

Measuring the Heat of Dissociation of NH_4Cl Activity

Step 1: Carefully weigh out 53.4 g (one mole) of ammonium chloride using the laboratory scale.

Step 2: Get exactly 200 mL (0.200 Kg) of lukewarm water at 8°C above room temperature. Add the water to your calorimeter and replace the lid. The temperature of the ammonium chloride and the calorimeter should be near or at room temperature. Take an initial temperature measurement of the water in your calorimeter and record it. (Note: Starting with water about 8°C above room temperature improves accuracy so that when the reaction is finished at about 8°C below room temperature, the calorimeter's losses to and gains from the environment equalize out and remove any systemic errors.)

Step 3: Add the 53.4 g of ammonium chloride to the calorimeter and replace the lid. Continue to stir gently through one of the holes in the lid of the calorimeter. Measure the temperature through the other hole every minute for approximately 10 minutes (or until the temperature has not changed for five minutes). All of the ammonium chloride should dissolve. Although you may want to open your calorimeter to check if the salt has dissolved, you should keep it closed as much as possible. You can tell if the powder has dissolved by looking through the hole, or by briefly opening the lid. Discuss with your group: What impact do you think opening the lid too much would have on your measurements?

Step 4: After you have recorded the final temperature, subtract it from the starting temperature. This is $\Delta T_{\text{solution}}$ or ΔT for short. In your notebooks, write down if you think there is a way to tell if all of the salt dissolved by looking at the temperature curve. What criteria would you use to decide if the reaction was complete?