

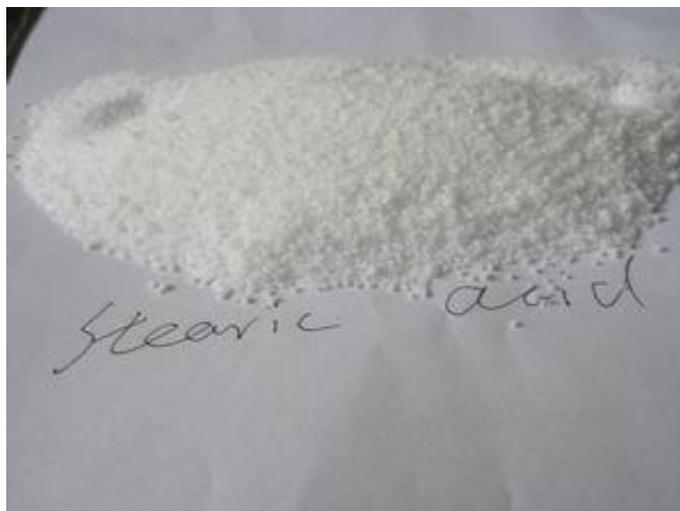


Cooling curve of stearic acid

CHEMISTRY
State of matter

Driving Question:

How does the temperature change during the cooling of stearic acid?



Thinking about the question

In this activity you will observe the process of the cooling of stearic acid (a constituent of wax). First, solid stearic acid is heated until it melts and then it is allowed to cool until it freezes. You will record the temperature of stearic acid as it cools.

Materials

In your investigations you will use:

- Data-logger e.g. CMA €Lab
- Temperature sensor,
- A stand and clamp,
- Test tube containing about 10 g stearic acid,
- 250 mL beaker containing water,
- Electrical Heater or bunsen burner for heating water bath.

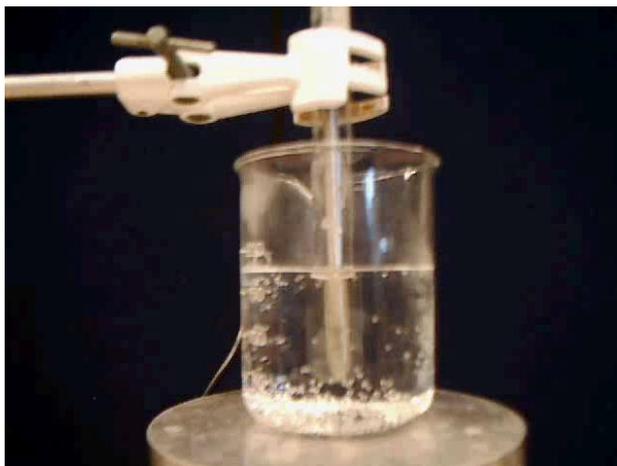
Safety

Wear eye protection.

Investigations

1. Connect the temperature sensor to the input 1 of your data-logger.
2. Place some stearic acid in the boiling tube to a height of about 2 cm.
3. Place the tube in the beaker half filled with water.
4. Clamp the tube so that it can be lifted out of the beaker safely.
5. Heat the water to boiling. Continue boiling until all the stearic acid has melted.

6. Carefully insert the temperature probe into the boiling tube and boil the water for another half minute.
7. Stop heating the water and carefully lift the boiling tube out from the beaker, keeping it in the clamp.
8. Start recording temperature.
9. Stir the substance gently as long as possible, using the probe.
10. Watch the graph of temperature vs. time as you observe the visual changes in the substance in the test tube.
11. How can you tell from the graph which part shows the liquid state?
12. Which part shows the solid state?
13. At what temperature did the liquid start solidifying?
14. How long did it take for the liquid to solidify?
15. The temperature of the stearic acid does not change as it solidifies. What evidence is there that it is actually losing heat?
16. The temperature continues to fall after it has solidified. Why?
17. What does the shape of the graph tell you about the loss of heat by the substance?
18. What do you think would happen to the graph if you had kept taking results for another 10 minutes?



Resources:

Coach 6 Activity: Cooling curve.cma

Coach 6 Result: Cooling curve.cmr