



Particles and Mixtures! Year 7 Science at Home

You can help! Your child is learning how all matter is made of tiny particles — and how we can separate mixtures using the different properties of those particles. Great examples right in your kitchen!

Why are we learning this? Particles and separation in everyday life

The ability to separate mixtures has been critical to life in this part of Australia for thousands of years. Traditional winnowing techniques separate seeds from chaff using air currents. Filtering and yandying (a technique using a wooden dish to separate seeds and minerals by density) are traditional First Nations separation methods. Today, water filtration and purification are critically important in remote communities. Understanding particle theory helps your child explain why these separation methods work — and how to choose the right method for any mixture.

My child will learn to:

✓ Explain particle theory

Use particle theory to describe why substances have different properties as solids, liquids and gases.

✓ Classify mixtures

Distinguish between pure substances and mixtures, and identify the components of solutions.

✓ Choose separation methods

Select and explain the right technique to separate a given mixture.

✓ Connect to real uses

Link separation techniques to everyday applications like water purification and food preparation.

Big ideas to know:

Particle theory — a key model

Scientists use particle theory to explain why matter behaves the way it does. In a solid, particles are tightly packed and vibrate in place. In a liquid, they slide past each other. In a gas, they are far apart and move freely. This model explains why ice is hard, water flows, and steam fills a whole room.

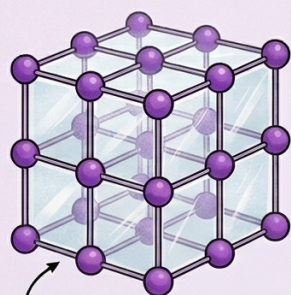
Pure substances vs mixtures

A pure substance contains only one type of particle (e.g. pure water, pure gold). A mixture contains two or more different types of particles that are not chemically bonded — they can be separated. Salt water, air and soil are all mixtures.

Separation techniques

We separate mixtures based on the different properties of their components. Filtration removes solids from liquids (different particle size). Evaporation removes liquid from dissolved solids. Distillation separates liquids with different boiling points. Traditional First Nations methods — winnowing, sieving, yandying — use the same principles.

Pure Substances vs Mixtures



PURE SUBSTANCE

- All same particles
(e.g. Copper wire, distilled water)



e.g. salt water = salt + water mixed together



MIXTURE

- Different particles mixed
(e.g. Salt water, trail mix)

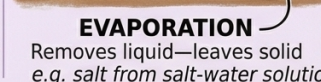


Ways to Separate Mixtures



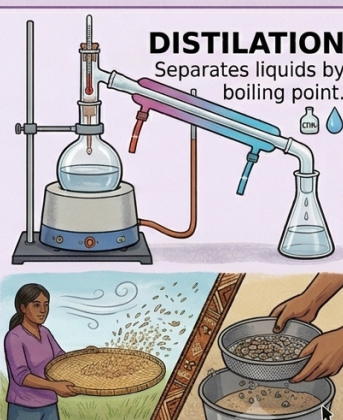
FILTRATION

Removes solid from liquid. E.g. sand and water, coffee filter.



EVAPORATION

Removes liquid—leaves solid
e.g. salt from salt-water solution.



DISTILLATION

Separates liquids by boiling point.



WINNOWING / SIEVING

Traditional methods—separate by size or weight (First Nations)



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Separation techniques — when to use each

Technique	What it separates	Why it works	Example
Filtration	Solid from liquid	Different particle size	Removing dirt from water, making coffee
Evaporation	Dissolved solid from liquid	Liquid evaporates, solid stays	Recovering salt from salt water
Distillation	Liquids with different boiling points	One liquid boils, other stays	Purifying water, making perfume
Chromatography	Dissolved dyes or inks	Different-sized particles travel at different speeds	Testing purity of food dyes
Winnowing / yandying	Seeds from chaff, dense from light	Density and air resistance differ	Traditional First Nations seed processing

Think Like a Scientist — Mixture Separator

Make a mixture at home using three ingredients — for example, rice, sand and water in a bowl. Your challenge: separate them using only simple equipment (a sieve, filter paper or cloth, and time). What is your strategy?

Ask: "How will you separate the rice from the sand? How will you separate the sand from the water? What property of each component are you using?" Plan first, then test — that is the scientific method!

Mixtures to try separating:

1. Salt water — can you recover the salt? (evaporation)
2. Muddy water — how can you make it clearer? (filtration)
3. Coffee grounds + water — separate them (filtration)
4. Rice + lentils + sand — which technique for which pair?
5. Ink on paper + water — watch chromatography happen!

Questions to ask your child

1. Why can we separate a mixture but not a pure compound by simple physical means?
2. How does particle theory explain why evaporation works to separate salt from water?
3. What property of sand and water makes filtration possible?
4. Why does oil float on water? What does particle theory say about this?

5. How is the process of getting clean water in our community related to separation techniques?
6. Why might distillation be used to purify water rather than just filtering it?
7. How does chromatography work — what makes different-coloured dyes travel at different speeds?

The classic home chromatography experiment: draw a line with washable marker on a coffee filter, stand it in a shallow tray of water so the water can rise but not touch the line. Watch the colours separate as the water carries them up at different speeds!

Key words to know:

Particle theory	The scientific model that explains matter's behaviour using the idea of tiny particles (atoms/molecules)
Pure substance	A material made of only one type of particle — e.g. pure water, gold, oxygen
Mixture	Two or more substances mixed together but not chemically bonded — can be separated
Solution	A mixture where one substance (solute) is dissolved in another (solvent) — e.g. salt in water
Filtration	Separating a solid from a liquid using a filter that only lets small particles through
Evaporation	Liquid turning to gas — used to separate dissolved substances from their solvents
Distillation	Separating liquids with different boiling points by heating then cooling the vapour

Key words to look up

Particle theory · Pure substance · Mixture · Solution · Filtration · Evaporation · Distillation

What school will check

By the end of Year 7, your child needs to use particle theory to describe substances' properties and apply knowledge of properties to separate mixtures.

Try it at home!

Put a cup of salt water in a sunny place and leave it for a few days. Check it each day. What is happening to the water? What do you see left behind? This is evaporation — the same process used to produce sea salt commercially!