

## 6 • Energy and Chemical Reactions

### HEAT OF FUSION OF ICE

Since ice absorbs energy as it melts, we can measure this energy. Melting energy is called the **heat of fusion**,  $\Delta H_{\text{fus}}$ , for ice. (The name comes from the fact that to **fuse** two pieces of metal you must **melt** them.) You will melt a known amount of ice and see how much heat it absorbs. Heat of fusion is reported in kJ/mole.

#### Procedure:

1. Mass a dry styrofoam cup. Record.
2. Measure 50.0 mL of  $\sim 50^\circ\text{C}$  water into a styrofoam cup. Mass and record.
3. Using a thermometer, measure and record the temperature of the water.
4. Add 2-3 ice cubes to the water. Stir gently with the thermometer. *Before* the ice is completely melted, add another ice cube.
5. Continue adding ice cubes one at a time until the temperature plateaus. Record the final temperature.
6. Carefully pull out the remaining ice cubes, allow the liquid water on the ice to drip back into the cup. Mass and record.

#### DATA:

mass of empty dry cup \_\_\_\_\_  $\pm 0.01$  g  
 mass of cup with water \_\_\_\_\_  $\pm 0.01$  g  
 initial temperature of water \_\_\_\_\_  $\pm 0.1^\circ\text{C}$   
 final temperature of water \_\_\_\_\_  $\pm 0.1^\circ\text{C}$   
 mass of cup with melted ice \_\_\_\_\_  $\pm 0.01$  g

#### CALCULATIONS:

mass of water in cup \_\_\_\_\_ g  
 $\Delta T$  of water in cup \_\_\_\_\_  $^\circ\text{C}$   
 heat lost by water \_\_\_\_\_ kJ  
 heat absorbed by ice \_\_\_\_\_ kJ  
 mass of ice melted \_\_\_\_\_ g  
 moles of ice melted \_\_\_\_\_ moles  
 $\Delta H_{\text{fus}}$  ice \_\_\_\_\_ kJ/mol

#### Calculations and Questions:

1. What is your value for the heat of fusion of ice? \_\_\_\_\_
2. What is the accepted value for this quantity? \_\_\_\_\_
3. What is the % error in your data. \_\_\_\_\_
4. Why was  $50^\circ\text{C}$  water used as opposed to room temperature water? (Hint: Think of heat exchanges, room temperature, and final temperature.)

#### Sample Calculations:

On another sheet of paper, CLEARLY show how you arrived at each of the values in your calculation table. You should show enough work so someone who wanted to repeat your experiment would know how to calculate each value that you did.