

Properties & Changes of Materials

Dissolving, mixtures & reversible/irreversible change



1. What does it mean for a material to dissolve, and what is a solution?

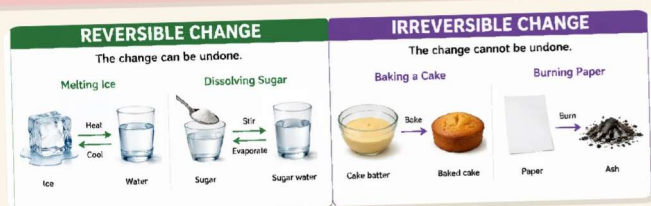
When a **solute** dissolves in a **solvent**, it forms a **solution** — the particles spread out but don't disappear.

- The dissolved material can usually be recovered by evaporating the solvent.
- Not all solids dissolve in water — some, like sand, remain undissolved.

3. What is the difference between a reversible and an irreversible change?

A **reversible change** (like melting) can be undone; an **irreversible change** (like burning) cannot.

- Irreversible changes usually create a new substance with different properties.
- Dissolving is reversible; a chemical reaction (like rusting) is not.



5. How can we compare materials using their properties?

Materials are chosen for a job based on properties like **hardness, transparency, flexibility and thermal/electrical conductivity**.

- A raincoat needs to be waterproof; a saucepan handle needs poor thermal conductivity.
- Comparing properties helps us explain why a material suits its use.

6. Greater Depth: does water temperature affect how fast a solid dissolves?

Warmer water usually dissolves solids faster than cold water.

- Heat gives particles more energy, so they mix and spread faster.
- Stirring also speeds up dissolving by moving particles around more.



2. How can we separate mixtures using filtering, sieving and evaporating?

Different **separation methods** suit different mixtures.

- Sieving** separates solids of different sizes; **filtering** separates an undissolved solid from a liquid.
- Evaporating** separates a dissolved solid from its solvent.

4. What signs show a new material has been made in a chemical reaction?

Bubbles/gas, a colour change, a temperature change, or a new smell can all signal a **chemical reaction**.

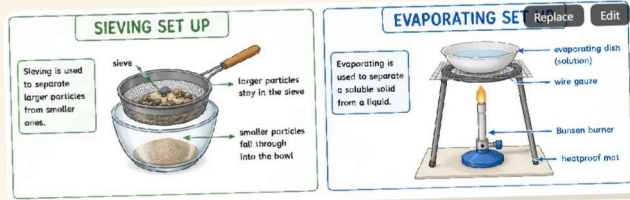
- Mixing vinegar and bicarbonate of soda produces gas bubbles — a clear sign of reaction.
- Once reacted, the original materials usually cannot be recovered.

Vinegar and Bicarb Reaction Test

We mix vinegar and bicarbonate of soda to see what happens.



What did we learn? When vinegar and bicarbonate of soda are mixed, a gas called carbon dioxide is made.



7. TAPS: How do we write up our dissolving-speed investigation?

FAIR TEST

Our TAPS test: **does water temperature affect how fast sugar dissolves?** It's a **fair test** — we change only the temperature and keep the amount of sugar, water and stirring the same.

- Question → **prediction** → variables (independent / control / dependent).
- Materials → **method** → carry out the test → **results** → **conclusion**.

Dissolving Solutions – Results Table

Substance	Amount added (g)	Water temperature (°C)	Time to dissolve (seconds)	Did it dissolve? (Yes / No)	Notes / Observations
Sugar	5	20	18	Yes	Dissolved quickly, solution clear

KEY VOCABULARY

solute solvent solution dissolve filtering sieving evaporating reversible irreversible
chemical reaction thermal conductivity independent variable conclusion

SKILLS I'LL USE

- Plan & carry out fair tests independently
- Take accurate, timed measurements
- Separate mixtures using scientific methods
- Record data in tables & graphs
- GD: report using scientific evidence