

Properties and changes of materials

Investigating reversible changes by separating materials

Y5 Science
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Properties and changes of materials

Investigating reversible changes by separating materials

Key Learning

- Some changes to materials such as dissolving and mixing are **reversible**. The materials can be separated, as no new materials have been formed.
- **Insoluble materials** can be separated from a liquid by **sieving** or **filtering**.
- **Soluble materials** can be separated from a liquid by the process of **evaporation**.

I can...

- select equipment to separate two or more materials by sieving, filtering and/or evaporating.

Activities (pages 4-8): 30 - 45 mins, plus evaporation time!

Household items to support learning:

- Kitchen paper, sieve, bowls, cups.
- Salt, flour and uncooked rice (or other dried grain/pulse).
- Teaspoon and water.
- Use lined paper and a pencil for recording. *Alternatively you may wish to print page 7 as a worksheet.*



Glossary of terms - DEFINITIONS

Dissolve: Some materials will **dissolve** in a liquid. For example, salt dissolves in water to form a clear, transparent solution.

Soluble: A material is **soluble** in a liquid if it dissolves in that liquid.

Insoluble: A material is **insoluble** in a liquid if it does not dissolve in that liquid.

Sieve/sieving: A **sieve** has a mesh or holes so it can separate different sized solids.

Sieving can also separate an insoluble material from a liquid - for example, rice and water.

Filter/filtering: **Filtering** can separate small grains of an insoluble material from a liquid. For example, a **filter** separates coffee grains from liquid coffee.

Evaporation: **Evaporation** is a change of state from liquid to gas. Water can **evaporate** from a salt solution, leaving the salt behind.

Reversible: A **reversible** change can be undone or reversed; no new materials are formed. Some changes to materials such as dissolving and mixing are **reversible**.



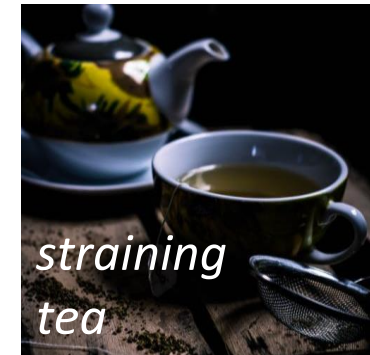
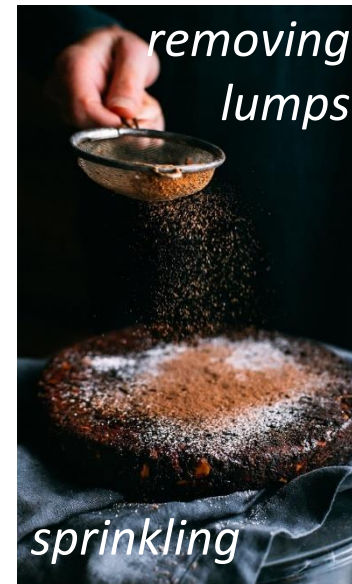
Explore, review, think, talk...

*How do we use sieves and colanders in the kitchen?
(5 minutes)*

- Sieves and colanders are useful pieces of kitchen equipment.



- Think or talk about some different ways sieves or colanders are used.





Separating materials

How do you separate materials that are mixed together?
(pages 5-8: 30 - 40 minutes)

- Sieves have a mesh or small holes.
- Different sized meshes are used depending on the size of the grains being separated.
- Fine grained solids or powders can pass through a small mesh.
- Sometimes more than one sieve size may be needed, for example, removing different sized stones from soil.



- Sieves can also separate many solids from a liquid.



- Think or talk about when a sieve might not be suitable for separating a solid from a liquid.
- Watch these two clips:
<https://www.bbc.co.uk/bitesize/clips/z9jd7ty>
- <https://www.bbc.co.uk/bitesize/topics/zcvv4wx/articles/zw7tv9q>



Separating materials

How do you separate insoluble and soluble materials from a liquid?

Insoluble materials can be separated from a liquid by **sieving** or **filtering**.

- **Sieving** is suitable for larger-sized objects or grains, such as cooked vegetables or rice.
- **Filtering** can separate small grains of an insoluble material from a liquid.
- For example, a **filter** separates coffee grains from liquid coffee.



You can easily make a filter at home using kitchen paper/roll or a kitchen cloth (something porous, that only liquid can pass through).

You can scrunch the kitchen roll into a cup then pour your mixture in. The solid should stay in the kitchen roll and the solution should drip through into the cup.





Separating materials

How do you separate insoluble and soluble materials from a liquid?

Soluble materials can be separated from a liquid by the process of **evaporation**.

- Soluble solids like salt dissolve in water to make a clear solution which will pass through a filter.
- The salt can still be separated because the water can be allowed to **evaporate**, leaving the salt behind.



