

WOW, That's Hot and Cold!

Problem: Which of the chemical reactions made in this lab are endothermic & which are exothermic?

Hypothesis: _____.

Materials: Sodium thiosulfate crystals, ammonium chloride, concentrated acid source, water, 3 test tubes, test tube rack, heat source, thermometer, safety goggles (worn at all times).

Procedures:

1. Label a test tube #1. Fill a test tube nearly full a sodium thiosulfate crystal. Record the temperature. Add just enough drops of water to make the crystals look wet halfway up their height.
2. Now warm the tube gently, with steady swirling, over a burner flame. The wet crystals will melt rather readily. When the tube contents are fully liquid, and uniformly stirred so no concentration waves show, record the temperature.
3. Set the tube aside to cool (if care is used, it can even be cooled in cold water, though in this case premature crystallization may occur). We now have a supercooled liquid. Even though the liquid is far below the freezing point (or saturation temperature), the sodium thiosulfate will not readily crystallize unless some kind of nucleus is provided.
4. When the tube is cooled, drop a single crystal of sodium thiosulfate into the tube-it makes no difference how tiny. Immediately crystals will start spreading from this nucleus.
5. When the reaction is completed the tube will be hot. Record the temperature.
6. Label a test tube #2. Place 2 ml of tap water in the test tube. Add 10 drops of concentrated sulfuric acid (H_2SO_4) to the water. Feel the tube and record the temperature. Carefully wash off the thermometer with tap water.
7. Label a test tube #3. Place 1 spatula of ammonium chloride (NH_4Cl) in the test tube. Add 2 ml of water. Stopper and shake the test tube. Record any change in the temperature of the solution and discard the materials.

Conclusion Questions:

1. What is a chemical reaction?
2. What's a reactant, What's a product?
3. Name the four types of reactions.
4. What's an endothermic reaction?
5. What's an exothermic reaction?