

In this unit we will

1. Compare and group everyday materials according to their properties
2. Investigate the separation of materials, including filtration and evaporation
3. Explore how some materials will dissolve and what this means in terms of the particle model
4. Learn that some changes are reversible, while others are irreversible

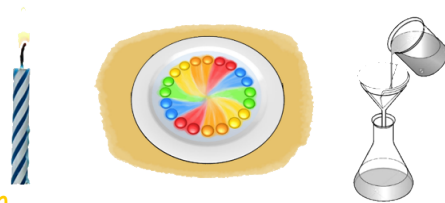
Science Skills that we will develop:

Explaining Science

1. I use complex science words correctly
2. I use a science model to describe and explain
3. I draw & annotate diagrams to help describe/explain

Designing Experiments

1. I use knowledge & understanding to make a hypothesis
2. I plan a reliable fair test
3. I plan to minimise risk & act on safety suggestions
4. I plan to collect repeat readings and calculate the mean



**Properties and
Changes of
Materials**

After baking scones last night, I've got some left over flour and raisin mix, but I also want to make some oaty raisin biscuits as well. How can I separate the flour and the raisins? Any suggestions?



Good idea, but how exactly did the sieve work? Talk about it with a partner before sharing with the class.



Did you use the word **particles**?

In this Science unit, we will be learning a lot more about how to mix and separate different materials.

Would the sieve work for separating sand and gravel?



Watch...

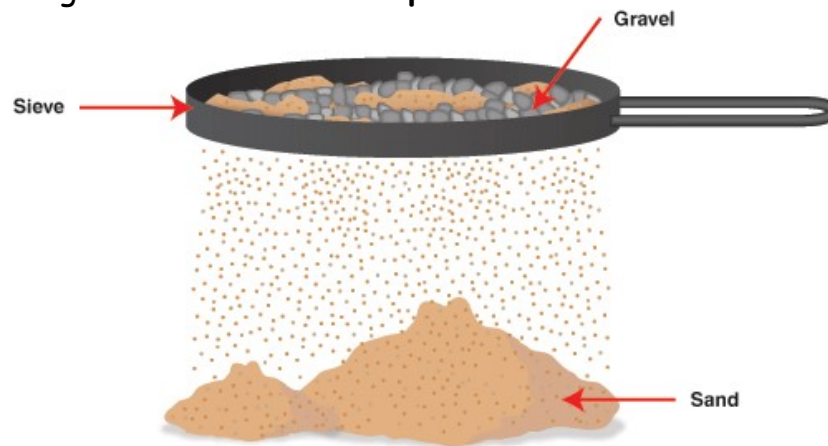


Why did the sand pass through the sieve so slowly?

This is called a riddle. What do you notice about the mesh?

Let's try it and see...

Can you explain to a partner how the riddle was able to separate the sand and gravel? Use the word **particles**.



Today, one of the materials you will be separating is water.

In your groups, mix a teaspoon of sand in a beaker with 100ml of water. What do you notice about the water, even after you stop stirring?

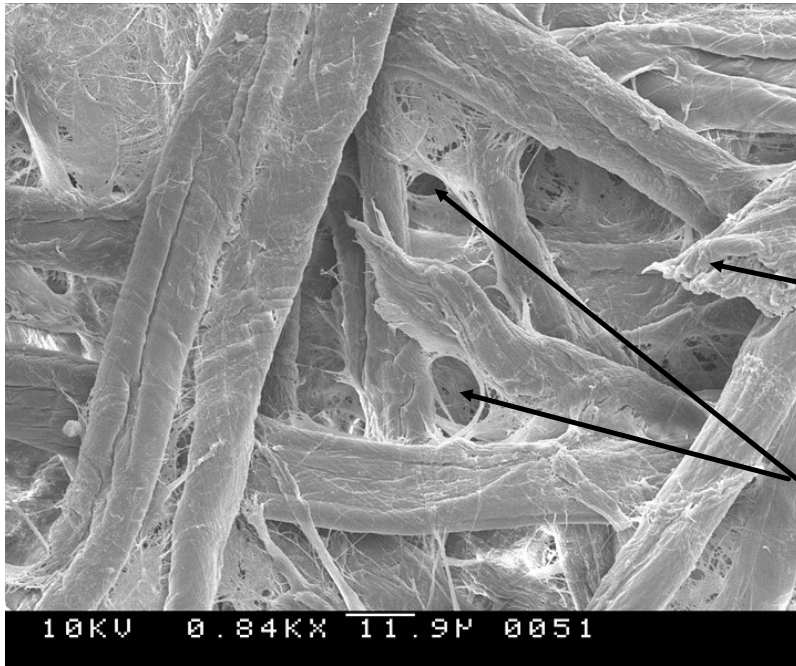


Why will neither a riddle or a sieve work to help us recover the clean water? Remember to use the word 'particles' to explain.