Insoluble and soluble solids can be separated from a liquid when *no new material has formed*.

Mixing and dissolving are **reversible changes**.

If you have a mixture of soluble and insoluble materials that you want to separate, you could:

- 1. Add water to the mixture and dissolve the soluble material (salt, sugar etc.)*
- 2. Filter the solution through some kitchen paper to separate the insoluble material*
- 3. Leave the solution and allow the water to evaporate. As the water evaporates, the soluble material will be left behind.*

Separating materials by sieving, filtering and evaporating.

Ask an adult to work with you.

You will need

- salt, flour, uncooked rice (or other dried grain/pulse) and a cup/bowl (to make your mixtures).

- a sieve over a bowl (for sieving).



- kitchen paper over a cup (for filtering).



- a wide bowl or plate (for evaporating).



- a teaspoon and some water.



I can select equipment to separate two or more materials.

1. Make four different mixes of solids and try then try to separate them.



Rice and flour



Salt and flour



Rice and salt



Rice, salt & flour

2. Select your separation method or methods:

- a. dry sieving only
- b. filtering only
- c. sieving and filtering
- d. filtering and evaporating
- e. sieving, filtering and evaporating

YOU WILL NEED TO ADD A SMALL AMOUNT OF WATER FOR SOME OF THE METHODS – THINK ABOUT SOLUBLE AND INSOLUBLE MATERIALS.

3. Choose your equipment to separate the mix of solids.
Record what happens (see suggested results table on page 7)
 - *If you decide to evaporate the water, leave the plate in a warm place. It may take a few hours for the water to evaporate.*

I can select equipment to separate two or more materials.

Mix of solid materials	Equipment selected for separating the solid materials	Separating method (or methods)	Observations - What happened? - Was it successful?
rice and flour			
salt and flour			
rice and salt			
rice, salt and flour			



Find out more... (20 – 30 minutes)

Try mixing and separating other materials or explore more about 'salty water'

THIS CHALLENGE
IS OPTIONAL

Ask an adult to work with you.

There are many different types of sieves and filters which you can use to separate insoluble materials.

Watch the link to the RSC's Chemistry in your Cupboard 'Separating techniques' activity.

<https://www.youtube.com/watch?v=sgRnDK4CFX4>



- *Try mixing and then separating some different insoluble materials using sieves and filters.*

Alternatively, explore more about the evaporation of water from a salt solution:

- Use the link to PSTT 'Science Fun at Home'.
<https://pstt.org.uk/resources/curriculum-materials/Science-Fun-at-Home>
- Download activity 9: 'Salty Science'

SCIENCE FUN AT HOME



Have some fun at home with these science activities from Science Sparks and the Primary Science Teaching Trust



THIS IS WHAT YOU MAY HAVE FOUND OUT – COMPARE YOUR RESULTS WITH THESE

I can select equipment to separate two or more materials.

Mix of solids	Equipment selected	Separating methods	Observations - what happened
rice and flour	<ul style="list-style-type: none"> • sieve • large bowl 	<ul style="list-style-type: none"> • dry sieving 	<ul style="list-style-type: none"> • The rice stayed in the sieve. • The flour went through the sieve into the bowl. • The rice and flour were separated.
salt and flour	<ul style="list-style-type: none"> • kitchen paper • cup • teaspoon • water • plate 	<ul style="list-style-type: none"> • filtering • evaporating 	<ul style="list-style-type: none"> • When water was added and stirred, the salt dissolved. • The flour stayed in the kitchen paper and the salt solution went through. • The water evaporated leaving the salt on the plate.
rice and salt	<ul style="list-style-type: none"> • sieve • large bowl 	<ul style="list-style-type: none"> • dry sieving 	<ul style="list-style-type: none"> • The rice stayed in the sieve. • The salt went through the sieve into the bowl.
rice, salt and flour	<ul style="list-style-type: none"> • sieve • large bowl • kitchen paper • cup • teaspoon • water • plate 	<ul style="list-style-type: none"> • dry sieving then • filtering • evaporating 	<ul style="list-style-type: none"> • The rice stayed in the sieve. • The flour and salt went through the sieve. • When water was added and stirred, the salt dissolved. • Filtering then evaporating separated the salt and flour.

The kitchen paper acts as a filter. It can take quite a long time for all the salt solution to drip through, leaving the flour behind.

The rice and salt can also be separated by dissolving the salt and then sieving or filtering. In this case, the salt solution needs evaporating too.

Don't worry if you use a method that does not work!

Record what happened and then try a different method.

It can take a few hours for the water to evaporate and leave the salt behind. Put the plate on a sunny windowsill to help speed up the evaporation.