

## materials

# Mixtures and solutions: filter sand, start the salt wait

## Lesson at a glance

Open with a clear jar of dissolved salt and a hands tally: gone forever, still there, or not sure? Hold it beside a sandy mixture jar so pupils name mixture versus solution. Groups predict where the salt is and what filtering will catch, then watch you model a filter cone and a thin salt dish on the windowsill. They filter sandy water, pour their own thin salt layer, and record prediction, filter observation and dish-now notes on the Investigation Journal page, leaving space for crystals later in the week.

## Learning objectives

- Predict and explain where dissolved salt goes in a solution
- Recover undissolved sand by filtering today, and set up a thin salt-solution dish for slow windowsill evaporation to check across later days
- Conclude from today's evidence that undissolved sand can be filtered out, and that dissolved salt was not caught by the filter and remains in the liquid, with crystals later in the week as the missing proof

## Before the bell: prep

Night before: dissolve ~2 tsp table salt in warm water in a clear jar and cool until fully clear; stir dry sand into a second jar. Set group trays: sandy water, clear salt solution, funnel, filter paper, empty cup, shallow dish, label, spoon. Print Investigation Journal pages. Pick one stable sunny sill or warm (not scorching) radiator shelf for all dishes.

**Materials**

| Item                              | Qty | Per   | Source      | Low-cost substitute                                                                                                                                                                                                                          |
|-----------------------------------|-----|-------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| table salt                        | 1   | class | supermarket | any fine cooking salt                                                                                                                                                                                                                        |
| clean dry sand                    | 1   | group | school kit  | washed fine grit, crushed clean eggshell, or dry rice grains (all stay undissolved for the filter half). Do not use sugar as the filter solid; sugar dissolves and is only useful as an optional extra dissolved example beside the salt jar |
| clear plastic cups or small jars  | 3   | group | classroom   | clean yoghurt pots or jam jars                                                                                                                                                                                                               |
| filter paper circles              | 2   | group | school kit  | strong kitchen roll or a coffee filter cone                                                                                                                                                                                                  |
| plastic funnel                    | 1   | group | school kit  | top half of a clean plastic bottle with the cap removed, used upside down as a funnel                                                                                                                                                        |
| shallow dishes or saucers         | 1   | group | classroom   | jar lids or clean plastic food trays                                                                                                                                                                                                         |
| plastic teaspoons or craft spoons | 1   | group | classroom   | lollipop sticks for stirring                                                                                                                                                                                                                 |
| trays                             | 1   | group | classroom   | large plastic lids or a covered desk with newspaper                                                                                                                                                                                          |
| labels and pencils                | 1   | group | classroom   | masking tape and a marker                                                                                                                                                                                                                    |
| jug of clean water                | 1   | class | classroom   | tap water in bottles                                                                                                                                                                                                                         |
| cloths or paper towels for spills | 1   | class | classroom   | old tea towels                                                                                                                                                                                                                               |
| Investigation Journal page        | 1   | pupil | classroom   | plain A4 page ruled into three headed sections: prediction and salt-layer choice; filtering observation; salt dish now and later                                                                                                             |



### Safety watch-point

No tasting any mixture. No heat sources for evaporation: windowsill or warm radiator shelf only. Wipe spills, keep sand off the floor, wash hands before leaving; check dishes sit stably and labelled.

### Teaching moves

- **Dissolved is not gone:** Bring out the sandy jar beside the clear salt jar. Board only mixture and solution plus 'dissolved is not gone'. Head off 'vanished' or 'turned into water' gently: particles still in the liquid, just too small to see. Save filtering and evaporation labels for the modelled cycle.
- **What do you think?:** Think-pair-share on two puzzles: where has dissolved salt gone, and what will the filter catch? Capture two or three worded predictions on the board without correcting. Ask: if salt is still there, why can't we see it?
- **How we get materials back:** Model the full cycle out loud. Fold filter paper into a cone, pour sandy water slowly, name filtering. Pour a thin salt layer into a labelled shallow dish on the agreed sill, name evaporation: no cooker, kettle or toaster. Say crystals are days away; today only starts the wait.
- **Filter and set up the dishes:** Hand trays and the Journal page. Groups own the salt-layer thickness (thin film dries sooner in cool Irish weather) and one sand success check. Walk for slow pouring, torn paper restarts, and no claims that salt is 'back' today. All dishes go to the same place.
- **Observe and record:** IWB headings: prediction and salt-layer choice; filtering observation; salt dish now (space for later). Check factual notes (wet sand in paper, clearer water below) stay separate from thinking (salt still dissolved). Overflow is useful data, not failure.
- **What the evidence shows:** Return to board predictions. Shared proof standard: sand proved today; salt reserved until crystals appear. Practise one observation and one inference sentence. Close with one class line: sand recovered by filtering; salt still in the liquid until crystals show.

### What it should show

Filtering: wet sand stays in the paper; water below looks clearer. Salt dish: clear liquid only today. No solid visible. Crystals usually begin within a few school days on a warm sill; full drying can take most of a week in cool weather. If nothing appears, the layer was too deep or the sill too cold/damp. Move to a safe warm radiator shelf and keep checking.



### Misconceptions & interventions

- **‘The salt has vanished’ or ‘turned into water’.** Hold the clear jar and name it gently: salt particles are still in the liquid, just too small to see. Point to the waiting dish: filtering won’t catch them; evaporation later is the proof.
- **‘The filter will catch the salt as well as the sand.’** After groups filter, ask what is in the paper versus what ran through. Link back to dissolved versus undissolved: only undissolved grains are too big for the holes.
- **Pupils claim ‘we got the salt back’ on the same day.** Stop the claim and restate the shared standard: sand is proved today; the salt conclusion waits until white crust or crystals are actually seen on the dish.



### Differentiation

| Emerging                                                                                                                                                                                                                                             | Developing                                                                                                                                                                                                                                  | Proficient                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• Pre-fold one filter cone and offer a sentence strip: ‘The filter caught _____. The water went _____.’</li><li>• Work the salt pour at the teacher table with a marked thin-layer line on the dish.</li></ul> | <ul style="list-style-type: none"><li>• Prompt a short ‘why’ for their salt-layer thickness and one sand success check on the Journal page.</li><li>• If paper clogged, ask what the overflow still shows about undissolved sand.</li></ul> | <ul style="list-style-type: none"><li>• Ask whether filtering could ever get dissolved salt back, and what evidence would prove it.</li><li>• Compare two groups’ thickness choices and predict which dish will show crystals first.</li></ul> |



### Cross-curricular hook

Link to seaside rock pools and salty pans drying in the sun: same slow evaporation leaving solid behind, observed on Irish shores.