We will be using a method called **filtration** to separate **insoluble** materials from water.

- Science knowledge Objective: I understand that some solids are **insoluble** (do not **dissolve** in a liquid) and can be recovered using **filtration**
- Science skill Objective: I begin to use complex science words correctly to describe and explain what I observe, using the **Particle Model**.

Filtration involves using something called filter paper. Look at the filter paper closely with a magnifying glass. hold it up to the light. What do you see?



This is filter paper magnified 850 times using a special microscope

paper fibres

holes

How will the filter paper help us to separate the sand/water mixture? (Think about the sieve...)

Watch carefully as your teacher uses filter paper, a funnel and a measuring cylinder to separate sand from water.

Now it's your turn to have a go at some **filtration**. With your partner set up your measuring cylinder and filter paper, stir your sand mixture again and carefully pour half of it into the filter paper cone.

Filtration experiment part 2: follow these simple instructions: Soil and water mixture

1. Pour 100ml of water into a clear beaker or jug
2. Add 1 teaspoon of dry soil and stir for 20 seconds
3. Discuss what you see
4. Leave for 2 or 3 minutes - now what do you see? Can you explain it?

Unlike the sand, soil contains a wide range of different sized particles, some **soluble** (dissolve in the water), some **insoluble** (do not dissolve).

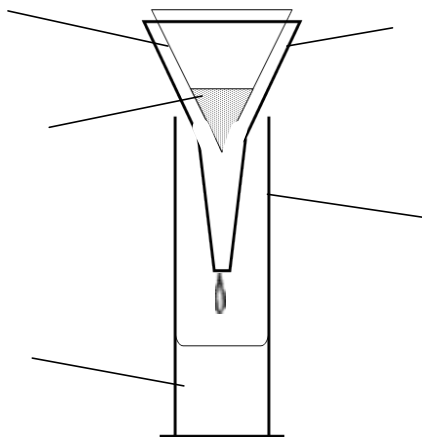
Most of the insoluble particles settled at the bottom of your beakers (what **force** was acting on them, to make them end up at the bottom of the container?).

The rest of the finer particles are either floating around in the water, or have **dissolved** to become part of the liquid.

Now set up your filtration equipment again with clean filter paper, stir the soil mixture once more and carefully pour half into the paper cone. Observe closely.

Can you label the different parts of the equipment that you used?

Using filtration to separate solids from water



funnel

measuring cylinder

filter paper

soil residue
(insoluble particles)

translucent water
(filtrate)

Now write about your filtration experiment, using the **Particle Model**.

Can you *describe* what you did using scientific words?

Can you *explain* what happened?

Can you *work out* why the filtrate water was not completely clean?

- | |
|--|
| * I use simple science words correctly to describe what happens when water is filtered |
| ** I begin to use complex science words correctly to describe and explain filtration |
| *** I use complex science words correctly to describe and explain filtration more fully |

