

How much solute can dissolve in water

Grade 7 science (Year 8 · Class 7) · Lab

Name: _____ Date: _____ Class: _____

How much salt can a given amount of water hold, and does hot water dissolve sugar faster? In this lab you add salt in small portions until a solution is saturated and then time sugar dissolving at four temperatures. You use your results to separate how much dissolves from how fast it dissolves.

Level: Grade 7 science (Year 8 · Class 7) · **Curriculum:** MS-PS1-2

Aim

To estimate the solubility of common salt in water at room temperature, and to see how water temperature changes the time sugar takes to dissolve.

Equipment

- Beakers (250 mL) and a measuring cylinder
- Balance reading to 0.1 g
- Glass rod or spoon
- Table salt and granulated sugar
- Thermometer
- Kettle, ice, stopwatch

Safety

Safety

Hot water scalds, so an adult should pour water above 40 °C. Do not taste anything made in the lab. Wipe up spills at once because wet floors are slippery.

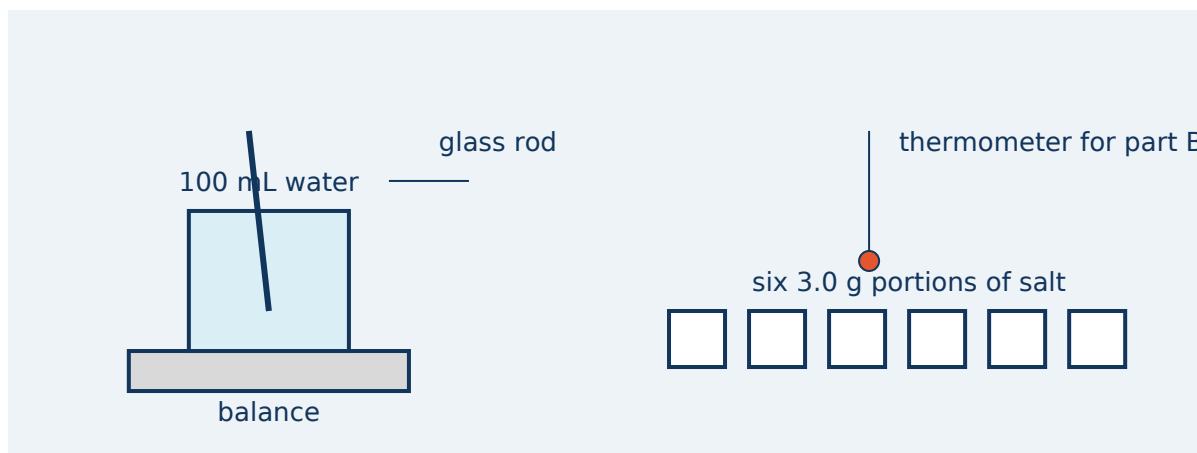
Method

Part A: how much salt dissolves.

1. Pour 50 mL of water at room temperature (about 20 °C) into a beaker.
2. Weigh 3.0 g of salt, add it, and stir for 2 minutes.
3. If it all dissolves, add another 3.0 g portion and stir again. Keep a running total.
4. Stop when some salt stays at the bottom after 2 minutes of stirring.

Part B: how fast sugar dissolves.

1. Prepare 100 mL of water at 10 °C, 30 °C, 45 °C and 60 °C.
2. Add 5.0 g of sugar and stir at a steady speed, starting the timer.
3. Stop the timer when no crystals can be seen.



Set-up for the solubility lab.

Results

Part A, results from a class in Accra (50 mL of water at 20 °C):

Total salt added (g)	3.0	6.0	9.0	12.0	15.0	18.0	21.0
Observation	clear	clear	clear	clear	clear	a few grains left	much salt left

Part B, time for 5.0 g of sugar to dissolve:

Water temperature (°C)	10	30	45	60
Time (s)	90	55	34	24

Analysis questions

Question 1 Saturation range

Use the Part A table to state the range of masses between which 50 mL of water became saturated.

Question 2 Convert to 100 mL

Convert the range to grams per 100 mL of water.

Question 3 Estimate and compare

Take the middle of the range as your estimate. The accepted value is 36 g per 100 g of water. Calculate the percentage difference.

Question 4 Pattern in Part B

Describe the relationship between water temperature and dissolving time.

Question 5 Dissolving rate

Calculate the average dissolving rate (g/s) at 10 °C and 60 °C, and how many times faster the second is.

Question 6 Explain with particles

Explain the Part B results using the particle model.

Question 7 Speed or amount

Salt solubility hardly changes with temperature, yet salt dissolves faster in hot water. Explain.

Question 8 Control variables

Name three variables kept constant in Part B and one possible source of error.