Post-Laboratory Review Questions

Review the following data from a calorimetry experiment to determine the heat of fusion of ice. After shaking off any excess water, several ice cubes were added to 99 g of warm water contained in a calorimeter. The initial temperature of the warm water was 46.8 °C. The ice–water mixture was stirred until the temperature reached a stable, minimum value, which was 1.1 °C. Any *unmelted* ice remaining at this point was immediately and carefully removed using tongs and the mass of the water in the calorimeter was measured—154 g.

1. Use the heat energy equation to calculate the amount of heat in joules released by the warm water as it cooled.

2. Based on the law of conservation of energy, what amount of heat was absorbed by the ice as it melted?

3. Determine the amount of energy absorbed per gram of ice as it melted.

4. Calculate the heat of fusion (the heat required to melt ice) in units of kilojoules/mole.

5. The literature value for the heat of fusion of ice is 6.02 kJ/mole. What is the percent error for the experimentally determined heat of fusion?

6. When a mixture of ice and water originally at 0 °C is heated, the temperature remains constant (within experimental error) until all of the ice melts. Explain what happens to the heat energy that is absorbed during this time while the temperature does not change.