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Separating mixtures







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Separating mixtures

From a harvested crop to clean grain



THE IDEA

Clean grain one step at a time. Threshing loosens grain from stalks. Winnowing uses moving air to carry lighter husk farther than heavier grain.

A sieve sorts by size. For a few stones you can spot among grains, handpicking may work best.

CHECK YOUR THINKING

Which method uses a moving stream of air?

A Winnowing.

B Threshing.

A. Winnowing.

WORK THROUGH A CASE

A sieve releases both tiny stones and grains through its holes. What did this trial teach you about the method?

Sieving separates by size relative to the openings. If two components are similar in size, choose a different useful difference, such as visible shape for handpicking. Airflow helps when husk and grain respond differently to moving air.

Separating mixtures

The muddy-water challenge



THE IDEA

Clearer does not always mean safe to drink. Sand can settle by sedimentation. Carefully pouring off the upper liquid is decantation. Filter paper catches larger grains as residue.

The filtrate may still contain dissolved substances and microbes. Ordinary settling and filtering do not prove that water is safe to drink.

CHECK YOUR THINKING

Does clear filtrate prove the water is safe to drink?

A No; dissolved substances and microbes may remain.

B Yes; all harmful material is visible.

A. Clarity shows that much visible suspended material was removed. It is not a complete test of water safety.

WORK THROUGH A CASE

The drops beneath the filter look clear. Could salt still be present? Design a test using a small sample.

Sand grains are too large to pass the paper pores. Dissolved salt travels with the water. Evaporate a measured portion alongside a plain-water control and inspect any residue. Clarity alone cannot establish purity.

Separating mixtures

Choose the next separation



THE IDEA

The iron is gone. Salt has dissolved in the water, but sand has not. Name what stays on the filter and what passes through.

Then explain how to recover the salt. Heating is a teacher demonstration.

CHECK YOUR THINKING

What passes through the filter?

A Water with dissolved salt.

B Pure water, leaving all salt behind.

A. Dissolved salt passes through an ordinary filter with the water. Evaporation can recover it.

WORK THROUGH A CASE

Suppose you evaporate all the water before filtering the salty sand mixture. What extra work does that create?

Salt recrystallises alongside the sand. You must add water again to separate them by filtration. Plan each step by naming which material stays and which passes on.

Separating mixtures

Separate two liquid layers



THE IDEA

What can you pour off first? Oil floats on water in the beaker. The clear boundary shows where one layer ends and the other begins.

Which liquid would come out first in a slow pour? Near the boundary both liquids can spill over together.

CHECK YOUR THINKING

Why wait after shaking the mixture?

A The water must first dissolve all the oil.

B The liquids need time to form separate layers again.

B. A visible boundary makes decantation easier to control.

LOOK AGAIN

Point to the boundary between oil and water.

The boundary separates the oil above from the water below. The two liquids form layers because they do not mix, and this oil is less dense.

Separating mixtures

Choose a sieve that works



THE IDEA

Guess what passes through each mesh. Fine flour can pass through holes that hold back larger bran flakes. The openings must be between the two particle sizes.

What would be left on a sieve with very large openings? If both components fit through, the sieve separates neither.

CHECK YOUR THINKING

When is sieving least useful?

A When the two solids have almost the same particle sizes.

B When one solid is clearly coarser than the other.

A. A sieve sorts by size relative to its openings.

LOOK AGAIN

Which particles can fit through the openings?

Particles smaller than the openings can pass through. Larger particles remain, so the mesh must suit the sizes in the mixture.

ONE LAST CHALLENGE

Which component left the pan?

A shallow salt pan holds seawater. After sunny weather, white crystals remain.



THE REVEAL

Water evaporated and the salt remained.

Water changes into vapour at the surface. Dissolved salts do not evaporate with it under these conditions.

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