

materials

Dissolving: what dissolves in water?

Lesson at a glance

Open by stirring sugar into warm water and asking where it goes. Pupils sort six fair-test cards on the fair-test-planner interactive (change the material; measure time; keep water amount, temperature, stir and spoonful the same), then each group writes its dissolve rule and a prediction. Groups time sugar, salt, sand and flour in warm water, recording live on the Investigation Journal page. Close by naming soluble versus insoluble and revisiting where the dissolved sugar went.

Learning objectives

- Plan which variable to change, measure and keep the same in a dissolving test
- Classify materials as dissolving or not dissolving in water and compare times where they do

Before the bell: prep

Day before: portion sugar, salt, sand and flour into small pots (one level teaspoon each trial) and set four clear cups, one measuring spoon, one stirrer and a timer per group of 4–5. Just before the lesson, mix kettle water with cold so the jug is comfortably warm, not scalding. Keep sand and flour hidden until group work.

**Materials**

Item	Qty	Per	Source	Low-cost substitute
clear plastic cups	4	group	supermarket	clean glass jars or yoghurt pots
warm water in a jug	1	group	classroom	room-temperature water (times will be longer)
sugar in a small labelled pot (about 4 level teaspoons)	1	group	supermarket	caster sugar from staff room supplies
table salt in a small labelled pot (about 4 level teaspoons)	1	group	supermarket	cooking salt
clean play sand or builder's sand in a small labelled pot (about 4 level teaspoons)	1	group	school kit	fine dry soil or grit from outdoors, dried
plain flour in a small labelled pot (about 4 level teaspoons)	1	group	supermarket	cornflour
teaspoon for measuring	1	group	classroom	5 ml medicine spoon
stirring spoon	1	group	classroom	clean lolly stick
stopwatch or timer	1	group	school kit	classroom clock with second hand, or the fair-test-timer on the IWB
cloths for spills	2	class	classroom	paper towels
Investigation Journal page	1	pupil	provided printable	ruled paper with a simple results table drawn by the pupil

Safety watch-point

Water must be comfortably warm only (kettle mixed with cold), never hot enough to scald. No tasting any mixture. Wipe spills at once; tip sandy or floury solids into the bin before emptying cups so sinks do not clog.

Teaching moves

- **Getting Started:** At the front, stir half a teaspoon of sugar into a clear cup of warm water so the class watches it disappear. Ask 'If the sugar is gone from sight, is it still there?' Accept ideas without settling them. Do not show sand or flour yet.
- **Plan a fair dissolving test:** Open the fair test planner on the IWB. Drag cards as pupils call Change / Measure / Keep the same. Target: change the material; measure time to dissolve; keep amount of water, temperature, stir and amount of material the same. Hold back your own prediction until every pupil has written theirs. Then each group agrees and writes its rule for judging 'dissolved'.
- **Test the four materials:** Model one full sugar cycle on the fair-test-timer (about 3–4 min) before any group cup is touched. Then groups run salt, sand and flour. Circulate for fair-test breakers: cups pre-filled and cooling, uneven spoonfuls, or changing stir style. Two-minute classroom cutoff if pieces remain; no tasting; wipe spills at once.
- **Check your journal page:** Five minutes only: every material needs dissolves yes/no and a time in seconds or a blank. Help rough-note groups transfer once onto the Investigation Journal page. Do not re-copy a second table.
- **What does the evidence show?:** Pool the pattern: sugar and salt soluble; sand insoluble; flour cloudy and not fully dissolved under most group rules. Revoice the opening question: the sugar is still in the water, mixed evenly. If anyone says it melted, contrast melting (heat alone) with dissolving (solid into liquid).

What it should show

Sugar dissolves, often fastest (roughly 20–60 s in warm water). Salt dissolves, often slower. Sand stays visible and does not dissolve. Flour clouds the water and counts as does not dissolve if bits remain under the group's rule. Odd sugar times usually mean a pushed stir, a cooler pre-poured cup, or an heaped spoonful: re-run from a level teaspoon and fresh pour.

Misconceptions & interventions

- **Pupils say the sugar melted or was destroyed when it disappeared.** Revoice: melting is solid to liquid from heat alone; here the solid mixed into water so pieces are no longer separate. That is dissolving. The sugar is still in the cup, mixed evenly (we do not taste to check).
- **Pupils put water temperature or stir under Change, thinking more than one thing can vary.** On the fair-test-planner ask: 'If one cup is hotter, how would we know it was the material that made the difference?' Drag temperature and stir back to Keep the same.
- **Pupils call flour dissolved because the water went cloudy and white.** Return to the group's written dissolve rule. If solid bits or cloudiness remain, it has not fully dissolved. Useful science talk: same rule for every material.

**Differentiation**

Emerging	Developing	Proficient
• Test two materials carefully (e.g. sugar and sand) with the teacher table supporting the timer start/stop and the dissolve-rule call. • Provide a partly filled journal row so they only add yes/no and a time for each trial.	• Run all four materials and compare sugar versus salt times under the same stir count. • Note one thing that would have made their test unfair if it had slipped.	• Repeat one material and compare the two times; average if both dissolved. • Critique how different dissolve rules changed the flour classification across groups, still using only today's four materials.

Cross-curricular hook

Tie to Maths Measures: pupils record dissolve times in seconds and compare which soluble material was faster.