

# Science

## Changing Materials Year 5

### Remember when

Change shape of solid squashing, bending, twisting and stretching. (Y2)

Materials that are solids, liquids and gases and their particle structure. (Y4)

Some materials change state when they are heated or cooled and the temperature at which this happens. (Y4)

Roles of melting, evaporation and condensation in the water cycle and the role temperature has on the rate of evaporation. (Y4)

### Sticky knowledge

- When the particles of a solid mix with the particles of a liquid, this is called dissolving. The result is a solution. Materials that dissolve are soluble.
- Materials that do not dissolve are insoluble. Insoluble materials form a sediment e.g. sand, soil.
- Some materials can be separated after they have been mixed based on their properties - this is called a reversible change.
- Some methods of separation include the use of a magnet, a filter (for insoluble materials), a sieve (based on the size of the solids) and evaporation.
- When a mixture cannot be separated back into the original components, this is called an irreversible change.

### Key vocabulary

conductivity	material
conductor	melting
dissolve	particles
electrical	reversible
evaporate	separate
filtering	solid
gas	solubility
irreversible	solution
liquid	thermal
magnetic	thermal
	transparency

### National Curriculum

- Compare and group together everyday materials on the basis of their properties, including their solubility
- Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
- Demonstrate that dissolving, mixing and changes of state are reversible changes
- Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

### Common Misconceptions

Some children may think:

- thermal insulators keep cold in or out
- thermal insulators warm things up
- solids dissolved in liquids have vanished and so you cannot get them back
- lit candles only melt, which is a reversible change.

	Focus/ title	Lesson outline
<p>Lesson 1</p> <p>LO: To know that solids can be separated by sieving.</p> <p>Enquiry type: Grouping and classifying</p>	<p>SK: Some materials can be separated after they have been mixed based on their properties - this is called a reversible change.</p> <p>Some methods of separation include the use of a magnet, a filter (for insoluble materials), a sieve (based on the size of the solids) and evaporation.</p> <p>Skill: Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p>	<p>Show a sieve – what is this? What do we use it for?</p> <p>Discuss SK: <i>Some materials can be separated after they have been mixed based on their properties - this is called a reversible change.</i></p> <p><i>Some methods of separation include the use of a magnet, a filter (for insoluble materials), a sieve (based on the size of the solids) and evaporation.</i></p> <p>Give the children a mixture of different solids (e.g flour, pasta, rice, paper clips, unifix cubes). Ask them to separate them (they will need magnets too).</p> <p>Then, give different sized sieves to investigate which solids are caught in each sieve.</p> <p>Write up – labelled diagram (GD). Sentences to describe (LA and ARE)</p> <p>LA – supported</p> <p>ARE – As described</p> <p>GD - children make a sieve system which will separate all of the solids at once using foil pie dishes.</p>
<p>Lesson 2</p> <p>LO: To know some solids can be</p>	<p>SK: Materials that do not dissolve are insoluble. Insoluble materials form a</p>	<p>Introduce children to the key vocabulary for the lesson - soluble and insoluble, what do we already know?</p> <p>Ask children to sort the ingredients often found into kitchen cupboards into whether they think they are soluble or insoluble. These could include granulated</p>