soil particles water particles insoluble filtrate

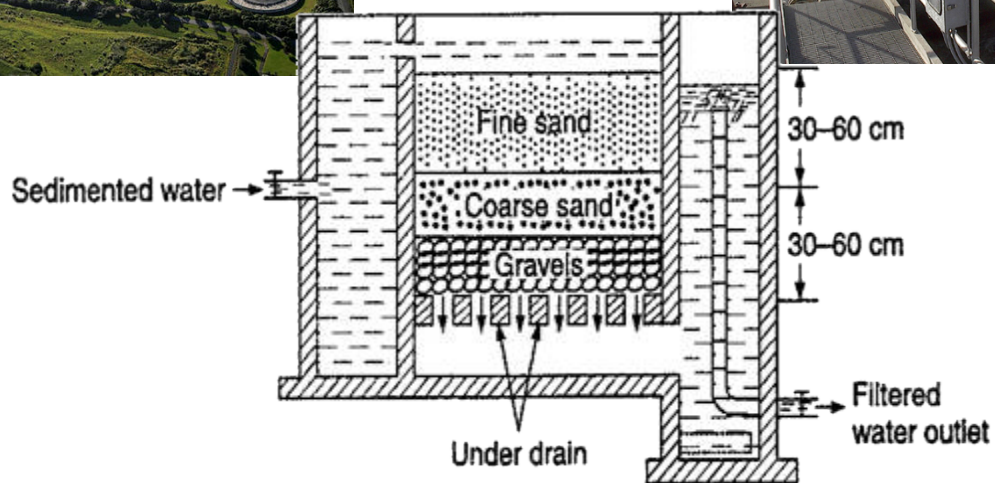
filter paper dissolve clearer soluble

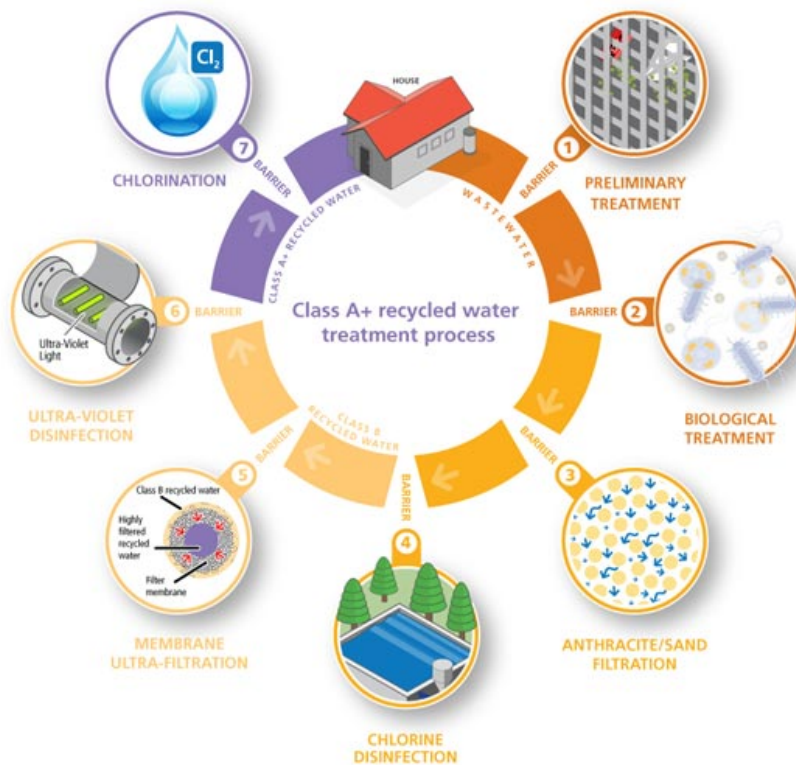
filtration soil mixture fibres residue



Sewage treatment

Sewage water is filtered by layers of sand and gravel



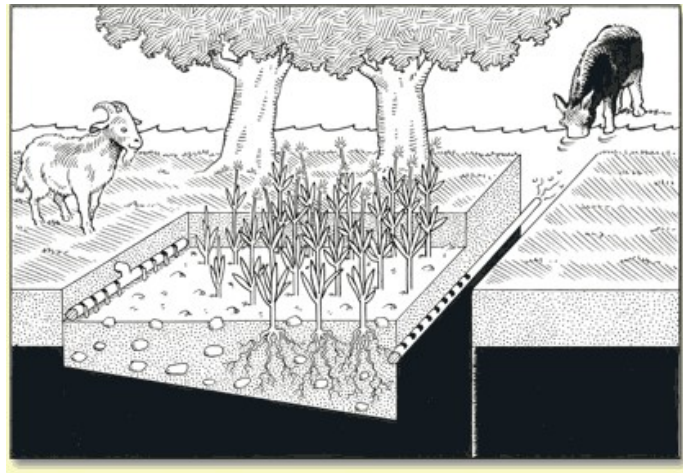


To make our water safe to drink, it also passes through very fine sieves, and ultra-violet light is used to kill off any harmful organisms left in it.



Reed bed water treatment - a more eco-friendly way...

The reed plants absorb most of the waste in the sewage water - it provides them with nutrients. Also, algae in the beds deal with the bacteria.



What else can you think of that uses filtration?