

OBJECTIVES

1. To make a super saturated solution.
2. To observe crystal formation from a super saturated solution.

BACKGROUND INFORMATION

At 0°C about 80g of sodium acetate will dissolve to form a saturated solution (no more will dissolve). At 50°C approximately 136g of sodium acetate will dissolve to form a saturated solution. However, if this solution is cooled, the sodium acetate will stay in solution and it is called a super saturated solution. Disturbing the solution provides a site for nucleation – the sodium acetate rapidly recrystallises out of solution. The recrystallisation is an exothermic process meaning that heat is released.



MATERIALS

- ~100g TO 200g sodium acetate trihydrate
- Water
- 100mL measuring cylinder
- Electric balance
- 250mL beaker
- Glass stirring rod
- 250mL jar with lid for storage
- Heating mantle
- Refrigerator
- Small, clean petri dish

PROCEDURE

1. Fill the beaker with sodium acetate trihydrate.
2. Add <teaspoon of water.
3. Heat the liquid to near boiling while stirring in the sodium acetate trihydrate.
4. Add more water if needed, but only a small amount at a time.
5. Decant the liquid into the jar so that any undissolved crystals remain in the beaker.
6. Put the lid/stopper on the jar and store in the refrigerator until cool.
7. Pour the liquid into a petri dish.
8. Touch the top of the liquid with the tip of your finger.

QUESTIONS

1. Define a saturated solution. *A solution in which no more solute will dissolve at the same temperature.*
2. Define a supersaturated solution. *A saturated solution which has been cooled to a lower temperature without the solute coming out of solution.*
3. Describe the solution after it is removed from the refrigerator. *It is a clear supersaturated solution.*
4. Explain what happens after the liquid is touched with the tip of the finger. *It rapidly recrystallises so that the dish becomes filled with solid crystals.*

EXTENSION

Try the same process with copper sulphate, sodium chloride and other salts.

REAL WORLD APPLICATIONS

Heat compresses: As the sodium acetate crystallises it releases heat i.e. it is exothermic.

Buffering: Sodium acetate solution is used as a buffer in tanning, textiles, food processing, cosmetics and petroleum production. A buffer solution resists changes in pH as an acid or alkali are added to the solution.

CURRICULUM CONCEPTS ADDRESSED

R2.1—All chemical reactions involve energy transformations.

R2.2—The spontaneous directions of chemical reactions are towards lower energy and greater randomness.

RESOURCES USED TO DEVELOP THIS ACTIVITY

1. E-how. n.d. http://www.ehow.com/how_2245735_hot-ice-sodium-acetate.html (accessed 8 November 2008).
2. Jarchem Industries Inc. 2003. <http://www.jarchem.com/sodium-acetate-anhydrous.htm> (accessed 8 November, 2008).
3. The Science Company. 2008. <http://secure.sciencecompany.com/Sodium-Acetate-100g-P6475C670.aspx> (accessed 8 November 2008).