<p>separated from liquids by filtering</p> <p>Enquiry type: Grouping and classifying</p>	<p>sediment e.g. sand, soil.</p> <p>Some materials can be separated after they have been mixed based on their properties - this is called a reversible change.</p> <p>Some methods of separation include the use of a magnet, a filter (for insoluble materials), a sieve (based on the size of the solids) and evaporation.</p> <p>Skill: Using test results to make predictions to set up further comparative and fair tests</p>	<p>sugar, icing sugar, salt, flour, instant hot chocolate, coffee (filter), marshmallows, jelly crystals, sprinkles, tea.</p> <p>Show results in a table in books.</p> <p>Ask children if they can think of a way to separate the insoluble ingredients from the water (we will discuss the soluble ingredients next lesson). Give a range of equipment (sieve, filter paper, funnel, measuring cup, spoon, tea strainer).</p> <p>Each group of children will have a selection of soluble ingredients and a selection of equipment. They will test which equipment is successful in separating the solid from the water.</p> <p>Outcome should be that the filter paper will always be the most successful at separating. Discuss why this is.</p> <p>LA – supported – fewer ingredients to test</p> <p>ARE – Does coffee always need to be put through a filter? Why?</p> <p>GD – Predict whether filter paper will separate – note that it doesn't have holes in like the other equipment.</p>
<p>Lesson 3</p> <p>LO: To know that some materials will dissolve to form a solution and this can be reversed using evaporation</p> <p>Enquiry type: Fair test</p>	<p>SK: When the particles of a solid mix with the particles of a liquid, this is called dissolving. The result is a solution. Materials that dissolve are soluble.</p> <p>Some materials can be separated after they have been mixed based on their properties - this is called a reversible change.</p> <p>Some methods of separation include the use of a magnet, a filter (for insoluble materials), a sieve (based on the size of the solids) and evaporation.</p> <p>Skill: Record data and results of increasing complexity using bar charts and tables</p>	<p>Recap – soluble and insoluble.</p> <p>Dissolve some of the soluble ingredients that were discussed the previous week. Again, show that they dissolve in water.</p> <p>Once the solids have been dissolved, ask the pupils questions such as Where has the solid gone? Can you think of examples in your everyday to base your thinking on? How could we get the solid back? Can they remember learning in year 4 about evaporation? Where would be the best place to put the beakers to evaporate the water quickly?</p> <p>Children to use post it planner to design their investigation in groups. Each group will have a different soluble material, and test different amounts of water to dissolve each one in.</p> <p>Next lesson look at and record the results.</p> <p>LA – supported group</p> <p>ARE – As described</p> <p>GD – to test the same amount of water in different places. Does this make a difference to the amount of soluble material we will get back?</p>
<p>Lesson 4</p> <p>LO: To understand how to separate different mixtures.</p> <p>Enquiry type: Observation</p>	<p>SK: When the particles of a solid mix with the particles of a liquid, this is called dissolving. The result is a solution. Materials that dissolve are soluble.</p> <p>Materials that do not dissolve are insoluble. Insoluble materials form a sediment e.g. sand, soil.</p> <p>Some materials can be separated after they have been mixed based on their properties - this is called a reversible change.</p>	<p>Check and record the results of last week's fair test. Write brief conclusion.</p> <p>Give the children some rock salt- explain what it is used for and what it is made up of. How can we get pure salt?</p> <p>Introduce possible resources.</p> <p>Children plan how to use sieving, filtering, dissolving and evaporating to create pure (ish) salt.</p> <p>LA – supported</p> <p>ARE – design their own investigation</p> <p>GD – Give a mixture of soluble and insoluble materials (cocoa powder, icing sugar, rice, granulated sugar. Predict the different components and separate the mixture to see if their predictions were correct.</p> <p>Safety note- pupils must not taste the salt produced in this unit's activities.</p>

	<p>Some methods of separation include the use of a magnet, a filter (for insoluble materials), a sieve (based on the size of the solids) and evaporation.</p> <p>Skill: Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p>	
<p>Lesson 5</p> <p>LO: To know that some changes are irreversible and can create new materials.</p> <p>Enquiry type: Observation</p>	<p>SK: Some materials can be separated after they have been mixed based on their properties - this is called a reversible change.</p> <p>When a mixture cannot be separated back into the original components, this is called an irreversible change.</p> <p>Skill: Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations</p>	<p>Introduce children to the key vocabulary reversible, irreversible, changes</p> <p>What are reversible reactions?</p> <p>What are irreversible? Which ones are which? True or false statements to check understanding.</p> <p>Carousel of activities (burning candle, bicarb and vinegar, plastic milk (milk and vinegar, nail in different liquids, melting chocolate/ sorting reversible and irreversible)</p> <p>Is the change reversible or irreversible?</p> <p>What happens?</p> <p>What products do you get at the end? i.e. bicarb and vinegar= carbon dioxide, nail= rust</p> <p>LA – sort into whether activities will produce a reversible or irreversible reaction.</p> <p>ARE – Predict whether each activity will produce a reversible or irreversible reaction and explain why.</p> <p>GD – As above, plus explain what makes a reaction irreversible. Are there specific types of reactions that cause irreversible results? (heating, burning)</p>
<p>Lesson 6</p> <p>LO: To know that some changes are irreversible and can create new materials.</p> <p>Enquiry type: Pattern seeking/ comparative</p>	<p>SK: When a mixture cannot be separated back into the original components, this is called an irreversible change.</p> <p>Skill: Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations</p>	<p>Build on findings from previous week.</p> <p>What happened when you mixed bicarbonate of soda and vinegar? What was produced?</p> <p>Children should attempt to explain how the bicarb and vinegar have reacted together to produce a new material, and the original ingredients can no longer be recovered easily.</p> <p>Show how a balloon can be inflated over a bottle neck using this reaction. Allow children to use a post it planner to design their own enquiry using this.</p> <p>Possible examples could include:</p> <p>Does the amount of vinegar affect the size of the inflated balloon?</p> <p>Can a paper bag be inflated in the same way?</p> <p>Does the amount of bicarbonate of soda affect how quickly the balloon inflates?</p> <p>LA – supported to test whether the amount of vinegar used will affect how quickly the balloon inflates.</p> <p>ARE – mixed ability groups</p> <p>GD – Can test a different acid (lemon juice) alongside vinegar and see if they create the same effect.</p>
<b>End of unit assessment</b>		

Working towards	Working at Age related expectations	Working at a greater depth
-----------------	-------------------------------------	----------------------------