

Reversible or Not

TEACHER DEMO

RUN AT 1:00

20 MIN

The point

Melting can go back because **the particles never changed**. Burning can never go back — it **breaks the particles and makes new, different ones** that fly off as smoke.

Materials

- A pat of butter + small pan
- Hot plate or stove (lowest heat) + oven mitt
- Fridge (re-hardens the butter)
- Matches + a scrap of paper
- Fireproof dish + tongs
- Cup of water (douse + the “cool it all you like” test)

Steps

- 1 Kids **predict on the worksheet front**: which comes back — the butter, the match, or both?
- 2 **Melt the butter** over lowest heat — solid to golden liquid. “The warm jiggling just beat the grip.”
- 3 **Straight into the fridge**. It re-hardens during the weigh-in finale.
- 4 Adult: **strike a match over the fireproof dish**, burn halfway, drop it. Burn the paper scrap too — watch the smoke climb.
- 5 **Let everything cool completely**. Pass the cold ash. “Is it turning back?”
- 6 **Dunk the ash in the water cup** — as cold as it gets, still ash. Not reversible.
- 7 ~1:30 — **bring the butter back out: solid again**. Reversible. Big ✓ on the true worksheet picture.

Say: “Cooling un-melts butter because the butter particles never changed. Cooling can’t un-burn a match — burning made NEW particles, and half of them flew away as smoke.”



Fig. 8 — two changes on one counter: one can go back, one never will

TEACHER PREP

Stage butter, pan, matches, paper scrap, fireproof dish, tongs, and the water cup by the stove before lunch. Crack a window (smoke alarm).

SAFETY

Flame is adult-only. Matches struck over the fireproof dish; water cup standing by; kids’ hands stay on the table edge. One match + one paper scrap is plenty.

What to watch for

- Butter looping solid → liquid → solid, unbothered
- The smoke climbing — particles leaving for good
- The disappointment of the ash that will not turn back — that IS the lesson

EXPECTED RESULT

Butter: fully reversible, could loop a hundred times. Match and paper: permanently ash + smoke — **new particles, no way back**, no matter how cold.