



materials

Reversible and irreversible changes

Lesson at a glance

Open by holding fresh bread beside toast and asking whether toast can become soft bread again. Name reversible and irreversible change, model melting chocolate then cooling it, and take group predictions for four changes. Groups rotate through chocolate melt-and-cool, salt dissolve-and-dry, and baking-soda-with-vinegar stations after a short teacher toast demo, then fill the SortingGrid page with observations and evidence. Close with the states-of-matter interactive on chocolate, a class sort, and a cooks-and-makers talk.

Learning objectives

- Distinguish changes that can be undone from changes that make something new
- Sort hands-on station results as reversible or irreversible with evidence
- Explain how cooks and makers use changes that cannot be undone

Before the bell – prep

Night before: chill plates, pre-dry and label two “salt came back” dishes, print SortingGrid pages, make toast for the hook. Set two copies each of Stations A–C (warm hand-safe water cups, plain chocolate, spoons, salt, dark paper, baking soda, vinegar, clear cups, trays). Check chocolate/gluten allergies.



**Materials**

Item	Qty	Per	Source	Low-cost substitute
plain chocolate pieces (allergy-checked, small squares)	18	class	supermarket	plain cooking chocolate broken from a large bar
chilled plates or saucers for re-hardening chocolate	6	class	classroom	extra saucers rotated from a cool box or fridge between visits
clean spoons or spatulas for moving chocolate (not palms)	6	class	classroom	clean lollipop sticks or coffee stirrers
cups of warm hand-safe water with lids for gentle chocolate warming (teacher-prepared)	2	class	classroom	one shared warm-lid station supervised by the teacher if only one cup is practical
table salt	1	class	supermarket	any fine cooking salt
labelled pre-dried salt samples ("salt came back")	2	class	classroom	salt sprinkled on dark card labelled as the dried result if overnight drying fails, plus honest talk that real drying leaves the same salt
clear plastic cups or beakers	12	class	classroom	clean yoghurt pots
water in small jugs	4	class	classroom	tap water in bottles
dark paper or dark plates for drying salt drops	6	class	classroom	black card scraps or a dark lunch tray
baking soda (bicarbonate of soda)	1	class	supermarket	fresh bicarbonate of soda from a home baking cupboard
white vinegar	1	class	supermarket	any clear cooking vinegar
teaspoons and tablespoons	8	class	classroom	any clean measuring spoons
plastic trays for stations (two of each station type)	6	class	classroom	lids from storage boxes or baking trays
sliced bread for toast demo	2	class	supermarket	any plain sliced bread; gluten-free if needed for display only
toaster or toaster oven (teacher only)	1	class	school kit	teacher brings pre-made toast and fresh bread to compare if no toaster is available



Item	Qty	Per	Source	Low-cost substitute
paper towels	1	class	classroom	clean cloths for wiping only
Investigation Journal page	1	pupil	provided printable	a simple four-row table in the journal with headings change, what we observed, reversible or irreversible, evidence

Safety watch-point

Teacher-only toaster; warm hand-safe water only; no tasting; chocolate on spoons not palms; vinegar mixes away from eyes and faces; check chocolate/gluten allergies; wash hands after pack-away.

Teaching moves

- **Getting Started:** Hold one fresh slice and one toast slice. Take three or four hands-up guesses on whether toast can become soft bread again—curiosity only, no answer yet and no kit out.
- **Changes we can undo, and changes we cannot:** Project only the two big words. Model the full cycle once: soften a small chocolate square on a warm-water lid you control, move it to a chilled plate, and voice prediction—observe—decide that it is still chocolate, so the change is reversible.
- **What do you think will happen?:** Keep desks clear. Think-pair-share predictions for all four changes into board columns Can undo / Makes something new. Introduce evidence in plain words as what you see, hear or feel, and offer the sentence stems aloud.
- **Station investigations:** Run the 3-minute toast demo first with pupils seated well back, then start the six-group carousel (two copies of A, B, C; ~5 minutes per visit so every group does each type). Stay near both Station C trays; stop leaning over fizz cups; wipe spills at once. Ask: same material or new—what is your evidence?
- **Record what we observed:** Send pupils straight to the SortingGrid while stations are fresh. Board the four row labels. Push evidence phrases (softened, hardened, crystals, fizz, brown and crisp). If live salt drops are wet, have them cite the labelled “salt came back” sample.
- **Why we could undo the chocolate melt:** Drive the states-of-matter interactive briefly: solid chocolate, warm just past melt, cool back to solid. Stress the dots are the same material moving differently. If the slider goes far too high, stop and say chocolate would scorch—not a clean boil.
- **Sort the changes:** Board Reversible and Irreversible. Invite groups to place all four changes and defend with journal evidence. If salt is mis-sorted, return to the pre-dried sample and the idea that slow still counts.
- **Cooks, makers and what we learned:** Plenary before pack-away. Revoice two strong evidence lines and link to Irish kitchens (soda bread, toasting, baking). Hear at least three pairs name one reversible, one irreversible, and one cook use, then tip fizz mixes, bin food waste, wipe trays and wash hands.



What it should show

Chocolate softens then firms again on the chilled plate (reversible). Salt vanishes in water; the pre-dried sample shows crystals returned (reversible even if the live drop is still wet). Baking soda and vinegar fizz with gas and leave a mix you cannot separate back (irreversible). Toast goes brown, dry and crisp and cannot become soft bread (irreversible). Odd salt sorts usually mean the group ignored the labelled overnight sample.



Misconceptions & interventions

- **“Salt is irreversible because our drop is still wet / it takes ages.”** — Show the labelled “salt came back” dish beside the live drop. Reversible means the same material can return, not that it happens in one lesson minute.
- **“The vinegar disappeared so it is gone forever” or “heat destroyed the chocolate.”** — Ask whether a new substance formed (gas, toast crust) or the same substance changed form. For chocolate, point back to the firm piece on the chilled plate—still chocolate.
- **Pupils call any messy change irreversible just because it looks different.** — Hold the sorting question to evidence: Can we get the same material back? Shape or mess alone is not enough.



Differentiation

Emerging	Developing	Proficient
• Offer the spoken stems I think ... is reversible/ irreversible because ... and “same material” / “new material” cards during the class sort. • Allow a shared SortingGrid per pair; teacher table supports evidence phrases from a word bank on the board.	• Prompt each group to name the evidence they will look for before rotating, then tick it on the grid after the station. • If salt is incomplete, require an explicit compare sentence with the “salt came back” sample.	• Ask what evidence would change their mind if another group sorted differently. • Invite one extra everyday kitchen example (melting butter versus frying an egg) defended as reversible or irreversible.



Cross-curricular hook

Link to Irish kitchens and bakeries—soda bread rising and toasting as irreversible changes cooks choose on purpose.

