

Materials Scientists & Engineers

Dissolving, separating, changes & conductors — plus states of matter & rocks catch-up



1. Y5 Main: what really happens when a solid dissolves?

Dissolving doesn't mean disappearing — the solid breaks into **particles too tiny to see**, spread evenly through the liquid.

- A **solution** looks completely uniform — you can't see the dissolved solid.
- Warmer water and stirring both speed up dissolving.

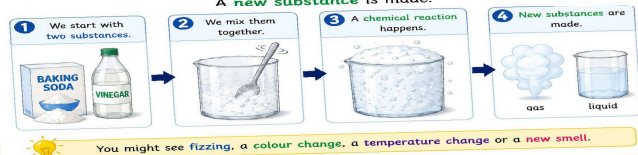
3. Y5 Main: physical or chemical change?

A **physical change** (melting, dissolving) is usually reversible; a **chemical change** makes a brand-new substance and can't be undone.

- Look for the clues: colour change, bubbles of gas, heat or light given off.
- Dissolving salt is physical — even though the salt "disappears".

Chemical Changes

A new substance is made.



5. Y4 Catch-up: states of matter & the water cycle

Matter is **solid**, **liquid** or **gas**. Heating/cooling causes melting, freezing, evaporation and condensation.

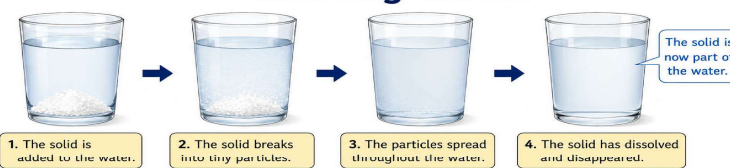
- Every material has its own melting point and boiling point — water: 0°C and 100°C.
- The **water cycle** repeats evaporation → condensation → precipitation endlessly.

6. Y4 Catch-up: how do rocks, fossils & soil form?

Rocks are grouped by **hardness**, **texture** and how they formed: **igneous** (cooled magma/lava) or **sedimentary** (squashed layers).

- **Fossils** form in sedimentary rock, which buries things gently in layers.
- **Soil** is weathered rock mixed with decayed plant/animal matter (humus).

Dissolving Solids



2. Y5 Main: how do we separate different mixtures?

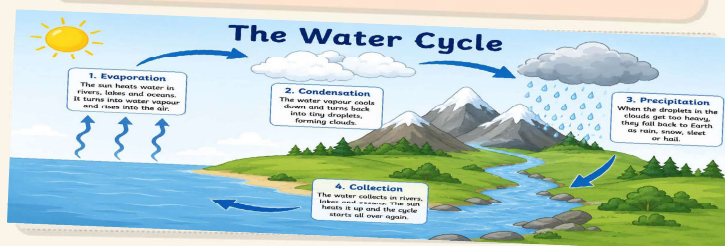
Three techniques, three jobs: **sieving** (particle size), **filtering** (insoluble solid from liquid) and **evaporating** (dissolved solid from liquid).

- Ask: has it dissolved? That decides filter vs evaporate.
- Evaporation removes the liquid — the solid is left behind, unharmed.

4. Y5 Main: which materials conduct — and which insulate?

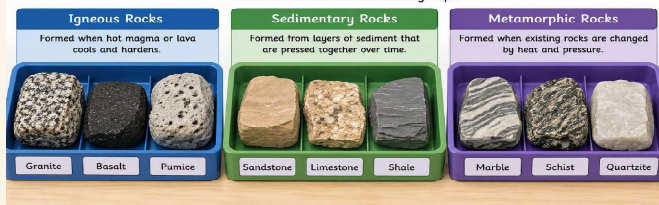
A **conductor** lets electricity or heat flow through it (most metals); an **insulator** doesn't.

- Good electrical conductors are usually good thermal conductors too.
- Not every conductor is a metal — graphite conducts electricity too.



A Sorted Rock Collection

Rocks can be sorted into three groups.



7. TAPS: which material is the best thermal insulator for a lunchbox?

FAIR TEST

Heat always moves from **hot** to **cold**. A good insulator slows this heat loss down — it doesn't stop it completely. We compare the **temperature drop**, not just the final temperature.

- Only the wrapping material changes — everything else (water, time, container) stays the same.
- Question → prediction → variables → method → results → **conclusion**: smallest drop wins!

TIME (MIN)	WITHOUT INSULATION		WITH KS2 INSULATION		DIFFERENCE (WITH INSULATION)	
	WATER TEMPERATURE (°C)	TEMPERATURE DROP (°C)	WATER TEMPERATURE (°C)	TEMPERATURE DROP (°C)	TEMPERATURE SAVED (°C)	% IMPROVEMENT IN HEAT RETENTION
0 (START)	70.0	—	70.0	—	0.0	0%
15	58.1	11.9	64.7	5.3	6.6	55.5%
30	48.2	21.8	59.9	10.1	11.7	53.7%
45	40.3	29.7	55.6	14.4	15.3	51.5%
60	33.6	36.4	51.8	18.2	18.2	50.0%
90	25.4	44.6	45.2	24.8	19.8	44.4%
120	19.8	50.2	40.1	29.9	20.3	40.4%

KEY VOCABULARY

dissolve solution sieve filter evaporate physical change chemical change conductor
insulator solid / liquid / gas water cycle igneous / sedimentary fossil soil

SKILLS I'LL USE

- Plan & carry out a fair test
- Choose the right separating technique
- Take accurate temperature measurements
- Classify rocks & materials by properties
- GD: explain results using particle ideas