SC5 a, c

**Introduction**: The amount of energy required to convert a solid to a liquid, at constant pressure and temperature, is called the heat of fusion of the substance. In this experiment, the heat of fusion of ice will be determined. In this lab investigation, ice will be melted by placing it in a known volume of hot water contained in a plastic cup. The system will be left undisturbed until all the ice has melted. The amount of heat lost by the hot water in this process can be calculated according to the equations in your composition books. The purpose of this lab is to calculate the heat of fusion for a known substance and to apply thermochemical concepts.

## Procedure

- 1. Get 100.0 mL of water at the highest temperature you can out of the tap.
- 2. Place the water in a Styrofoam cup.
- 3. Measure the temperature of the water.
- 4. Simultaneously, the other partner should be getting a handful of ice cubes that need to be dried.
- 5. Place the ice cubes in the cup of hot water and wait until the ice cubes have completely melted.
- 6. Measure the final temperature.
- 7. Measure the total volume of the cool water.
- 8. Place all data in the table below.
- 9. For the masses: Assume that the density of water is 1.0 g/mL.

DATA TABLE:	
Initial mass of hot water.	g
Initial temperature of hot water.	°C
Final temperature of water and melted ice.	°C
Final mass of water and melted ice.	g
Change in Temp of Hot Water	°C
Change in Temp of Ice	<u>o</u> C
mass of ice added	g

## Calculations

1. Assuming that the heat gained by the ice  $(Q_{ice})$  is equal to the heat lost by the warm water  $(Q_{warm water})$  you can solve for the value of  $\Delta H$  for ice.

$$m_{ice} c\Delta T + \Delta H_{fus} m_{ice} = m_{warm water} c\Delta T$$

Where the left side of the equation represents the ice melting and then warming up to the final temperature and the right side represents the energy lost by the warm water.

Now solve for  $\Delta H_{\text{fus}}$  .

## Questions

- 1. The accepted value for the heat of fusion of water (ice) is  $334^{\text{ joules}}/\text{g}$ . What is your percentage of error?
- 2. What is the most important source of error?
- 3. What happened to the temperature of the ice as it was melting?