Introduction

In this experiment you will observe the change in heat content of a substance as it changes structure. The compound we will use is sodium thiosulfate pentahydrate. Its formula is $Na_2S_2O_3.5H_2O$. We will be breaking the bonds forming the crystal structure, changing the solid to a liquid.

Procedure

- 1) Get a test tube containing sodium thiosulfate from the lab bench.
- 2) Fill a medium sized beaker with cool tap water.
- 3) With the Bunsen burner on low, heat the solid very gently. Don't hold the test tube in the flame continuously. Move it in an out to keep the temperature low. We want to dissolve the Na₂S₂O₃ in its own water molecules, so it is imperative that you heat gently. Otherwise you may evaporate some of the H₂O molecules or decompose the sodium thiosulfate.
- 4) Make sure that all the solid is now liquid. Check the sides of the test tube for remaining solid crystals. When you have changed the substance into a liquid, place the test tube in the beaker filled with water to cool, and go back to your seat.
- 5) Now take the test tube out of the water, and dry it.
- 6) Feel the test tube. It should be at about room temperature.
- 7) Obtain a small crystal of the original solid from the lab bench and drop it into the test tube. Observe what happens. Feel the test tube for any change.

Questions:

- 1) Describe what happens to the substance in the test tube after you drop in the crystal.
- 2) What is it called when a substance goes from liquid to a solid?

- 3) List the phases of matter in order of increasing energy. In other words, which state of matter has molecules moving the slowest (low energy) and which state has molecules moving the fastest (high energy)?
- 4) Although you should have felt a temperature change, that does not mean that a chemical change has taken place. During this experiment a *physical* change occurred. The substance just went from a liquid to a solid. Try to explain why you observed such a temperature change. (Think in terms of the energy contained within each phase of matter - question #3)

5) For each phase change described below, indicate whether energy was absorbed in the process (endothermic) or if energy was released (exothermic).

Phase Change	_Endothermic or Exothermic
Ice melting	
A gas becoming a solid	
Water vapor condensing	
A solid going through sublimation	